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AGRICULTURAL RESEARCH CORPORATION
WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT



FOURTH ANNUAL REPORT
AUGUST 15, 1982 - AUGUST 14, 1983

WSARP PUBLICATION No. 19

AUGUST 1983

AGRICULTURAL RESEARCH CORPORATION
WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT

THE GOVERNMENT OF SUDAN
UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT
THE WORLD BANK
CONSORTIUM FOR INTERNATIONAL DEVELOPMENT
WASHINGTON STATE UNIVERSITY

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is supported by

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FOURTH ANNUAL REPORT
WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT
AID CONTRACT # afr-C-1539

August 15, 1982 - August 14, 1983

THE CONSORTIUM FOR INTERNATIONAL DEVELOPMENT
WASHINGTON STATE UNIVERSITY

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WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT

FOURTH ANNUAL REPORT

August 15, 1982 - August 14, 1983

I. EXECUTIVE SUMMARY

The Western Sudan Agricultural Research Project (WSARP) has completed the fourth year of the USAID Technical Assistance Contract (TA No. AID-afr-C-1539). During the August 15, 1982 - August 14, 1983 year the project continued to progress in a number of areas and activities. A summary of the present year's accomplishments together with those of the previous years are itemized in Table 1.

Additional Sudanese scientists joined the project. Four joined the project after completing studies overseas. Twelve scientists continue training in the US, while nine scientists are currently conducting research in the field in Sudan. The 25 percent salary incentive was implemented, which should assist in hiring and retaining senior staff.

The project, in cooperation with the Agricultural Research Corporation (ARC), hosted six workshops during the year. These were held in Khartoum, in Wad Medani, in the Kordofan region, the Darfur region, and at Ghazala Gawazat. The subjects were horticulture, farming systems and regional research planning in the Kordofan and Darfur

regions. The research workshop in South Darfur was conducted in conjunction with the Western Savannah Corporation. Scientists, administrators and staff attended other conferences and workshops which were relevant to the work of the WSARP. Three Sudanese scientists initiated and/or completed non-degree training in the US in agro-forestry, pest management (striga control) and animal nutrition.

US Scientific and administrative staff inputs amounted to 158 person/months in Sudan and 35.6 person/months in the US for the reporting period. A total of 509 person/months of US TA staff have been provided during the tenure of the project. Twenty (20) consultants have served on the project for a total of 16 person months of input.

Additional Sudanese administrative and support staff have been hired by the project. A number of positions for Sudanese scientists, technicians, skilled maintenance staff, librarians, skilled drivers, force account staff and others remain open at Kadugli and will be required at the other stations when they come on line.

The construction program at sites other than Kadugli has continued to move forward, although at a slower rate than planned. Houses, administrative, research and guest house facilities have the foundations, walls, roof supports and in some cases the roofs completed. Ancillary facilities are also completed, or well underway. The completion of these facilities has been delayed for one year thus far. Due to devaluation, costs have escalated an estimated S£ 4,000,000.

The Kadugli research station was accepted from the contractor in June, 1982, and has been occupied by staff. Force Account activities in Kadugli have continued to move forward slowly. At other sites, Force Account activities have been minimal. Inadequacies in staff, transportation and supplies continue to impede progress.

The research program at Kadugli has made notable progress, with the implementation of a production systems mode requiring interdisciplinary collaboration among scientists. Five US scientists have been in place during the report period with two senior Sudanese scientists for the total period and two others for the latter part of the report period. Research is ongoing as central support thrusts, as on farm and in herd and on station research. A spectrum of disciplines have been involved, including social sciences, economics, animal production and nutrition, range science, soil science, agronomy and others. The Senior Research advisor to the Director General of ARC continued to carry out his duties during the report period. The research underway is summarized in Volume IV of the Work Plan.

The Project Support Unit has continued to function in support of staff and stations. These activities have included purchasing, clearing, budgets, travel, communications, aircraft operations and inventory. Radios have been established and are functioning at Khartoum, El Obeid and Kadugli. The aircraft is operating on a regular schedule.

Equipment and commodities ordered during the report period resulted in an expenditure of \$394,000. Included have been research equipment, chemicals, office equipment, spares, shop equipment, books and journals, etc.

The Campus Coordinator's office at WSU continued to backstop and support the project, monitor project activities, assist in planning and evaluating research, assist in defining training for scientists for degree and non-degree training, purchase and ship equipment and commodities, etc.

A total of \$2,209,070 was expended from the TA budget during the current report period with over \$8 million expended from 1979 through August 14, 1983.

A number of planning activities directed to research and administrative functions and project management have taken place during the report period. Included were the aforementioned workshops on research planning, farming systems and research.

The mid-project evaluation was completed by representatives of USAID, the World Bank and the Government of Sudan in November, 1982, and the report and recommendations submitted to USAID and the WSARP. A USAID construction consultant also completed his evaluation and prepared recommendations for the project and AID. In addition, the Advisory Council was convened by Dr. Bakheit, Director General of the ARC. Internal project planning, monitoring and evaluation activities continued during the report period.

Table 1

Summary of WSARP Activities and Accomplishments for the Fourth Project Year

Accomplishments for 1979-82, and Projected Activities for 1983-84

Category of Activity	Accomplishments During Report Period (1982-83)	Accomplishments Prior to Aug. 1982	Projected Activities for 1983-84
<p>I. Project Planning, Monitoring and Evaluation</p>	<p>Station and Project-wide planning for research and other project activities were carried out; work plan for years 4-6 prepared, printed, and distributed; various project activities monitored with discussion involving Project ARC, AID, CID, and World Bank with problems and potential actions defined; mid-project evaluation completed with necessary documentation and planning; evaluation of construction and Force Account work carried out by USAID consultant; CID and WSU representatives participated in all the above; project sponsored Farming Systems Workshop, Darfur Regional Workshop, and Kordofan Regional Workshop for information transmittal, planning and coordination; seven (7) consultants provided input; Project Advisory Council initial meeting held Oct. '82; workshops on research at GG and on research in Southern Darfur held; Volumes I, II and III of the Workplan completed, printed and distributed. Volume IV, Research Proposals, near completion.</p>	<p>Numerous planning activities with resultant documentation with input from consultants, project scientists, project administration and ARC; numerous meetings with GOS organizations and other Sudanese institutions for information gathering, networking, and planning were held; project participated in Kordofan Regional Planning Conference; cooperative research planned and/or underway with SATEC, Nuba Mountain Corporation, Western Savannah Corporation, and others; WSARP Advisory Committee met and discussed project activities; numerous other planning activities carried out; twice a year monitoring visits by Campus Coordinator and Deputy Coordinator carried out; twice a year monitoring carried out by World Bank representatives; continuous monitoring by USAID/KRT mission staff;</p>	<p>Project Coordinating Committee to be established; monitoring of all project activities to be carried out; planning of research at El Obeid to be completed; monitoring of research progress to be accomplished at completion of crop year with necessary reorientation of plans, if necessary; formal research planning and proposal structure to be finalized and implemented; roles and responsibilities to be re-examined and any necessary changes made; Volume IV of the workplan to be completed and distributed;</p>
<p>II. Construction and Facility Development</p>			
<p>A. Facility designing, tendering, contracting, and supervision</p>			
<p>1. Kadugli</p>	<p>Construction Contract was completed, except for one-year maintenance period; supervision carried out by Karplen Consultants;</p>	<p>Design tendered, supervised by Karplen Consultants of Khartoum;</p>	<p>Maintenance period to be completed with necessary alterations or corrections; Karplen Consultants supervision responsibilities to be completed;</p>

Category of Activity	Accomplishments During Report Period (1982-83)	Accomplishments Prior to Aug. 1982	Projected Activities for 1983-84
2. Other Sites	Supervision of construction carried out by Grube-Zimmer Inc.; Resident Architect in-country; Clerks of Works and Site Engineers not provided by GOS as required by contract;	Search for A&E firm carried out with Grube-Zimmer Inc. selected and contracted for planning and supervision; designs completed and approved, tender process completed and construction contract signed; supervision carried out by Grube-Zimmer staff;	Supervision to be continued; additional Site Engineers to be identified and hired; extension of Grube-Zimmer contract to be negotiated;
B. Construction			
1. Kadugli	Maintenance period underway	Contract signed and construction completed;	None
2. Other Sites	Construction delayed at least one year; foundations, walls and roof supports completed at all sites; construction costs increase significantly due to devaluations of Sudanese pound and other actions beyond control of contractor;	Construction underway at all sites;	Construction tentatively to be completed August 1984
C. Force Account	Progressing slowly at Kadugli; limited activity at other sites; construction of station-to-farm road at Kadugli completed; water system to Kadugli Research Farm completed; temporary animal facilities completed on Kadugli Research Farm; perimeter fencing completed on Kadugli Research Farm; a number of other needs completed on the Kadugli Research Station;	Fencing, roads, water system, and other requirements initiated and/or completed; planning, liaison, contracting, equipment and supply procurement completed; design of facility requirements carried out by Project Engineer;	Completion of all facilities at Kadugli farm; additional support facilities to be planned and initiated at El Obeid; complete horticulture research farm; plan water system, roads, and animal facilities at El Fasher; implement Force Account Workplan;
	Bore holes drilled at El Fasher and El Obeid; began fencing horticulture research farm at El Obeid; provided services of Project Engineer; Workplan for Force Account activities prepared and submitted by Project Engineer		

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Category of Activity	Accomplishments During Report Period (1982-83)	Accomplishments Prior to Aug. 1982	Projected Activities for 1983-84
III. Staffing and Training			
A. Staff Projections	Revised staff projections; added positions for maintenance staff as per evaluation team recommendations and AID Consultant; added production specialists and additional library staff as per Evaluation Team recommendation; Information Officer position added;	Staff Projections revised, based upon more complete project definition by USAID, WB, ARC, Project and CID/WSU;	Monitor staffing to meet projections;
B. Sudanese scientific, administrative and support staff	Added three new scientists at El Obeid and one at Kadugli; total of 9 Sudanese scientists in the field bringing the total for the year to an estimated 63 person months of input for all Sudanese scientists; hired additional administrative and support staff;	Seventeen (17) scientists and numerous administrative, technical, and support staff joined project;	Additional staff at all levels to be hired; additional maintenance, administrative and support staff required; see additional staff under training;
C. U.S. Staff:	Soil and Water person on board during reporting period; 193.6 person months of U.S. scientific, administrative, and support staff provided in Year 4;	299.4 person months of technical assistance, scientific, administrative, and support staff provided Years 1 through 3; included were a spectrum of disciplines, including social science, range, livestock, economics, agronomy, engineering, advisory, vehicle maintenance and administrative.	Continue U.S. inputs; estimate 200.0 person months of input from various disciplines in Year 5; consultants to provide input; reappoint US staff at end of contract and/or hire replacements;
D. Training	12 Sudanese scientists in degree training in U.S.; 3 Sudanese scientists in non-degree training in locations other than U.S.; 6 project staff participated in conferences and workshops;	12 Sudanese scientists in degree programs in U.S.; various non-degree training and attendance at conferences and workshops completed;	Degree training to continue; one additional scientist to begin training; additional non-degree training to be carried out; international and national conferences to be attended by U.S. and Sudanese staff;
E. Workshops	Workshops on Farming Systems and Regional Planning Workshops in Darfur and Kordofan conducted by project; support for Horticultural Conference; workshop on research in Southern Darfur held by project; Advisory Committee convened;	A number of formal and informal meetings and workshops held by project; project staff participated in various conferences, workshops, and meetings; project participated in Kordofan Regional Planning Conference; various topics covered including regional development, research planning, coordination with other institutions, etc.;	Continue relevant workshops, conferences, and meetings as appropriate for project and ARC; include farming systems, management, maintenance program design and implementation, and others;

Category of Activity	Accomplishments During Report Period (1982-83)	Accomplishments Prior to Aug. 1982	Projected Activities for 1983-84
IV. Research Program	Research on production systems in Kordofan underway and progressing; various research planning activities carried out; Kadugli Station Research Committee functioning; draft of operational guidelines for WSARP research prepared; consultants provided input for research program; gum arabic research continuing at El Obeid; crop research initiated at El Obeid;	Numerous research planning activities completed; consultants provided input into planning and monitoring activities; research activities underway and/or completed; production system approach institutionalized;	Research to continue; research plans to be developed for El Obeid; consultants to provide input; reports to be prepared and distributed;
V. Consultants	7 consultants provided in seed technology, range nutrition, range and livestock production, farm and station development, farming systems (2), and citrus production;	13 consultants provided in range science, agricultural engineering, station development, agricultural economics, animal disease, livestock production, farming systems, engineering, vehicle identification;	Consultants to be provided in inventory and stores, maintenance, extension and training, marketing, agro-climatology and others;
VI. Project Support Unit	Project support unit functional with Chief Administrative Officer, Deputy Administrative Officer, and support staff; variety of activities carried out including purchasing, inventory, travel budgets, interaction with AID/KRT, staff support, communications, etc.;	PSU has been staffed since 1979 with U.S. and Sudanese staff; types of activities indicated for current years also accomplished in previous years;	Continue PSU activities
VII. Transportation and Communications	Aircraft operating on a regular schedule; radios set up and functioning in Kadugli, El Obeid, and Khartoum; additional vehicles (18) received, cleared, and most assigned to stations; continued problems with vehicle maintenance, operations, and availability; Expatriate Maintenance Officer assigned and working to keep vehicles functional; mechanics in training at Kadugli; numerous spares purchased;	Aircraft and spares purchased and operational; 5 radios and antennas purchased and in country; 35 vehicles ordered, cleared, and in Sudan; 6 Lorry's purchased and operational; various vehicle spares purchased and shipped to Sudan;	Additional vehicles to be ordered; aircraft continue to function; radios to be set up in El Fasher, GG, and Wad Medani; maintenance consultant to assist in setting up preventative maintenance program;
VIII. Senior Research Advisor to the Director General of the ARC	Dr. James Riley carried out a variety of activities related to ARC and to the project;	Dr. Riley appointed and functioning as Senior Research Advisor;	Dr. Riley to continue as Research Advisor;

Category of Activity	Accomplishments During Report Period (1982-83)	Accomplishments Prior to Aug. 1982	Projected Activities for 1983-84
IX. Equipment and Commodities	Equipment and materials purchased amounted to \$394,000; included are research equipment, research chemicals and supplies;	A total of \$1,238,657 expended for a variety of expendable and non-expendable equipment and materials;	Additional vehicles, tractors, farm equipment, research equipment, library, office and laboratory furniture, training equipment, shop and maintenance equipment, research supplies and others to be ordered; additional books and journals to be ordered;
X. Budget	A total of \$2,209,070 expended during report period; S£ component from PL 480 funds expended for Trust Account, 70% of Sudanese salaries, station operations and construction; S£ devaluation increased construction costs by an estimated S£4,000,000 and by an estimated S£1,000,000 for Force Account;	A total of approximately \$6,200,000 from TA Budget expended; construction expenditures to August 1982, include \$611,000 from USAID, \$3,576,000 from WB; S£ 1,211,000 from USAID and S£ 924,000 from GOS;	Estimated TA expenditures for the next report period will be \$6,000,000 of which \$2,116,400 will be equipment, spares and shipping;
XI. WSU Campus Coordinator's Office	Coordinator, Deputy Coordinator, and support staff functioning; variety of activities including purchasing, shipping, travel, report and planning documentation, USAID/W interaction, training support, planning and monitoring, and others carried out;	Office began functioning in 1979 and has continued to do so;	Office will continue to function in support of project;
XII. Private Sector and Women's Involvement	U.S. and Sudanese private sector participating; women's roles included in research; U.S. women involved in project;	Same as for current period.	System orientation to research will continue to address women's roles; U.S. women will continue to participate in project;

II. INTRODUCTION

This Annual Report is required by USAID and has been prepared by technical assistance staff to indicate inputs, outputs and progress toward achieving project purposes and goals. Table 1 briefly summarizes accomplishments from 1979 to 1982.

August 15, 1983 marked the end of the fourth year of implementation of the Western Sudan Agricultural Research Project (WSARP) under the terms of the contract between USAID and the Consortium for International Development (CID) with Washington State University (WSU) as Lead University. This contract was initially implemented more than a year after an agreement was signed between the World Bank and the Government of Sudan for a loan to partially finance the project. The WSARP is a part of the Agricultural Research Corporation (ARC) of the Government of Sudan (GOS). Its implementation is a cooperative effort between the ARC, CID/WSU, USAID, and the World Bank.

Previous annual reports have described progress to the respective dates. The Annual Report for August, 1981-August, 1982, is included in Volume II of the Workplan. Quarterly reports are prepared and circulated by the Deputy Project Director (DPD) to USAID, CID and WSARP and also indicate progress. The quarterly reports for the current report period are included as Appendix i.

The project underwent a mid-project evaluation in November, 1982. This evaluation was mandated by both the AID and World Bank and required participation of a large number of individuals representing the GOS, ARC, WSARP, USAID, World Bank, CID and WSU. In preparation for the evaluation, a detailed Work Plan in three volumes was prepared and provides a comprehensive overview of the project through October, 1982. Volume I of the Work Plan describes the general research programs and plans. Volume II describes the project history and functional structure, and project status (Annual Report for 1981-82).

Volume III describes, in a general way, the research plan for Kadugli and the other stations. Volume IV, which has only recently been completed, details the specific research activities that are ongoing at the Kadugli Research Station. Thus, the reader is referred to the various reports and Work Plan volumes for a comprehensive review of the evolution and status of the Western Sudan Agricultural Research Project.

This Annual Report reflects key aspects of the current stage of project implementation. During the past four years, changes have occurred within the project itself and within the larger environment in which the project operates. These changes include: a high turnover rate in personnel in the many organizations involved directly and indirectly with the project; reorganization of the GOS ministerial structure; regionalization of many activities of the GOS Government; several significant devaluations of Sudanese currency against the US dollar; a global economy characterized by rising energy costs and inflation; and others.

Such a dynamic environment requires that the process of implementation receive constant monitoring. This is especially crucial as the project moves into the major transition between construction of the western research stations and the Project Support Unit/ARC Liaison Office, and the staffing and operation of these stations. This annual report highlights past accomplishments as well as present and future issues to be addressed. In addressing these issues, it will be essential for all participants in the project to fully coordinate their efforts to enable the project to meet its objectives.

III. PROJECT PLANNING, MONITORING AND EVALUATION

Project planning has been an ongoing process since 1979 and has involved a broad spectrum of individuals from various organizations. These have included representatives of relevant ministries within the Government of Sudan, ARC, project administrative and scientific staff,

USAID personnel in the US and Sudan, World Bank Staff, CID Executive Director and Deputy Directors, WSU Campus Coordinator and Deputy Campus Coordinator and consultants. Individual discussions as well as Workshops, meetings and conferences provide input into the continual planning process. USAID Mission staff have been an active part of this process from the outset. Many of these activities have been recorded in reports, publications, and meeting minutes.

In addition to the planning activities, the project has approached project implementation as a dynamic process evolving over time. This necessitates continual monitoring, evaluation and change to meet evolving needs for optimal project implementation. Project monitoring is an ongoing process. World Bank, WSU, and CID representatives visit Sudan twice annually for this purpose. AID/Khartoum likewise monitors project progress. Such visits have allowed representatives of the involved organizations to meet as a group for valuable consultation and input.

During the current report period, Mr. S. Marples of the World Bank visited the project twice. The WSU Campus Coordinator, Dr. J. Henson and Deputy Coordinator, Dr. J. Noel, traveled to Sudan for monitoring and evaluation in October-November, 1982, and April-May, 1983. CID Executive Director, Dr. J. Fischer participated in November, 1982 and CID Deputy Director, Dr. J. Kearns, in November, 1982, in April, 1983 and in August, 1983. Project Director, Dr. D. Dafalla, visited the US in January, 1983 for joint discussions with Dr. J. Henson, Dr. J. Noel, Dr. J. Kearns, and AID Project Manager, Ms. J. Turk.

The USAID and the World Bank required a mid-project evaluation to determine project status and to provide information for possible reorientation of activities. Based upon this requirement, the project prepared background information and documentation that was provided to an Evaluation Team composed of Dr. Kenneth Turk, Cornell University, Team Leader; Dr. Michael Collinson, CIMMYT Farming Systems Program, Nairobi, USAID Representative; Dr. John Vercoe, CSIRO,

Australia, IBRD Representative; and Dr. Hussein Idris, UNDP, GOS Representative. The major part of the on site review was undertaken during the period 13-29 November 1982.

As an initial step in the evaluation, the evaluation team assembled in Khartoum and reviewed copies of various background documents to augment those that they had received prior to their arrival in Sudan. Briefings and background sessions were held with representatives of the GOS, ARC, USAID and the World Bank. Program activities were discussed fully with all key members of the WSARP staff, WSU Campus Coordinator, the Deputy Campus Coordinator, CID Executive Director and Deputy Director and with the Senior Scientists at Kadugli and El Obeid. Visits were made to the research stations at Kadugli, El Obeid, El Fasher, Ghazala Gawazat, the ARC Headquarters in Wad Medani and the new facilities under construction at Shambat.

As a result, the team was able to obtain an overview of the status of the project, its progress, and its problems. They were also able to define recommendations for moving the project forward in an optimal way. Appendix II of this document contains a summary and recommendations from the Evaluation Report. The reader is referred to the complete Evaluation Report for details of the recommendations and the rationale for them.

An overview of the evaluation as it appears in the Summary is given verbatim below:

"Substantial progress has been made in the early phases of the rather complex Western Sudan Agricultural Research Project (WSARP). An administrative structure, with a project support unit, has been established and is functioning. Good working relationships exist between project administration, the donors, staff at headquarters, the coordinating staff at Washington State University, and the staff of the Consortium for International Development, the prime contractor for technical assistance.

An aircraft has been purchased and is functioning to help meet project needs for transport and communications. A radio network will soon be functioning to provide improved communications between administration and each of the field stations and they with each other.

Some research has been initiated at the Kadugli station in South Kordofan and further projects are in various stages of planning. On the basis of the original time frame, the research program and plans for the future are slightly ahead of schedule. Early investigative work was initiated in range management and social anthropology that has built up a strong base of description and understanding of the local range environment and of household, farm and community organizations in South Kordofan. This and other accumulated information has been of value to incoming scientific staff, allowing their rapid orientation to the local situation. Project scientists have become thoroughly involved with farmers and have developed a working knowledge of traditional farming practices. Three disciplinary sections: range management and animal production, socio-economics, and cropping systems-agronomy have proposed research programs for the 1983-84 season and in some cases 1984-85.

Members of the Evaluation Team were impressed with the apparent enthusiasm for the implementation of a systems approach as a new tool of agricultural research. In the Western Sudan, with its nomads, transhumants, and sedentary farmers, with strong interfacing of crops and animals, both within and between farming systems, the WSARP has tremendous opportunity for impact on the orientation and methodology of the systems research approach.

General work plans have been developed for the other stations, but no specific research proposals have been prepared.

The construction program at the stations is considerably behind schedule, due to many factors. The major facilities at Kadugli have been completed and some staff positions have been filled. Much remains to be done to develop roads, driveways, parking areas, the station farm and maintenance and repair shops. Construction of buildings, houses and other facilities at El Obeid, El Fasher and Ghazala Gawazat will not be completed until February 1984. Headquarters staff of the project will move from Khartoum to El Obeid at that time.

The major constraint to the success of this project is a lack of experienced, qualified Sudanese staff at all levels --scientists, technicians, and operational support staff. Full value of the technical assistance scientists will not be obtained without adequate, qualified Sudanese counterpart scientists to provide the continuity necessary for research to be effective. A second constraint is a lack of adequate mechanisms and personnel for maintenance of vehicles and other equipment and physical facilities at each of the stations.

The alleviation of these and other constraints and deficiencies which would improve overall project administration and operation, are dealt with in the summary recommendations that follow. They are arranged in groups according to the major sections of the report. The reader is referred to the text for comments relating to the recommendations given for consideration by project management and others concerned with the project and the ARC. Additional specific recommendations and suggestions are given in the report."

In addition to the evaluation of the programmatic, administrative and related aspects of the project, the construction program and the force account activities were evaluated by a USAID consultant, Mr. D. Gephart. Mr. Gephart's recommendations are detailed in Appendix III.

As a result of the recommendations of the two aforementioned evaluations, a number of steps were initiated to meet expressed needs, eliminate deficiencies and implement recommendations. This evaluation process has served as an active part of project implementation, which in turn improves the project's overall effectiveness.

Action taken on the recommendations by the Mid-project Evaluation Team from the perspective of CID/WSU is given as Appendix IV. Perusal of Appendix IV will indicate that progress has been made with the implementation of some of the recommendations by the Evaluation Team. One of the most important constraints to project effectiveness, as pointed out by the Evaluation Team (quoted above), is the provision of qualified Sudanese staff at all levels. Identification and hiring of staff has been slow, although the recent implementation of a previously approved 25 percent salary incentive may have a positive impact. The Evaluation Team, as quoted previously, indicated that in order for US scientists to be optimally effective, Sudanese counterparts must be present. Few counterparts are yet available, with most of the scientists that have been appointed away from Sudan in training. Staff at other levels, especially technicians and skilled support staff, are available only in limited numbers. Thus, this important part of the project, as pointed out by the Evaluation Team, has not progressed optimally.

Another important consideration, as indicated by the Evaluation Team, is the hiring and/or training of maintenance staff and the implementation of a maintenance program for vehicles, buildings, and equipment. Limited progress has been realized in this regard to date. Well trained staff at other levels, including clerical, management, and technical are also limited. However, additional staff have been hired since the evaluation.

Mr. Gephart has addressed maintenance programs as one section of his recommendations on construction and related activities. In addition, Mr. Gephart indicated that the Project Engineer, Dr. Higgins, has not

been optimally utilized. Instead of providing the overall engineering skills, supervision and planning required by the project, he has been required to carry out menial Force Account construction efforts in order to keep the Force Account work moving forward. In response to Mr. Gephart's recommendations in November, 1982, Dr. Higgins was requested to prepare an overall Workplan for the Force Account work so that it might move forward more rapidly and maximize Dr. Higgins' efforts. Dr. Higgins prepared such a document which defined the requirements for optimizing his efforts and obtaining maximum progress. This is given as Appendix V. This will be further discussed under the Force Account in Section V. This plan has not been completely implemented with the resulting lack of optimal progress of the Force Account activities.

IV. LOGICAL FRAMEWORK

Table 2 depicts the Western Sudan Agricultural Research Project Logical Framework. This log frame provides a background against which the inputs, outputs, and overall performance of the project as officially defined can be measured. As can be seen from the comparison of the log frame with the summary of project accomplishments given in Table 1, considerable progress has been made. It would seem appropriate to now re-examine this project planning document for possible updating and refining in light of the evaluation report and current project status.

V. CONSTRUCTION AND FACILITY DEVELOPMENT

The construction program of WSARP provide for research stations and the associated ancillary facilities at El Ubeid, El Fasher, Ghazala Gawazat and Kadugli. In addition, facilities for a Project Support Unit, which will also house the ARC Liaison Office, are under construction in Khartoum. In order to expedite the construction program, the

firm of Karplen Consultants Inc. of Khartoum was hired to plan the renovation of the existing facilities and design and supervise construction of new facilities at the Kadugli station. The firm of Grube-Zimmer, Inc. of Portland, Oregon, USA, was hired to carry out architectural, engineering and supervisory activities for the other sites.

The initial time projections indicated that the Kadugli station would be completed in April, 1982. The completion was delayed, however, with the station being provisionally accepted from the contractor in June, 1982.

The construction at Ghazala Gawazat, El Fasher, El Obeid, and Khartoum was scheduled to be completed in August, 1983, but the present completion date is projected for August, 1984. The delay in the completion date has been due to a number of factors. Among these has been the fact that the contractor did not order the materials and commodities required from overseas in a timely manner. The contractor delayed in presenting samples for approval by the supervising architect, and in placing the orders, with a resulting significant delay in the arrival of various hardware, windows, doors, and roofing. The severe drought in the West, especially around El Fasher, resulted in a rationing of water which has had an adverse impact on brick production. In addition, the regional Ministry of Agriculture in Kordofan banned the cutting of trees for fuel wood, which was used to fire brick for the El Obeid station. As a result of this, additional delays in brick production occurred. The contractor had to obtain wood long distances from the brick manufacturing site. He also had to purchase and haul brick from other production locations that were far from the construction site. Another factor that has adversely impacted on the construction program has been the ongoing fuel shortage in Sudan.

The construction contract for the sites other than Kadugli indicated was let at a cost below estimates made by the A&E firm. This enabled the inclusion of some additional facilities and an increase in size of

some of the planned facilities, to more adequately meet the needs of the project. During the last year, however, there have been two significant devaluations of the Sudanese pound. These devaluations have resulted in an escalation of cost of materials, supplies and personnel that are paid with Sudanese pounds. The impact of the devaluation has been a matter of great concern to the contractor and project and has resulted in a number of discussions and negotiations between the project donors, Grube-Zimmer, various GOS ministries and the contractor to determine the impact of devaluations on contract costs. The government has made a policy decision concerning the impact of these devaluations for all construction programs throughout the country. As a result of the GOS policy decisions, the pound cost for the construction program, at sites other than Kadugli, has increased by approximately four (4) million pounds. This increase is further elaborated in Appendix VI.

In summary, completion of the construction program at sites other than Kadugli has been delayed by at least a year, and the costs have escalated by approximately four 4 million Sudanese pounds. These factors, (especially the delay in completion of the facilities) have necessitated a reassessment of the projected staffing time-frame and the research program plans.

A. Architecture, Engineering and Supervisory Activities

As indicated above, Grube-Zimmer, Inc. of Portland, Oregon, contracted with CID to provide architectural, engineering and construction supervisory services for the project sites at El Obeid, El Fasher, Ghazala Gawazat and Khartoum. In order to carry out these activities, Grube-Zimmer has provided a resident supervising architect stationed in Khartoum. This person, Mr. H. Bergman, has the responsibility of overseeing quality control, progress and associated matters relating to the construction program at all of the sites. His ability to carry out these activities depends upon the provision of adequate and timely transportation to visit the various sites, as well as the

presence of Sudanese Engineers and Clerks of Works at these sites. The unavailability of the project aircraft on a regular basis was a problem for a time, but was alleviated during the latter part of 1982. Since that time, the supervising architect has been able to travel to the sites more frequently.

In the original agreement between the GOS and the World Bank, the GOS was to provide Clerks of the Works and site engineers for all the construction sites. The Government, however, has been unable to provide them since qualified site engineers were not available within the GOS, and engineers in the private sector would not join the project at Government-level salaries. To circumvent this problem of inadequate site supervision, it was agreed that the Grube-Zimmer contract would include a supervising engineer to be located at El Fasher. In addition, the Mission approved the inclusion of Sudanese pounds in the Trust Account budget to hire site engineers for Ghazala Gawazat, and El Obeid. (This decision was based on recommendations made by Mr. Gephart to the Mission.) These engineers were to be selected and supervised by the supervising architect. Due to delays, however, some of these individuals have only recently been hired. As of August, 1983, a Site Engineer and a Clerk of the Works were available at El Obeid, a Clerk of the Works was at Ghazala Gawazat and a Clerk of the Works and an engineer were at El Fasher.

B. Status of Construction

El Obeid

As indicated above, progress has continued on the construction program, but at a slower pace than anticipated. At El Obeid, the senior houses have the foundations, walls and roof framing completed and some have roofs completed. Interior electrical wiring was begun. Brickwork was completed with the roofing now being placed on the administration, research, and guesthouse/-conference facilities. Other facilities such as the middle and

junior houses and research support buildings are not as near completion, progress is limited primarily by the availability of bricks and by the availability of materials that have been ordered from overseas. The contractor indicates that much of the materials ordered overseas have arrived in Port Sudan, and windows and doors will be arriving in El Obeid in the near future.

El Fasher and Ghazala Gawazat

At El Fasher and Ghazala Gawazat, work has continued to move forward with the brickwork completed on the facilities and the roof supports nearly all in place. Construction at these sites has been delayed because of water unavailability. Further progress is awaiting the arrival of materials ordered from overseas.

Khartoum

Work on the facility in Khartoum has been delayed for a number of months. All structural and brickwork is completed, with delays in the arrival of doors, windows, toilet fixtures and other imported items. It is anticipated that the overseas material required will be available soon.

C. Force Account

A number of required facilities were not included in the main construction contract. As a result, these facilities are being constructed, utilizing station staff or locally hired individuals or contractors. Examples include improving and fencing the airstrip at Kadugli, fencing the Kadugli research farm, constructing an airstrip at Ghazala Gawazat, constructing the road from the Kadugli station to the research farm and improving or drilling water wells.

As indicated previously in this report, Mr. D. Gephart served as a consultant to AID to evaluate the status of the construction and Force Account programs. Mr. Gephart made twelve (12) recommendations which are given as Appendix III. The following defines the response to these recommendations in the order that they appear in in Appendix III:

1. Confirm Copies of Contracts - These have been supplied to USAID as per Mr. Gephart's recommendation.
2. Monthly Reports - Monthly reports are provided by the supervising architect to USAID and the project.
3. USAID Engineering Monitoring and Site Inspection -This requirement is with USAID to continually monitor the progress of the construction program by the AID project operations and support officer.
4. Trust Account - Mr. Gephart recommended that a breakdown of the Trust Fund should be prepared with an indication of whether the requested amounts included maintenance and expatriate support. A breakdown of the Trust Account is prepared each year and is given to AID for information and approval. USAID/KRT is aware of the breakdown of the Trust Account.

In terms of the provision of Sudanese pounds for maintenance activities and expatriate support, expatriate support expenditures in-country are included in the Trust Account. Examples are housing and utilities for expatriates stationed in Khartoum.

Funds for maintenance of the facilities and equipment are not included in the Trust Account. Funds for such are included in the proposed budgets for each of the

stations (See Appendix XI). The proposed budget for each station has a line item for maintenance of buildings, roads, bridges, fire lines, research equipment, machinery, tractors and a contingency (called miscellaneous operations and maintenance). Vehicle and tractor spares are included in the Technical Assistance dollar budget. These budgetary items have been included in the budget estimates prepared by the contractor each year during the life of the project. The availability of these funds, however, depends upon the Project Director presenting these budgets or a modification thereof for ARC and GOS approval. The provision of these funds therefore, depends upon the Government of Sudan and Project Administration. Thus, Sudanese pounds for maintenance have been included in the budgets prepared by the Technical Assistance staff and submitted to the Project Director for his consideration and subsequent submission to the Government of Sudan for approval. The AID contract with CID/WSU does not determine the availability or utilization of such funds for maintenance.

In addition to Sudanese pounds for maintenance, the Force Account budget contains both dollars and Sudanese pounds. The dollar component was set aside to provide hard currency to purchase necessary construction and maintenance items that have to be ordered from overseas. Examples are spares for the generators (if not available in Khartoum), spares for electrical fittings, etc.

In addition to the funding for maintenance, the revised staffing pattern, which is given as Appendix VIII, includes skilled maintenance staff in the various categories including electricians, plumbers, masons,

painters, and also provides for a position at each station for a senior maintenance engineer. The latter is a new addition to the proposed staffing pattern. The other skilled labor required for maintenance, however, has always been included in the proposed staffing patterns for the stations. In addition, the TA budget supports an expatriate Maintenance Officer, Mr. Cenidoza, who has been completely occupied with vehicle maintenance, and has had insufficient time to carry out additional responsibilities.

A number of efforts have been carried out to assist in meeting the maintenance requirements. These include:

- a. definition of maintenance staff in the staff projections,
- b. recommendations for US maintenance TDY to assist in defining a maintenance program and training staff,
- c. presentation of programs for hiring and training of maintenance staff,
- d. suggestions for the establishment of a training capability to meet maintenance requirements,
- e. Mr. Nunn's consultancy, and
- f. a maintenance schedule for buildings, utilities and vehicles.

Regardless, maintenance programs for vehicles, equipment and facilities remain minimal. This must remain a high priority area for attention.

5. CID's role relating to construction and development of project infrastructure.

Mr. Gephart indicated that the project engineer's, talents were not being utilized in an overall supervisory and management capacity, as was appropriate, but rather as a worker in the force account activities. Due to the unavailability of trained staff, transportation and other requirements, and the necessity of completing a number of the force account activities for the project to move forward, supervision and/or actual conduct of force account activities have taken practically all of Dr. Higgins' time. This has resulted in most of the effort being carried out at Kadugli. The Gephart report suggests, however, that appropriate people be hired who can carry out and supervise the local functions with Dr. Higgins having overall responsibility to provide guidance and assistance, as well as serve as liaison with the Project Director. As a result of this recommendation, Dr. Higgins was asked in November, 1982, to prepare a plan defining activities, time frame, staffing, transportation and other needs to optimally meet the requirements for the Force Account work and for Dr. Higgins to assume overall supervisory responsibility. This plan is given as Appendix V.

In April, 1983, Dr. Higgins was asked to report the progress in implementing the Force Account activity schedule that was prepared in November, 1982. This is included in Appendix VII. It can be seen from this report that although a number of activities have been completed in the Force Account area, the requirements for a completely functional Force Account effort is recommended by Mr. Gephardt and planned by Dr. Higgins,

have not been forthcoming. This has had a resultant negative impact on the amount of Force Account work accomplished.

6. CID redirect the present functions of the CID Project Engineer to fulfill the scope of work as initially established for the Project Architect/Planner.

As indicated under 5 above, an effort has been made to redirect the present functions of the Project Engineer to more closely fulfill those initially described for the Project Architect/Planner, a position that was eliminated early in the project due to funding inadequacies.

CID/WSU has no control over the resources provided for these activities, since they are PL-480 funds that are under the control of the Project Director. Therefore, CID/WSU can only provide suggestions and the preparation of proposed approaches and plans, with the funds required under the control of the Project Director and the Government of Sudan.

7. CID, through the Project Director, Deputy Director, Project Engineer and the A&E firm of Grube-Zimmer take immediate steps to fill full-time positions of Resident Engineer and Clerk of Works at the four sites.

CID/WSU, through the Project Director has attempted to identify individuals to fill these positions. Initially, the possibility of these personnel being provided by the Government of Sudan as per the World Bank-GOS Loan Agreement, was explored. It was not possible to obtain trained individuals to fill these positions from the GOS. Next, the project attempted to fill these positions utilizing PL-480 funds, which are

under the control of the Project Director/GOS, but this required that the individuals be hired at the GOS salary levels. The process of advertisements, the identification of potential candidates, and the offering of positions to the candidates indicated that the terms of service, i.e., the government salary levels, were not acceptable for the competitive, small pool of individuals available.

As a last resort, CID/WSU discussed with USAID the possibility of inclusion of funds for these positions in the Trust Account. This means that the individuals could be hired via the Trust Account without having to adhere to GOS salary levels. In this regard, advertisements were again placed, individuals identified and now some of these positions have been filled. There have been delays, however, in filling all the positions. Therefore, CID/WSU has made an effort to circumvent the problems associated with the provision of Resident Engineers and Clerks of Work and has now been able to provide the mechanisms in conjunction with USAID for hiring these individuals, some of whom are on the job. In order to avoid inequities, CID/WSU were obliged to top off salaries of GOS personnel employees already employed as Resident Engineer and Clerk of Works.

8. CID, with the visit of the Senior Partner, Joachim Grube of G&Z in mid-November, 1982, scheduled a meeting to include the CID Project Director, USAID Engineer and the Resident Architect for coordinating construction operations, and other details, including budgets, time-frame, etc.

Mr. Grube travels to Sudan approximately four times per year. During each visit he meets with the Resident Architect, an employee of his firm, the CID Project Engineer, the Project Director, the Contractor and the USAID person responsible for the construction program. This has been and continues to be standard practice. One deficiency in regard to such meetings, however, is the lack of a clear definition and acceptance of the role that the Project Engineer plays in the overall planning, etc. of the construction program. This was addressed in 6, above.

9. That WSARP approve the placement of a full-time Karplen resident engineer supervisor of construction at the El Obeid construction site.

This has been done as per the recommendation.

10. That WSARP review and revise their Project Support Unit operations to establish lines of responsibilities; develop a maintenance capability for buildings, vehicles and equipment; develop alternatives for vehicles spare parts support; and establish a working budget and maintenance operational plan to accommodate the present level of infrastructure and equipment on the project.

This recommendation is in several parts, which will be addressed individually.

Lines of responsibility for the PSU operations have been in place for several years. It may well be that these need to be redefined and CID/WSU intends to do so during the next visit of the Project Coordinator and Deputy Coordinator to Sudan.

A maintenance capability for buildings, vehicles and equipment is an urgent need that has also been pointed out by the mid-term evaluation team. The CID/WSU agrees completely with the importance of this requirement and also realizes that this has not, in fact, been completely implemented. It requires the provision of staff, funding and a maintenance plan for buildings, vehicles and equipment. In this regard, proposed plans have been sent out to Sudan in 1980 to be a departure point for the development of a maintenance program effective in Western Sudan. This has not occurred. Due to the lack of progress, CID/WSU requested that AID approve the appointment of a maintenance person on the project, a position filled by Mr. Cenidoza. In actual fact, however, Mr. Cenidoza has been completely involved in the maintenance of vehicles and has not had the time nor the support to develop a maintenance program for the other requirements. CID/WSU has recommended the hiring of individuals in the required skill positions that have been indicated in proposed staffing projections given in Appendix IX. In these projections, the necessary skilled workers, including electricians, plumbers, painters, carpenters/masons, generator operators and mechanics have been suggested for each station. The need for these positions was initially recognized and agreed to in March, 1980 (See Appendix VIII). In addition, in November, 1982, the staff requirements were reviewed and were discussed with the Project Director. The number of skilled laborers was expanded to meet the needs of the project and in addition, a new position called a Maintenance Engineer was included. The latter person would be responsible for maintenance activities at each of the

stations. To date, only a small number of these positions have been filled. Although the Project Director has attempted to fill others.

Alternatives for vehicles spare part support requires the establishment of an effective inventory and stores system. CID/WSU has suggested this need and the Project Director has agreed. CID/WSU, over the last eight months, has suggested two TDYs to carry out these important functions.

In terms of establishing a working budget and maintenance operational plan to accommodate the present level of infrastructure and equipment on the project, such budget requirements have been included in the proposed budgets that CID/WSU presents periodically to the Project Director for his consideration and for potential submission to the GOS. Therefore, CID/WSU has attempted to build in the requirements for a maintenance program.

Since an overall plan is not presently available. Mr. Nunn from ICRISAT assisted the project in defining needs and equipment for maintenance shops. The shop equipment has been ordered and is currently either in Sudan or is enroute. CID/WSU has recommended that a maintenance TDY be hired immediately and spend from six months to one year in Sudan to meet the needs of the project in this extremely important area.

11. That WSARP, under the PL-480 Title III, Local Currency Project Account, revise and submit to USAID review and approval a project budget for 1982/83 to adequately cover the building maintenance requirements and site development requirements.

This has been done in the past and is periodically updated. The maintenance requirements are included in the Operational Budgets proposed to the Project Director, as well as in the Force Account Pound Budget and Force Account Dollar Budget that has been discussed with USAID. Again, the problem lies with obtaining the approval for and the availability of funds. CID/WSU can only recommend the provision of these funds to AID and the Project, who in turn must submit them and obtain approval by GOS for the expenditure of PL-480 funds for this purpose.

This recommendation further indicates that the budget should reflect the prorated share of costs to be funded by the GOS through their annual budget allocations. CID/WSU has never been able to find out what the annual budget allocations should be for GOS. Therefore, it has been difficult to build in such an annual budget into the allocations. This has been attempted, however, as shown in the budget summary in Appendix XI.

12. That WSARP take immediate steps to resolve the problems of vehicle support for engineering personnel doing construction inspection and supervision of site work, etc., including the problem of lack of aircraft and radio communications with each WSARP field station.

Some vehicles have been supplied to the engineering personnel at El Fasher and El Obeid.

The aircraft is now flying on a regular schedule and has thus addressed the issue of the lack of aircraft communication. Radios have been established and are functioning from Kadugli and El Obeid to the aircraft when flying and to Khartoum. Radios are still not

provided at El Fasher and Ghazala Gawazat. Spare parts required for additional radios to become functional have recently been sent to Sudan, so it is hoped that the radios at these other sites will become functional soon.

D. Kadugli Research Farm

Land for the Kadugli research farm is located approximately three (3) kilometers from the research station. A khor that is flooded during the rainy season is located between the station per se and the farm. As a result, during the rainy season it is necessary to drive a considerable distance to gain access to the farm from the station; unless a raised roadway, the necessary bridges, etc. can be constructed between the farm and station.

The construction of the roadway requires heavy equipment which the project does not own. For the past two years, efforts have been made by project management to obtain the use of appropriate heavy equipment that can be utilized for construction of the road or to contract for the construction with Roads and Bridges or with a private firm. Due to a number of factors, however, it was not possible to finalize a contract with a commercial firm, to make the necessary arrangements with the Roads and Bridges Corporation or to implement other alternatives to enable the road to be constructed and access provided. As a result, over the last two years the farm was not usable for crop trials, which had to be carried out on rented land. It was possible, however, to utilize the farm for the sedentary livestock herd.

During the latter part of this report period, it was possible to finalize a contract with a commercial firm in Kadugli for constructing the access road. As of August,

1983, construction is underway and has made good progress. It is anticipated that the road will be completed by late August or early September, 1983.

The land incorporated within the boundaries of the research farm is undeveloped. As a result, it is necessary to carry out a number of improvements in order for the farm to be completely functional. Required improvements include additional fencing, clearing, the construction of animal facilities of various types, the construction of living quarters for herders, sheds for storage of tools and storage facilities for other materials that will be utilized on the farm, and preparation of land for experimental plots.

At the present time, the fencing has been completed around the periphery of the farm; temporary animal facilities have been constructed, with the herders living in tents adjacent to these facilities; temporary corrals have been constructed and have been in use; land has been partially cleared; water has been piped from the research station to the farm and is now available; and the access road is under construction.

To assist in defining the needs and plan the development of the research farm, Mr. Ernest Nunn of ICRISAT spent time with the project serving as a farm development consultant. Mr. Nunn was instrumental in the development of the ICRISAT research farm and has also worked in a number of countries with several organizations defining research farm needs, and development plans.

Mr. Nunn arrived in Khartoum in November, 1982, and spent time with project staff in Khartoum and in Kadugli. He was able to meet with project administration and scientists, visit the Kadugli site and examine the plans for the facilities at all of the research stations. He also addressed the issues of the construction, equipping and

functioning of maintenance and support shops and farm support buildings at the other sites. Mr. Nunn's complete report is being published separately by the project and has previously been distributed to the project, the ARC and donors.

The report defines approaches for farm development and utilization, the impact development can have on the quantity and type of work that can be conducted, and the amount of equipment and labor that will be required. All of these obviously have a direct influence on the capital and operational budgets. The report further indicates the buildings and other facilities required on the Kadugli farm for livestock and crop activities which include:

1. A pole-type barn for livestock to provide protection from sun and rain. The barn should be equipped with facilities for tying the cattle when required.
2. Permanent corrals with chutes and weigh scales.
3. Office space with a refrigerator and evaporative cooler.
4. Storage facilities for feed and equipment.
5. Living quarters for herdsmen.
6. Regular power supply or generator.
7. Well laid out plots for crop trials.

In addition to the farm, Mr. Nunn made recommendations on the establishment of shop facilities, including various types of equipment at all the stations. The latter have been or are being ordered. In addition, Mr. Nunn suggested some additional farm

equipment beyond that already ordered. Much of this equipment, included in Appendix III of Nunn's report, has been ordered. A front-end loader, a two wheeled hydraulic dump trailer, a two-row planter and seed processing thresher have all been ordered or are already in Sudan. Additional farm equipment will be ordered for the other stations.

Mr. Nunn further suggested modifications and/or additional farm buildings to meet some of the needs that have not been met by the contract. Funding for these buildings will come from the Force Account budget.

E. Research Farms at El Obeid, Ghazala Gawazat and El Fasher

The El Obeid research station already maintains two gum arabic research areas. One of these is a nursery and the other is a research farm. In addition, land has been identified for the conduct of a horticultural research activities near the horticultural crop production area around El Obeid. Approval for the land has been obtained, and early development activities are underway.

Agronomic and livestock research facilities and farm development remain to be initiated at El Obeid. Mr. Nunn's report addresses need in terms of the support activities for the agronomic work, but did not address the farm per se. Farm needs must be determined as soon as possible so that plans can move forward for the definition of needs and the provision of the necessary research facilities on the farm.

Research farm needs at El Fasher have not yet been addressed, except as indicated above. Ghazala Gawazat has a large land area previously fenced and subdivided. Much of the existing fencing and other support requirements need replacing. The bore holes at Ghazala Gawazat have been reworked and faulty pumps replaced.

VI. STAFFING AND TRAINING

A. Initial Staff Projections

The original project documents, as prepared by the World Bank, were inadequate in terms of staffing needs of the stations. Conspicuously absent were skilled maintenance and operational staff to maintain and operate the equipment and facilities.

As a result of this obvious inadequacy, discussions in 1980 with representatives of the project, the ARC, Ministry of Planning, USAID and the World Bank led to an agreement on staff projections for the life of the project. This initial work-up and approved list of staff is included as Appendix VIII.

B. Revised Staff Projections

After the project had been underway for three years, it became evident that the staff projections needed to be further revised, based upon additional information and evolving needs. This has resulted in the revised staff projections which are included as Appendix IX and Table 3, on page 72. These projections indicate an increased number of staff, especially in the skilled areas for maintenance staff, including a maintenance engineer at each of the stations. The latter would have the overall responsibility for station and facility maintenance. Additional librarians or library assistants, and a new category of scientists with extension expertise labelled "production specialists" were also included as a result of recommendations of the evaluation team.

C. Current Project Staffing

1. Sudanese Staff

Table 3 summarizes the positions for Sudanese scientists identified by location and by academic discipline. It should be noted that the Evaluation Report suggested that there needed to be at least one plant scientist, one animal scientist and one social scientist at every station with the possible exception of a plant scientist at El Fasher. Project discussion prior to and following the evaluation concluded that at least one scientist with training in the plant sciences was and should be included at all stations, including El Fasher. Also included in Table 3 are the names of Sudanese scientists who are presently serving at the stations. Sudanese project scientists who are training in the US are identified in Tables 4, page 74. A total of twelve scientists are in training for advanced degrees and one for non-degree training in the US at the present time. Following the resignation from the project of one trainee, an additional candidate for an advanced degree has yet to be identified. There are presently four Sudanese scientists at the Kadugli station -- one in range science, one in animal nutrition, one in social science and one in agronomy. At El Obeid, there are four Sudanese scientists with one of them out-of-country for non-degree training at this writing -- one in forestry (currently on short-term training in the US), two in agronomy and plant breeding, and one in horticulture. Thus, the number of Sudanese scientists at Kadugli and at El Obeid, plus the Project Director in Khartoum, is nine. This number, added to the twelve in training, results in twenty-one scientists in various disciplines on the project. A total of forty-three positions for scientists and fifteen for production specialists have been identified in the staffing projections (Table 3 and Appendix IX).

2. US Staff

Table 5 indicates the present complement of scientific and support staff supported by the technical assistance budget. All of the US positions are filled with the exception of research associates. There is a search underway to locate individuals to fill these posts. Dr. Arya, whose location is El Obeid, was identified during July, 1983 and will report to Sudan in the Fall, 1983. The delay in the filling of the soil and water position has been caused by the anticipated delay in the completion of the El Obeid station. After re-evaluating the situation, however, it was decided that both Sudanese scientists and the US soil and water specialist should be located at El Obeid in rented housing until the station was completed. Therefore, four additional scientists, one American and three Sudanese have been added at that station.

During the report period, 158 person months of US technical assistance staff time were provided in Sudan and 35.6 person months were provided in the US. A total of 509 person months of US technical assistance staff time has been provided from 1979 through August 15, 1983.

D. Training and Attendance at Conferences and Workshops

Table 4 summarizes the present training activities and workshops during the reporting period. Seven Sudanese scientists are in training for PhDs in the US, one additional Sudanese PhD candidate is doing his thesis research with the project in Ghazala Gawazat and will return to the U.S. to complete his degree. Four individuals are training for MS or MA degrees in the U.S. One MSc position in extension is yet to be identified. One individual in agricultural economics is to begin training in the US in the Fall, 1983. The starting and anticipated completion dates for

each of the individuals are also given in Table 4. Thus, twelve individuals in various disciplines are in degree training in the US at the present time.

Non-degree training and attendance in non-project or ARC sponsored workshops and conferences were participated in by ten project staff. Of these, three were US staff attending conferences or workshops in Khartoum. Four Sudanese scientists participated in training or conference activities outside of Sudan during the report period and three participated in conferences within Sudan. One of the above began training abroad in Agroforestry, one participated in training in Animal Nutrition and one participated in a workshop on the biology and control of Striga spp. (an important parasitic weed in Western Sudan).

A large number of the project staff as well as individuals from the ARC and other organizations participated in seven workshops, meetings and conferences sponsored partially or entirely by the ARC/WSARP. These are listed under Item D in Table 4. A farming systems workshop was held in Khartoum, regional workshops were held in the Kordofan and in the Darfur regions and a horticulture workshop was held in Wad Medani. In addition, conferences were held to discuss and/or plan research activities for Ghazala Gawazat and for Southern Darfur in association with the Western Savannah Development Corporation. Also, the WSARP Advisory Council was convened by the Chair, Dr. Bakheit, in October, 1982.

VII. RESEARCH PROGRAM

The WSARP is mandated by the donors to carry out an integrated crop-livestock production system (FSR) research program in the West. It was also mandated that the project prepare a Workplan for Years 4 through 6 to be presented during the mid-project evaluation. This occurred, with the Workplan documentation in four volumes. Volume I serves as an

overview of the project, research approaches, resources, constraints, etc. that have general applicability for the whole project area. Volume II contains background information, administrative and planning structures, staffing, training, time frame and other related topics. Volume III contains a general description of the research plans for the Kadugli station. Volume IV, in press at end of this reporting period contains detailed descriptions of research activities, based upon proposals prepared by the scientific and technical staff of the Kadugli Research Station. Detailed plans and proposals of other WSARP stations will be prepared as the stations come on line and scientists have an opportunity to prepare such documentation, based upon detailed identification of constraints, priorities, etc. The reader is referred to the above-mentioned documents for additional details.

Project planning documents have been periodically prepared and updated, beginning in 1979. These relate not only to the research program, but other aspects of the project activities. The evolution of the research program has been incorporated into the Workplan volumes mentioned above.

In the early project discussions and planning, it was felt that it would be beneficial to the project to begin research as early as possible, although the project paper and other documentation suggested that the research begin when the facilities were completed. Early initiation was thought to be important to plan the research approach, conduct research per se and allow project administration to prepare administrative, maintenance and other support functions for the other stations, based upon lessons learned at Kadugli. Therefore, the research program was initiated in Kadugli two years before the completion of the facilities. As a result, some activities, primarily in crop production, range-livestock and the social sciences have been ongoing at Kadugli for the last three years. Prior to the initiation of the project, the ARC had staff and research activities underway at Kadugli.

As indicated above, the project utilizes the production systems approach. This requires interdisciplinary interaction among scientists with an orientation to on-farm or in-herd constraints and the development and/or testing of approaches that can alleviate these constraints. Because of the approach, considerable discussion has taken place with the development of a number of reports and papers that have been directed to the formulation of such an approach and to its implementation in Western Sudan. As a part of this ongoing effort, the project hosted a Farming Systems Workshop in Khartoum during this report period. Participants included WSARP scientists and administrators, ARC scientists and administrators, representatives of various Sudanese organizations, representatives of other projects, AID/Khartoum, WSU, CID, and consultants, including Dr. Michael Collinson, Director of the AID funded CIMMYT Regional Farming Systems Program. Dr. Collinson also served on the Evaluation Team. The establishment and continuation of the relationship to the CIMMYT program has been very worthwhile for the project.

As a result of one of the recommendations contained in the mid-project evaluation and based upon further discussions with Dr. Collinson during the workshop, the project developed a draft document which more clearly defines project activities, purposes, and administrative and functional structures for the research program. This draft document is included as Appendix X of this report and has not yet been implemented .

The details of project research will not be given here because of the volume of the information being generated. Instead, the research will be given in individual Annual Reports which are prepared by the research scientists.

To indicate research in progress during the report period, the following list of research activities is given. These are detailed in Volume IV of the workplan.

1. Adoption and Utilization of New Sorghum Production Technology by Farmers of the Nuba Mountains
2. Varietal Screening Trials for South Kordofan
 - Sorghum
 - Sesame
 - Soy Bean
 - Cowpea/Mungbeans
 - Forage Legumes
 - Pigeon pea
3. Maintenance of Soil Fertility Through Legumes
4. Critical Periods of Weed Competition in Sorghum
5. On-Farm Evaluation of a Package of Improved Practices for Increasing Sorghum Production
6. Crop Responses to Applications of N and P on Nuba Mountain Soils
7. Range Resource Classification and Evaluation in South Kordofan
8. Supplementary Feeding of Livestock During the Dry Season
9. Nutritional Factors Affecting Livestock Production in South Kordofan
10. Introduction of Forage Legumes into the Cropping Systems of Transhumant and Sedentary Groups in South Kordofan
11. Extent and Impact of Burning and Measures for Fire Control on Range Resources

12. Range-Use Patterns and Livestock Productivity of Transhumant Baggara and Sedentary Nuba Systems in Kordofan
13. Bush Control Studies for Improving Rangeland Productivity and Utilization in South Kordofan
14. Transhumant Production Systems Study
15. Animal Production/Health Evaluation in Two Sentinel Cattle Herds
16. An Overview of Livestock Production Systems in South Kordofan
17. Sedentary Production System in Southern Kordofan
18. Livestock Production Systems in Northern Kordofan

Camel Production Systems in Dar Kababish

Camel Feeding Habits, Nutritional Requirements, Range Carrying Capacity and Potential Environmental Impact

Effect of Market Forces on Camel Off-Take

Evaluation of Traditional Camel Husbandry and Management Practices

The above indicates the scope of the activities that are planned or ongoing at the present time. It should be noted that there are both central and support thrust activities, on-farm and in-herd activities and activities located on the research station. The agronomic activities, however, are being carried out on rented land, since the research farm was not ready for use for this cropping season. Also

indicated in the above list are the involvement of the project in both crop- and livestock-related activities. It should be noted, also, that a part of the list of activities is shown for livestock production systems in Northern Kordofan. These activities are in an early stage of development and actually have comprised only an initial survey, with the definition of the above activities to be carried out in detail.

Due to the delay in the construction program at El Obeid, after due consideration the project administration decided that it would be appropriate to initiate additional research at El Obeid with the scientists and support staff living in rented facilities until the station is completed. As a result of this decision, research activities were initiated at that station, along with the already ongoing effort in Gum Arabic research. Therefore, the research activities at El Obeid are directed to Gum Arabic research and agronomic activities related to various crops including sorghum, sesame, groundnuts, horticultural crops and others. Because of the time of arrival of the scientists, field activities have been initiated as indicated above, but the effort at El Obeid is still in an early stage of its definition and establishment. As for the work at Kadugli, a report of the El Obeid research will be presented under separate cover at the end of the cropping season and after the results have been analyzed.

In support of the research activities, equipment, supplies and other commodity requirements have been purchased and shipped to Sudan as well as purchased in-country. It is anticipated that additional equipment and commodities will be purchased so that they are on hand when the other stations come on line in August, 1984.

VIII. CONSULTANTS

During the reporting period a total of seven consultants served in Sudan on the project and directed their activities to project and ARC research related topics. Four of these individuals were supported by

funds from sources other than the Project, while the remaining three were supported from Project funds. The consultants were as indicated below:

<u>Consultant</u>	<u>Subject Addressed</u>
Dr. J. D. Maguire, Professor of Agronomy, Department of Agronomy and Soils Washington State University, Pullman, Washington	Seed Technology and Seed Production Needs for Kordofan and Sudan
Dr. J. Holocek Assistant Professor of Range Nutrition, Department of Animal and Range Sciences New Mexico State University, Las Cruces, New Mexico	Livestock Nutrition from Range Resources
Dr. D. Dwyer Professor and Chair of Range Science, Utah State University, Logan, Utah	Range and Livestock Research
Mr. E. Nunn Director of Facilities, ICRISAT, Hyderabad, India	Farm and Station Development
Dr. D. Shetty Scientist, ICRISAT Farming Systems Program, Nigeria	Farming Systems Research

Dr. M. Collinson
Director
CIMMYT Regional Farming
Systems Program,
Nairobi, Kenya

Farming Systems Research

Dr. A. Krezdorn, Professor Emeritus,
Department of Fruit Crops,

University of Florida

Citrus Production and Virus-
free Bud Wood
Project

Dr. Maguire's activities included working with the Seed Administration, the ARC, the regional government and the Project in assessing the status and needs for improved seeds and the capabilities for supplying these seeds to producers in the Kordofan region. Dr. Maguire has prepared a report of his findings which will be forthcoming soon. Dr. Maguire was supported by the Washington State University's Strengthening Grant at no expense to the Project.

Dr. Jerry Holocek from New Mexico State University spent a month at Kadugli working with the project scientists involved in range and livestock research. He worked closely with Drs. Fadlalla, Cook and Bunderson addressing research activities for evaluating livestock nutrition utilizing forage resources. He worked with these scientists to design approaches to carry out such research. Dr. Holocek's report has been prepared and distributed to Project and ARC. Dr. Holocek was supported by the New Mexico State University's Strengthening Grant at no expense to the project.

Dr. D. Dwyer spent three weeks in March and April in Sudan working with the Project staff in assessing progress and assisting in defining future research activities in range-livestock. Dr. Dwyer also participated in the Farming Systems Workshop in Khartoum and the two regional workshops in Darfur and in Kordofan. This represented

Dr. Dwyer's third consultancy on the Project. He was one of the initial consultants in 1979 that examined the Project's potential thrusts relating to range and livestock. Since that time, Dr. Dwyer has worked closely with the Project and has assisted it in a number of ways in the area of range and livestock research.

Mr. E. Nunn of ICRISAT spent time with the Project as a consultant on farm and research station development. Mr. Nunn examined the present status of the Kadugli Research Farm and made recommendations concerning its development. In addition, he examined the support facilities that are designed at all the stations, and made recommendations concerning some expansion and/or change in them. Mr. Nunn, because of his considerable experience while working at ICRISAT in India as well as assisting in the development of a number of research stations in several countries in Africa, was also able to assist the project in determining needs for maintenance and support shops. In this regard, Mr. Nunn developed lists of equipment that will be needed to make the workshops at the stations optimally functional and to develop the required maintenance capabilities. Mr. Nunn's report will be distributed soon, with draft copies already provided WSARP, ARC and USAID.

Dr. Shetty participated as a farming systems agronomist in the Farming Systems Workshop held in Khartoum. He participated in all of the discussions and served as a resource person, based upon his previous experiences with ICRISAT in India and in Nigeria.

Dr. Michael Collinson returned to the Project in March, having previously served on the Evaluation Team in October and November, to participate in the Farming Systems Workshop. Dr. Collinson provided a great deal of information and direction, and he and the AID funded CIMMYT program have continued to provide valuable input. In addition, several Project staff have participated in CIMMYT-sponsored workshops and training sessions.

Dr. Krezdorn served as a consultant on citrus production and the Virus-free Bud wood Project for the ARC and the Project. Within this context he visited a number of ARC stations that have ongoing citrus research. He also visited Kadugli and El Obeid, although it was not possible for him to meet Dr. Osman, who recently joined the project as a scientist in horticulture. Dr. Krezdorn's prepared a report with recommendations that have been circulated to the ARC and Project.

It is anticipated that in the coming year a number of consultants will be required. These include consultants in inventory and stores, agro-climatology, library and information, extension and training, marketing, station maintenance and others.

IX. PROJECT SUPPORT UNIT/TEMPORARY PROJECT HEADQUARTERS/ARC LIAISON OFFICE

The Project Support Unit (PSU) is currently amalgamated with Project headquarters, but later will assume support and liaison functions when the headquarters moves to El Obeid. This move is anticipated to occur in August, 1984, approximately. The activities of the Project Support Unit are to provide support and liaison for the research stations in the West. At present, PSU and headquarter's activities include administration; purchasing; customs clearing; record keeping; banking and budgeting; vehicle scheduling in Khartoum; maintenance and operations in Khartoum; aircraft operations and scheduling; ministerial contacts and liaison; ARC liaison and interactions; travel arrangements; communications; project engineer activities; senior advisor to the Director General of the ARC activities; stores; and others. Thus, a number of the project support-related activities, as well as those related to construction and administration, are housed in Khartoum. The PSU will move to new facilities currently under construction at Shambat (Khartoum) in August, 1984. The US staff serving in the PSU are given in Table 5.

Some PSU activities are addressed in other sections of this report. Other PSU activities, such as clearing of shipments through customs, have continued to cause difficulties; particularly with getting materials and orders to clear through the airport or through Port Sudan. A number of shipments have been lost for varying periods of time, and some, when finally located, have been plundered. In order to try to assist in this endeavor, the Project has hired another clearing agent to assist in these activities, which are extremely time consuming and frustrating for all concerned.

In terms of the US staff working in the PSU, Mr. Lee Stenquist, the Chief Administrative Officer, finished his tour of duty in April, 1983 and was replaced by Mr. John Hannum. Ms. Shirley Higgins continues to serve as the Deputy Administrative Officer in charge of banking and budgets, aircraft scheduling and other duties. Additional support for the office from technical assistance includes: Ms. Perlita Sulit, Senior Secretary and Ms. Dorothy Bergman, Secretary. Dr. Gerald Owens, Deputy Project Director is also located in the PSU.

The Sudanese staffing includes the Project Director, Dr. Dafalla Ahmed Dafalla; the Assistant Director for Administration, Mr. Osman Abdullah, and a number of support and operational staff.

Installation of the radio at the PSU and at El Obeid and Kadugli have greatly improved communications. Regularly scheduled weekly flights of the Project aircraft to El Obeid, and Kadugli and monthly flights to El Fasher and Ghazala Gawazat have tremendously improved both communications and support of project activities in the field.

Several offices on the first floor of the current headquarters building were established to serve as an ARC Liaison Office in Khartoum. The ARC Liaison Office will also move to the new facilities at Shambat.

X. TRANSPORTATION AND COMMUNICATIONS

During this report period, the radio network between Khartoum, El Obeid, Kadugli and the aircraft has been put in place and is functional. Twice daily radio contact is maintained between all the sites and also communication with the aircraft when it is flying. This has resulted in an improved communication between the two stations and the Project Support Unit. Radios are still not in place in El Fasher and Ghazala Gawazat. The radios intended for El Fasher and Ghazala Gawazat were damaged in shipping. This resulted in the necessity of obtaining replacement parts, which has delayed operations of radios in El Fasher and Ghazala Gawazet. In addition, a radio will be installed at ARC Headquarters to improve communications between the Project and ARC headquarters.

Transportation for project staff at Khartoum, Kadugli and El Obeid and for the construction and Force Account activities continued to be a problem. During the last year, the project aircraft has been flying on a reasonably regular schedule, which has allowed much improved transportation between Kadugli, El Obeid and Khartoum. In addition, periodic monthly trips to El Fasher and Ghazala Gawazat to provide transport for the supervising architect has also taken place. Thus, the transportation problems in terms of the aircraft have improved.

Ground transportation, however, continues to be a problem. Insufficient numbers of vehicles for the research and support activities and inadequate maintenance results in vehicles being inoperable and/or unavailable as needed for various requirements in Khartoum and at the stations. Although Mr. Cenidoza works full-time on vehicle operations and maintenance, this has not resulted in a completely functional and integrated maintenance and support system for vehicles. Additional Sudanese and/or other qualified mechanical maintenance staff are necessary.

Unavailability of vehicles in Khartoum impacts negatively on staff effectiveness. Vehicle maintenance, drivers who do not operate vehicles in an optimal manner and unreliable scheduling are problems. As a result, US staff have been forced to use personal vehicles for a significant number of project activities. During the last year, as per an amendment to the CID contract, six vehicles were licensed with private plates at Kadugli so that US staff could use them after work hours. A shortage of vehicles at Kadugli has continued to impact negatively on Sudanese and US staff effectiveness. The same is true at El Obeid.

During the coming year, a maintenance consultant will be hired to assist in the design and implementation of a preventative maintenance program and for the training of maintenance staff.

XI. THE SENIOR RESEARCH ADVISOR TO THE DIRECTOR GENERAL OF THE ARC

Dr. James Riley, Senior Research Advisor to the Director General of the ARC has continued his activities during the reporting period. These have encompassed five general activity areas identified below.

A. ARC Program Support and Development

Activities in this area have continued to be directed to assisting ARC scientists and units in defining support for program areas. An example is interactions with the International Development Research Center (IDRC) concerning potential support for the publications unit in ARC. The identification of areas for potential cooperation and support have also been carried out with INTSORMIL, the Peanut CRSP and with various international agricultural research centers. This has resulted in the formulation of mutually beneficial working relationships as well as additional support for ARC activities in Sudan. Dr. Riley has

also worked closely with a number of ARC scientists to assist in the identification of materials and information to benefit their individual programs.

B. WSARP Program Support and Development

Dr. Riley has continued to contribute significantly in this area and to participate in a large number of project-related efforts from programmatic as well as a coordinating standpoint. He participates and contributes to the preparation of various documentations, attends meetings, interacts with project scientific staff in discussing and planning research. He has been responsible for coordinating the Farming Systems Research Workshop and the regional workshops in Darfur and Kordofan.

C. Integration of WSARP and ARC Programs and Expansion of Contacts with International Programs

Dr. Riley's background and experience in the international agricultural research center network has enabled him to play an important role in interacting and interfacing project and ARC activities with the international agricultural research centers. Included have been ILCA, ICRISAT, ICARDA and IITA. He also has assisted in the integration of project activities into the ARC.

D. Furthering Agricultural Development in the Sudan

Dr. Riley's activities in this area have spanned a spectrum of endeavors, including working with the USAID Mission in the evaluation of reports and proposals, serving on evaluation and planning teams, and related matters. He has worked with representatives of the international agricultural research centers and international donors to provide information, make contacts, plan itineraries for visits to Sudan by institutional representatives and others.

E. The Preparation and Editing of Papers and Reports

Dr. Riley continues to prepare papers and reports either as a sole or as a co-author. An example is a paper entitled, "Development of the Horticultural Potential of the Kordofan Region of Sudan," by Ahmed A. Obeidalla and James J. Riley. In addition, he has prepared a synopsis of the regional workshops in Darfur and Kordofan. Other activities include reviewing papers.

Dr. Riley's position as Senior Research Advisor to the Director General is the only position remaining in what was once envisioned as a research planning and evaluation unit of the project. Due to constraints in funding, it was not possible to maintain that program in its entirety as originally described. It likewise has not been possible for Dr. Riley to interact directly with ARC administration on the planning and evaluation of research per se as was originally envisioned in the early documentation.

II. MAINTENANCE PROGRAM

The mid-project evaluation report as well as other reports from the Project Engineer, the AID construction consultant, THE A&E firm, and the Supervising Architect have continued to stress the need for a maintenance program for vehicles, facilities and equipment. Mr. Gephart's report resulted, as indicated under Construction Program above, in the definition of a need to plan the Force Account and Maintenance Programs.

The sole vehicle maintenance officer is paid from TA funds, and spends all of his time in repairing and maintaining vehicles. Mr. Cenidoza has had limited time to develop an overall maintenance program at the Kadugli station. In addition, Mr. Cenidoza spends a considerable amount of his time in Khartoum and not at the stations per se. This, coupled with a lack of mechanics, engineers, and other categories of

skilled staff, has resulted in a continued deterioration of vehicles and of facilities at Kadugli and in Khartoum. This is summarized by a statement in the Project Engineer's June, 1983 Report in which says, "There is still no skilled resident station maintenance officer at Kadugli. . ." This is further emphasized by the Project Engineer's report of August, 1983, which says, "With a few exceptions, station maintenance problems are growing at Kadugli."

The basic maintenance requirements of Sudanese staffing and equipping of the maintenance and inventory facilities are not occurring in a timely manner. Mr. Nunn in his report suggested, as indicated elsewhere in this report, the establishment of shops and suggested tools and equipment for these shops. The latter have either been ordered or are in the process of being ordered with an expenditure of \$27,600 for shop tools and equipment. More will be forthcoming, based upon Nunn's recommendations.

The necessary hiring of staff has been slow and their training has been limited to mechanics. Frequently, those hired are inadequately trained. It is almost impossible to hire the required personnel in Sudan, especially without the establishment of a training capability for the project to train maintenance staff and others so they carry out their jobs effectively. In addition, a consultant in maintenance programs is required for 6-12 months to assist in the design of preventative maintenance programs and training of maintenance staff.

XIII. EQUIPMENT AND COMMODITIES

During the reporting period, equipment and commodities continue to be purchased in Sudan as well as in the US and shipped to Sudan. Examination of the Summary Budget of accumulated expenditures through August 15, 1983 (Table 6), indicates that expendable equipment and materials from the Technical Assistance Budget that amounted to \$284,618 with the non-expendable equipment and materials purchased amounting to \$1,348,083. Included in these figures are the following:

Research Equipment--\$44,089; Office and Laboratory Equipment and Supplies--\$58,208; Farm Equipment and Spares--\$63,137; Vehicle Shop Tools--\$27,561; Vehicles and Trucks--\$478,752 and Shipping--\$469,785. Also included in the expenditures to date are a variety of other equipment and materials, including such items as research supplies; office equipment and supplies; household equipment and appliances; vehicles spares; farm tractors, equipment and spares; shop equipment and tools; copy machines.

In the coming year a large amount of research and other equipment will be purchased. The additional vehicles that have been approved will be bought, as will be spares for the new vehicles and additional ones for the previously purchased vehicles. It is anticipated that an expenditure of approximately \$400,000 will be made for research equipment, with \$72,000 in spares for this equipment. As indicated in the previous budgetary summaries distributed to those concerned, special laboratory and library furniture will amount to \$126,000. An additional expenditure for tractors and implements will come to approximately \$240,000, including spares. Also budgeted is small non-tractor farm equipment for approximately \$56,000. Other additional material will include shop, vehicle and farm maintenance equipment for approximately \$141,000. Training and liaison equipment and information dissemination equipment--\$55,000 and research supplies approximately \$270,000. These estimates were prepared in November, 1982, and were updated in March, 1983. Office and laboratory equipment to be purchased in Sudan amount to over 400,000 S£. All these must be ordered and in place by August, 1984, when it is anticipated that all the stations come on line (See next paragraph).

In order to determine the furniture and equipment needs, a study was carried out, with a room-by-room analysis of these requirements. The result is given in Table 10 in which furniture to be purchased in-country is given as S£ costs and furniture unavailable in Sudan to be purchased in the US is given as special equipment to be purchased with dollars. The 1982 prices plus 50% inflation factor was used in

the SE determination. This study was done in November, 1982. Due to devaluation, these prices, which have been included in the projected budgets, may be low.

The SE requirements have been included in budgets provided the Project Director and USAID in November, 1982, April-May, 1983, and gone over with the Project Director, and CID and AID representatives in January, 1983. The SE component in terms of obtaining the funds from PL480 and the purchase of the furniture is the responsibility of the Project Director and his staff. Orders have not yet been placed for this furniture. The purchase of the furniture equipment in dollars is the responsibility of CID/WSU. The lists have been submitted to the Project Director and his approval requested in order for the equipment to be ordered. Approval has not been received.

It is worth noting that shipping costs from the US to Port Sudan are amounting to approximately 51 percent of the purchase price based upon the current total expenditures for the project. This percentage does not include the in-country transportation paid in Sudanese pounds, which adds to this total.

XIV. BUDGET

A. General

The original Technical Assistance budget was prepared based upon estimates in 1977 and 1978. All project needs and the rate of inflation were not completely anticipated at that time, so that the amount of funds provided were inadequate to meet all of the project needs at the time the Technical Assistance Contract was signed in 1979. Because of this, a number of activities and proposed components of the project were either decreased in scope or were eliminated completely. In addition, it was not possible then to accurately estimate the need for various types of

equipment such as research and farm equipment, etc. In addition to this, inflation and devaluation have played a very important role in changing the project budgetary requirements.

The construction program costs were greater than initially anticipated because of the inclusion of Ghazala Gawazat and some additional facilities not initially programmed for the project. This resulted in USAID including additional dollars in the construction program. An effort was also made to restructure the original dollar budget for technical assistance, which amounted to over 19 million dollars so as to make available additional dollars for the construction program and replace the dollars programmed for technical assistance activities in-country with PL480 Sudanese pounds. Thus, the technical assistance dollar component was decreased, with the released dollars being used in the construction program. The details of the historical development of the project is given in Workplan Volumes dated October, 1982.

In addition to the above, research program needs have evolved over time, based upon input from scientists and administrators on the project, consultants and an evaluation of the cost of these materials and equipment. As a result, an annual restructuring of the budget projections has taken place to project the budgetary needs for the next year and for the life of the project by amount, source of funds, currency, expenditure categories and year.

The US scientist inputs into the project were delayed somewhat compared to original projections. This resulted in the freeing up of some additional funds that were reprogrammed primarily for equipment which was originally under-estimated; for inclusion of a position for a maintenance officer (the position occupied by Mr. Cenidoza); for the position of Deputy Administrative Officer occupied by Ms. Higgins; for unanticipated significant transportation costs increases; for inflation, and for extension of

construction supervisory services,' due to delays in construction. Delayed US scientist staffing, decreased number of consultants, the use of consultants paid from other sources, delays in the establishment of libraries, and less turnover of US staff than originally anticipated have resulted in decreased expenditures in these areas over the amount originally programmed. Increased costs of shipping, identification of necessary shop, farm, and research equipment requirements, inflation and other factors have used the funds freed up from these categories. As per the CID/USAID contract, funds have been transferred between budget categories to offset these additional needs. In November, 1982, the total budget was revised by category, source, currency, and time. This was reviewed by representatives of USAID/KRT, the Project Director and CID. The budgets were again revised in April, 1983, and again discussed with the above indicated organizational representatives. Another draft revision is included in this report as Appendix XI.

B. Expenditures

1. Expenditures During 1982-83

The dollar expenditures for the technical assistance budget for the report period are given in Table 6. A total of \$2,209,070.45 were expended in this project year.

2. Cumulative Expenditures through August 15, 1983

The cumulative expenditures from August, 16, 1979, through August 15, 1983 are shown in Table 6. A total of \$8,304,182.60 have been expended in dollars through the technical assistance contract.

3. Estimated Life of Project Expenditures

Appendix XI gives revised expenditure estimates for life of Project by years, category, source and currency. This table can be compared with others previously provided USAID, the World Bank, and the Project. Appendix XI should, however, be considered a draft at this writing.

4. Training Budget

Original estimates for the training budget indicated an expenditure of approximately \$911,000. This provided for the various support requirements, tuition, stipends, travel, research costs, etc. for trainees studying overseas for non-degree training in-service training, including consultants, conferences, etc. Because of the delay in the identification of trainees, the cash flow of expenditures in training has been slower than was originally anticipated. An extension of the project will also be required. The anticipated time of degree completion for each trainee is given in Table 4.

5. Construction Budget

As discussed previously under construction, the construction period has been extended, requiring an extension of the supervisory contract supported by the technical assistance contract with Grube-Zimmer Incorporated. Also, devaluation has resulted in an increase in the Sudanese pound components of the construction program of an estimated 4 million additional Sudanese pounds (see Appendix VI).

6. Station Operating Costs and Salaries

Each year proposed Sudanese S£ budgets for the Trust Account, the headquarters activities in Khartoum and the research stations are prepared by the Coordinator and Deputy Coordinator. These budget estimates are based upon the most current information available and are presented to USAID and the Project Director and discussed with them. These budgets, except for the Trust Account, are then utilized by the Project Director and/or modified as he sees fit and ultimately submitted to the ARC and the GOS for approval. Thus, the S£ budgets that have been prepared by the technical assistance staff have not necessarily been those that were submitted and approved by GOS. Therefore, the information relating in S£ in Appendix XI are only those that are proposed. In this regard, the reader is referred to previous budget estimates covering the 82-85 budget years inclusively which were the result of reassessment of project staff and operating costs needs last carried out in November, 1982 and April, 1983. A current estimation of project needs for the technical assistance dollar budget is given in Appendix XI (draft, only). At the time this report was prepared, there was no additional information available for re-estimating the figures given for the Sudanese pound budgets, except for a revised trust account budget and the £ component of the construction budget.

XV. WSU CAMPUS COORDINATOR'S OFFICE

The lead university in the CID system has principal responsibility for project planning and implementation with support from other CID universities and the CID Executive Office. These responsibilities include budgets, audits and adherence to USAID regulations for all aspects of the technical assistance activities, staffing, purchasing,

etc. Each CID university also must operate within additional guidelines and regulations of the University and State in which the University is located.

During the reporting period the WSU Campus Coordinator's office was staffed by the Coordinator (50%), Deputy Coordinator (50%), secretary (100%) and hourly paid assistance in purchasing and shipping. Activities carried out in 1982-83 include:

- a. planning and monitoring of project activities;
- b. recruitment and appointment of US staff and of consultants;
- c. purchasing and shipping;
- d. report and planning document preparation;
- e. travel for staff and consultants;
- f. two trips to Sudan of six weeks duration in November and for four weeks in April-May, 1983;
- g. preparation of various documentation for trainees, staff appointments;
- h. participation in workplan preparation;
- i. identification of appropriate training possibilities and interacting with universities and departments for short-and long-term training of Sudanese scientists;
- j. budget preparation and implementation;
- k. interacting with USAID/Washington for staff appointments, travel approval, consultant appointments, interpretations of AID regulations and others; and

1. interacting with mission staff.

In addition to the above-indicated staff, project activities have been supported by WSU staff in purchasing, finance, personnel, training, library, agricultural finance and others. These activities are supported by the indirect cost component of the budget.

During the next year, the activities of the office will be improved by the addition of computer capabilities for budget, staff, inventory and purchasing. The purchase of a computer and accessory equipment is from university funds. This addition will augment the addition of word processing capabilities added to the office this year from University sources. The latter capability has been used extensively for project activities.

XVI. PRIVATE SECTOR AND WOMEN'S INVOLVEMENT

In line with USAID strategy, WSARP has involved the private sector and women. The US private sector has contributed to the project in the architectural, engineering and construction supervision efforts by Grube-Zimmer, Inc. of Portland, Oregon. The private sector of Sudan has participated by the use of Karplen Consultants for the Kadugli architectural and supervision activities and by a Sudanese construction firm implementing the construction program at sites other than Kadugli.

Women are important participants in all the agricultural systems being studied by the project. Because of this, emphasis has been placed on determining production constraints and potential interventions to alleviate these constraints as they relate to women, men and children. In this regard, Ms. B. Michael is serving as a Research Associate in Anthropology, studying women's roles in the transhumant production

system as a part of her project activities. This need was recognized by the DG of ARC and Project Director in approving Ms. Michael's participation in the project.

Women are also involved in other aspects of the project. Ms. Shirley Higgins serves in Sudan as the Deputy Administrative Officer, with Ms. J. Turk serving as USAID project officer. Dr. Jan Noel is the Deputy Coordinator and Dr. Jean Kearns is the CID Deputy Executive Director.

The Evaluation Team in discussions in Kadugli supported the project's inclusion of adequate attention to the effective participation of women in Western Sudan's agricultural development. Among proposed future strategies is the inclusion of at least one woman scientist at each station in the position of "production specialist" to ensure that research station/producer interactions reach women producers and reflect their perceptions.

XVII. LIBRARY AND INFORMATION

The central library to serve the Western stations is to be located at El Obeid. The construction program includes facilities for such and contains associated training facilities. The WSARP library must be closely integrated into the ARC library in Wad Medani.

Due to the status of the construction program during this report period, the only facilities available for library functions have been at Kadugli. Furniture, shelving, etc. were ordered and arrived in Kadugli early in the report period. These have not been put in place and the library is not functional. The needs for the library staffing for Kadugli and other sites have been included in the staff projections. A search was undertaken to identify a librarian for Kadugli and the individual given training. To date, however, the librarian has not arrived at Kadugli.

Computer search capabilities to identify information for staff has been carried out at Washington State University. A total of 45 were completed and the information transmitted to Sudan. In addition, a total of 500 books have been ordered and sent to Sudan. In addition, 30 journal subscriptions have been ongoing, with the periodicals being sent to Sudan. To assist scientific staff in identifying current literature, two subscriptions to "Current Contents in the Agricultural Sciences," which gives the contents of hundreds of relevant journals is provided at Kadugli and El Obeid. In addition, a system by which scientists can order copies of relevant articles has been ongoing. As a result, an estimated 1,000 copies of articles and publications have been sent to Sudan. Also, Dr. Riley assists other ARC scientists in identifying relevant information, which the project has provided.

The post of Information Officer has been identified as a need and included in the projected staffing. A person in this position would be responsible for dissemination of information about project activities, maintain close liaison with the ARC, etc.

XVIII. WSARP PUBLICATIONS

The project has published reports from consultants, project generated reports, annual reports, as listed in Table 9. Not listed as formal publications are a large number of trip reports, evaluation and monitoring reports, etc.

XIX. TIME-FRAME

Time frames for project activities have been developed periodically as the project has evolved. Table 7A was included in the second annual report and 7B in Volume II of the Workplan, dated October, 1982. These tables indicate the time-frame for previous activities and for projected activities for the life of the project as estimated

over a year ago. Due to delay in the completion of the construction program, however, that time-frame is no longer completely valid. Table 8 has been developed to indicate the time-frame for project activities, based upon current information.

XX. ISSUES

The mid-project evaluation report indicated a number of issues requiring attention. Some have been addressed, while others have not yet been remedied and remain problematical. These can generally be defined as pointed out in the evaluation report as follows:

- A. Staffing--The necessity of identifying, hiring and retaining Sudanese scientists, technical and support staffs that are trained and capable of carrying out the project's mandate is fundamental. The evaluation report emphasized this problem with the coming on-line of the additional three stations during the next year to place additional strains on the capability of the project to hire and retain adequately trained staff at all levels to meet project needs.
- B. Maintenance--Maintenance was pointed out as a problem by Mr. Gephart as well as the mid-project evaluation report. This continues to be a problem, with little progress having been made since the evaluation on the identification and implementation of a necessary long-term maintenance program for vehicles, facilities and equipment. Identification, hiring and training of maintenance staff requires urgent attention.
- C. Construction

Delays in the construction program will have impacts on all of the above, and will also impact the ability of the project to carry out effective activities during the tenure of the current USAID and World Bank funded efforts.

D. Budget

Devaluation of the Sudanese pound has had significant impacts on the cost of the construction program as has been previously indicated. If additional devaluations occur, increased stress will be placed on the budget and additional requirements will become evident.

E. Force Account and Farm Development

Force Account and farm development activities need to be augmented in terms of resources and impetus. This topic has been discussed in detail elsewhere in this report (Sections II and IV).

F. Equipment and Furniture

If the stations are to become operational when completed in August, 1984, it is essential that the required equipment and furniture be ordered as soon as possible, in order to be in Sudan and/or manufactured and available in Sudan when required.

Table 2
WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT
AID LOGICAL FRAMEWORK

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p>Program or Sector Goal: The broader objective to which this project contributes:</p> <p>A1</p> <p>Improved standard of living for subsistence farmers and pastoralists in Western Sudan.</p>	<p>Measures of Goal Achievement:</p> <p>A2</p> <p>1. Increased ag. production. 2. Sustained range productivity. 3. Enhanced linkages between herder/farmer prod. systems.</p>	<p>A3</p> <p>1. Socio-economic studies 2. Min. Ag. statistics</p>	<p>Assumptions for achieving goal targets:</p> <p>A4</p> <p>1. That improved ag. research is made available to herders and farmers, and they are receptive. 2. That an improved transport/marketing system is developed. 3. GOS will develop land use policies. 4. That ag. research is an essential ingredient to improved ag. production. 5. GOS will continue to support ag. research and provide recurrent costs.</p>
<p>Project Purpose:</p> <p>B1</p> <p>Develop and institutionalize an efficient system for agricultural research operations in W. Sudan.</p>	<p>Conditions that will indicate purpose has been achieved: End of project status.</p> <p>B2</p> <p>Adequately developed Sudanese staffed ag. research organization capable of carrying on effective research programs in W. Sudan selected from own priorities.</p>	<p>B3</p> <p>1. Contractors reports 2. Project evaluation</p>	<p>Assumptions for achieving purpose:</p> <p>B4</p> <p>That GOS will induce qualified staff to accept assignments in W. Sudan</p>
<p>Outputs:</p> <p>C1</p> <p>1. Research projects in: a) Livestock/range production b) water and land use management. c) range & livestock production. 2. Physical infrastructure of research facilities 3. Strengthened range management capability, on ag. research in W. Sudan. 4. Improved human resource base of Sudanese staff. 5. Viable logistic/communication system for support of ag. research organizations in Sudan as well as international.</p>	<p>Magnitude of Outputs</p> <p>C2</p> <p>1. 5 research programs completed. 2. 4 research stations completed. 3. Office building in Khartoum for management. 4. 20 Sudanese trained - external 60 Sudanese trained - OJT 5. 5 radio base station established 4 mobile radio stations operating 1 aircraft operational. 6. Planning evaluation committee formed. 7. 5 conferences held.</p>	<p>C3</p> <p>1. Published reports 2. Project evaluation site visits 3. Site visits 4. Contractors reports. 5. PIO/Cs. 6. Committee reports. 7. Conference reports.</p>	<p>Assumptions for achieving outputs:</p> <p>C4</p> <p>1. Research is performed under rigorous scientific standards 2. Construction materials available on timely basis. 3. Counterparts available.</p>
<p>Inputs:</p> <p>D1</p> <p>1. Technical Assistance: a) LI Researchers (AID) b) LI management/planning (AID) c) SI (AID) d) A & E (AID) 2. Construction financing (ISRD/AID/GOS) 3. Training - external OJT (AID/AID/GOS) 4. Commodities - general (AID) aircraft (ISRD) 5. Other costs (GOS/AID/ISRD) Operational costs, etc.</p>	<p>Implementation Target (Type and Quantity)</p> <p>D2</p> <p>See BUDGET PP Table IV</p>	<p>D3</p> <p>1. Controllers disbursement records 2. Contractors reports</p>	<p>Assumptions for providing inputs:</p> <p>D4</p> <p>1. Funds available from principle sources on timely basis. 2. TA recruitment performed on timely basis.</p>

Table 3. Sudanese Scientific Positions Identified by Location, Discipline, and Sudanese Scientists Presently Conducting Research in the Field

<u>Location of Position</u>	<u>Discipline</u>	<u>Sudanese Sci. Currently at Stations</u>
<u>Kadugli</u>		
	Production Systems Agronomist	Mukhtar Kenani
	Agro-Breeder	None
	Soil/Water Use & Management Specialist	None
	Agricultural Engineer	None
	Farm Management Economist	None
	Livestock Production Specialist	Babo Fadlalla
	Range/Forage Specialist	Hashim Mukhtar
	Research/Extension Liaison Specialist	None
	Crop Protection Specialist	None
	Weed Specialist	None
	Social Scientist	M. Azim Abu Sabah
<u>E1 Obeid</u>		
	Production Systems Agronomist	None
	Systems Agronomist	El Hag Abu El Gasim
	Agro-Breeder	Abdel Rahman El Khidir
	Horticulturist	Osman Adam Osman
	Water/Land Use Systems Analyst	None
	Systems Deputy Program Leader	None
	Soil Physicist	None
	Agricultural Chemist	None
	Agricultural Engineer (Soil/Water)	None
	Agro-Climatologist	None
	Economist/Biometrician	None
	Farm Management Economist	None
	Social Scientist	None
	Livestock Production Specialist	None
	Forage/Range Specialist	None
	Research/Training/Liaison Officer	None
	Asst. Training Officer (Mid-level)	None
	Plant Pathologist	None
	Gum Arabic Specialist #1	Zakaria Saad
	Gum Arabic Specialist #2	None

El Fasher

Agricultural Economist	None
Social Scientist	None
Animal Production Specialist	None
Animal Production/Nutrition Specialist	None
Animal Health (Coop. with Vet. Dept.)	None
Range Management Specialist	None

Ghazala
Gawazat

Production Systems Agronomist	None
Groundnut Breeder	None
Agricultural Economist	None
Social Scientist	None
Animal Production Specialist	None
Animal Health Specialist	None
Range Scientist	None
Liaison/Extension (Mid-level)	None

Khartoum
(Later at
El Obeid)

Project Director

Dr. Dafalla Ahmed
Dafalla

Various
Locations

Production Specialists - 12
(Extension/Liaison)

Table 4. Summary of Present Training Activities and Workshops During the Report Period

Type of Training Discipline	Name	University	Date Began Training	Anticipated Completion Date
A. Ph.D. Degree Training				
1. Agronomy	Hassan Osman Ahmed El Awad ¹	Univ. of California	July 1983	Sept., 1984
2. Ag Engineering	Mekki Abdelatif Omer	Washington State Univ.	June 1981	June 1987 ²
3. Forestry (Gum Arabic)	Farouk Mohamed El Hadi	Washington State Univ.	June 1981	Aug. 1987 ⁴
4. Soils/Soil Fertility	Gadel Karim Mohamed Madibo ³	Univ. Calif. Riverside	July 1982	Sept. 1985 ⁴
5. Range/Livestock	Moustafa Ahmed Rahman ⁴	Utah State University	May 1982	Jan 1985
6. Ag. Economics	Tighani Mirghani El Amin	Washington State Univ	June 1981	Sept. 1985 ⁴
7. Range Management	Ahmed S. El Wakeel	Utah State University	Sept. 1982	June 1986 ⁴
8. Agronomy/Breeding	Ibrahim Mohd. Daw El Madina	Univ. Calif Riverside	Jan. 1983	Sept. 1988 ⁴
B. MSc/MA Degree Training				
1. Soils	Babiker Abdalla Ibrahim	Washington State Univ.	Jan. 1983	Jan. 1985
2. Economics	Sid Ahmed Hassan Sid Ahmed	Washington State Univ.	Sept. 1983	Jan. 1986 ⁴
3. Animal Production	Abdel Gadir Ajeeb	Washington State Univ.	June 1983	Jan. 1986 ⁴
4. Social Science	Mohmud Ayed Mekki	Washington State Univ.	June 1983	Jan. 1986 ⁴
5. Extension	To be identified	?	Jan. 1984	Sept. 1986 ⁴

¹ Supported by ARC until July 1, 1983

² Extend beyond current CID contract period

³ Supported by ARC until July 1, 1982

⁴ Previously supported by ARC; in Sudan conducting research

C. Non-Degree Training and Participation in Workshops/Conferences

		<u>Inclusive Dates</u>
1. Egypt Major Cereals Project	Muhktar Kenani	14 April-12 May, 1983
2. CIMMYT FSR Seminar, Nairobi	Dr. Dafalla	18 April-20 April, 1983
3. Agro-Forestry, University of Idaho	Zacharia Saad	Aug. 1983-May, 1984
4. USAID Procurement Workshop, Khartoum	Osman Abdalla Mohamed	4 Oct.-7 Oct., 1982
5. "	Ms. Shirley Higgins	" "
6. Desertification Workshop, Khartoum	Zacharia Saad	20 Feb.-24 Feb., 1983
7. "	Dr. Dafalla	" "
8. "	Dr. Owens	" "
9. "	Dr. Teitelbaum	" "
10. Animal Nutrition New Mexico State University and Washington State University	Dr. Babo Fadlalla	10 July-14 August
11. Striga Workshop North Carolina State University	Dr. El Hag Abu Gasin	6 Aug. - 26 Aug

D. Workshops, Meetings and Conferences (Sponsored Partially or Wholly by ARC/WSARP)

<u>Workshops, Meetings and Conferences</u>	<u>Dates</u>
1. Farming Systems Workshop, Khartoum	2-4 April
2. Kordofan Regional Workshop, El Obeid	9-10 April
3. Darfur Regional Workshop, El Fasher	11-12 April
4. Horticulture Workshop, Wad Medani	20-24 March
5. Ghazala Gawazet Research Planning Workshop, Khartoum	31 May-1 June
6. Joint Tour of Southern Darfur and Interaction with Western Savannah Development Corporation, S. Darfur	3 May-7 May
7. WSARP Advisory Council, Khartoum	25 Oct.

Table 5. US Scientific and Support Staff

	<u>Name</u>	<u>Position/ Discipline</u>	<u>Date of Initial Appointment</u>
A.	In Sudan		
1.	In Khartoum		
	Dr. G. Owens	Deputy Project Director	October 15, 1981
	Dr. D. Higgins	Project Engineer	June 16, 1980
	Mr. Lee Stenquist ¹	Administrative Officer	April 1, 1981
	Mr. John Hannum	Administrative Officer	April 23, 1983
	Ms. S. Higgins	Deputy Administrative Officer	October 4, 1980
	Dr. J. Riley	Senior Research Advisor to the DG of ARC	June 16, 1980
	Mr. H. Bergman	Supervising Architect	August 1, 1981
	Ms. P. Sulit	Senior Secretary	
	Ms. D. Bergman	Secretary	
2.	In Kadugli		
	Dr. T. Bunderson	Range Scientist	Sept. 15, 1980
	Dr. R. Cook	Animal Production Specialist	July 22, 1982
	Dr. J. Gingrich	Production Agronomist	May 12, 1982
	Dr. J. Teitelbaum	Social Scientist	January 8, 1982
	Dr. N. Patrick	Agricultural Economist	March 20, 1982
	Mr. A. Cenidoza	Maintenance Officer	Sept. 26, 1982
	Ms. B. Michael	Research Associate/ Social Science	Sept. 27, 1982
3.	El Obeid		
	Dr. L. Arya	Soil and Water Specialist	Sept. 2, 1983 (Anticipated)

¹ Completed tour

B. In the US

1. Washington State University

Dr. J. Henson	Campus Coordinator	August 17, 1979
Dr. J. Noel	Deputy Coordinator	August 17, 1979
Ms. K. Nicholas	Secretary	
Mr. S. Peterson	Purchasing Assistant	

2. Consortium for International Development

Dr. J. Fischer	Executive Director	August, 1979
Dr. J. Kearns	Deputy Ececutive Director	March, 1983
Dr. J. Reuss	Deputy Director	August, 1980

Table 6
 Sudan Contract AID/afr-c-1539
 Expenditures for Period 8/16/82 - 8/15/83
 and Cumulative Expenditures through 8/15/83

	<u>Expenditures 8/16/82 - 8/15/83*</u>	<u>Cumulative Expenditures through 8/15/83*</u>
Salaries	\$ 532,016.50	\$1,283,830.27
Fringe Benefits	97,746.98	225,937.28
Consultants	-0-	29,448.36
Differential & Allowances	205,917.16	481,868.75
Travel & Transportation	72,743.96	383,758.98
Equipment & Materials		
Expendable	284,618.65	284,618.65
Non-expendable	109,426.67	1,348,083.34
Participant Training	91,855.30	135,692.54
Other Direct Costs	14,198.02	290,206.54
Subcontracts	294,840.05	2,306,585.25
Indirect Costs	348,839.24	980,832.07
CID G & A	<u>156,867.92</u>	<u>553,320.57</u>
TOTAL	<u>\$2,209,070.45</u>	<u>\$8,304,182.60</u>

*Expenditures for 8/1/83 to 8/15/83 are estimates.

Table 7A

Project Time Frames from October, 1980 to December, 1981

7/12

Table 7A
 TIME FRAME
 WSARP PROGRAM
 October, 1980 - December, 1981

YEAR	1980			1981												
	MONTH	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Construction Program																
Kadugli	Construction	→ Housing Finished														
Other Sites	Final	Tender Document Preparation	Tender	Evaluate Tenders and Mobilization Sign Contract			Contractor Mobilization	Construction								
- 75 -	Designs	Preparation Pre-qualify Contractor	Site Engineers and Clerks of Works Identified and Begin Grube Zimmer Supervision Contract Negotiated and Signed USAID Construction Funds Approved				→									
	Project Support Unit	Evaluate Functions and Expand Activities	Hire Additional Staff	US			Hire Senior Administrative Officer	Expand and Improve Functions	→							
	Aircraft Tenders Evaluated Develop Aircraft Use Policy	Renegotiate for Aircraft Adverse Pilot and Mechanic	Purchase Aircraft	US			Aircraft Prepared	Aircraft Functional	→							

Table 7A

YEAR	1980			1981											
MONTH	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Advisory Committee	Further Identify Composition and Function					Appoint Advisory Committee						Advisory Committee Meeting			
General Procurement Equipment and Supplies					9 PU from US		AID 6 mo. Report Due Wash., DC	9 PU to Khartoum			Additional Vehicles Arrive KRT		AID Annual Report Due	CiD Site Visit and Evaluation	
Additional Vehicles Ordered					New Project Director		Henson/ Noel to Khartoum - Project Status and Admin, Mto	Additional Vehicles Leave US							
Supplies and Equipment Purchasing & Shipping			Order 6 Trucks				Trucks Leave US			Trucks Arrive KRT					
Research Planning	Planning Meeting for 1980-81 and 81-82														CiD Review
Research Implementation and Staffing for Integrated Crops and Livestock on Cracking Clays															
Sociology															
Range															
Plant Protection Agency															
Livestock															
Ag. Engineering															
Agroclimatology															
Economics															

YEAR	1980			1981												
	MONTH	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Gun Arabic (El Obeid)																
Animal Health (IARFAM)								→		→		→		→		→
Cooperative Activities - ARC;																
Range; Live- stock; Sociol- ogy; Animal Health																
Consultants																
Library								→								
Equipment								→								
Maintenance								→								→
Soils								→								
Range		→	→												→	→
Animal Health		→	→												→	→
Livestock		→	→												→	→
Economics		→	→												→	→
Aq. Engineering		→	→												→	→
Plant Protection								→								
Horticulture Evalu- ation/Planning (with ARC)								→							→	

Table 7B

Project Time Frames for Life of Project (prepared October, 1982)

3. El Obeid

- a. Gum Arabic
- b. Other

4. El Fasher

5. Ghazala Gawazat

6. Central Research Support Activities at Headquarters

D. Staffing

1. Khartoum (liaison Office)

- a. Administration
- b. Support

2. Kadugli

- a. Administration
- b. Scientists
- c. Technicians
- d. Support Staff

3. El Obeid

- a. Administration
- b. Scientists
- c. Technicians
- d. Support

4. El Fasher

- a. Administration
- b. Scientists
- c. Technicians
- d. Support

	1979	1980	1981	1982	1983	1984	1985
3. El Obeid							
a. Gum Arabic	████████	████████	████████	████████	████████	████████	████████
b. Other					-----	████████	████████
4. El Fasher							
5. Ghazala Gawazat					-----	████████	████████
6. Central Research Support Activities at Headquarters						████████	████████
D. Staffing							
1. Khartoum (liaison Office)							
a. Administration							
b. Support		-----	████████	████████	████████	████████	████████
2. Kadugli							
a. Administration							
b. Scientists			-----	████████	████████	████████	████████
c. Technicians			-----	████████	████████	████████	████████
d. Support Staff			-----	████████	████████	████████	████████
3. El Obeid							
a. Administration							
b. Scientists						-----	████████
c. Technicians						-----	████████
d. Support						-----	████████
4. El Fasher							
a. Administration							
b. Scientists						-----	████████
c. Technicians						-----	████████
d. Support						-----	████████

5. Ghazala Gawarit

- a. Administration
- b. Scientists
- c. Technicians
- d. Support

E. Training

- 1. Long-term
- 2. Short-term
- 3. Short-courses/Workshops

F. Commodities and Equipment

- 1. Supplies
- 2. Research Equipment
 - a. Kadugli
 - b. Other stations
- 3. Vehicles
 - a. Pick-ups/Vans/etc.
 - b. Lorries
- 4. Tractors and Attachments
- 5. Maintenance/Shop Equipment

G. Aircraft

- 1. Purchase
- 2. Operations

[-----] Represents activities being carried out prior to project initiation
 [-----] Represents moderate project inputs and
 [-----] Represents completely functional under project auspices

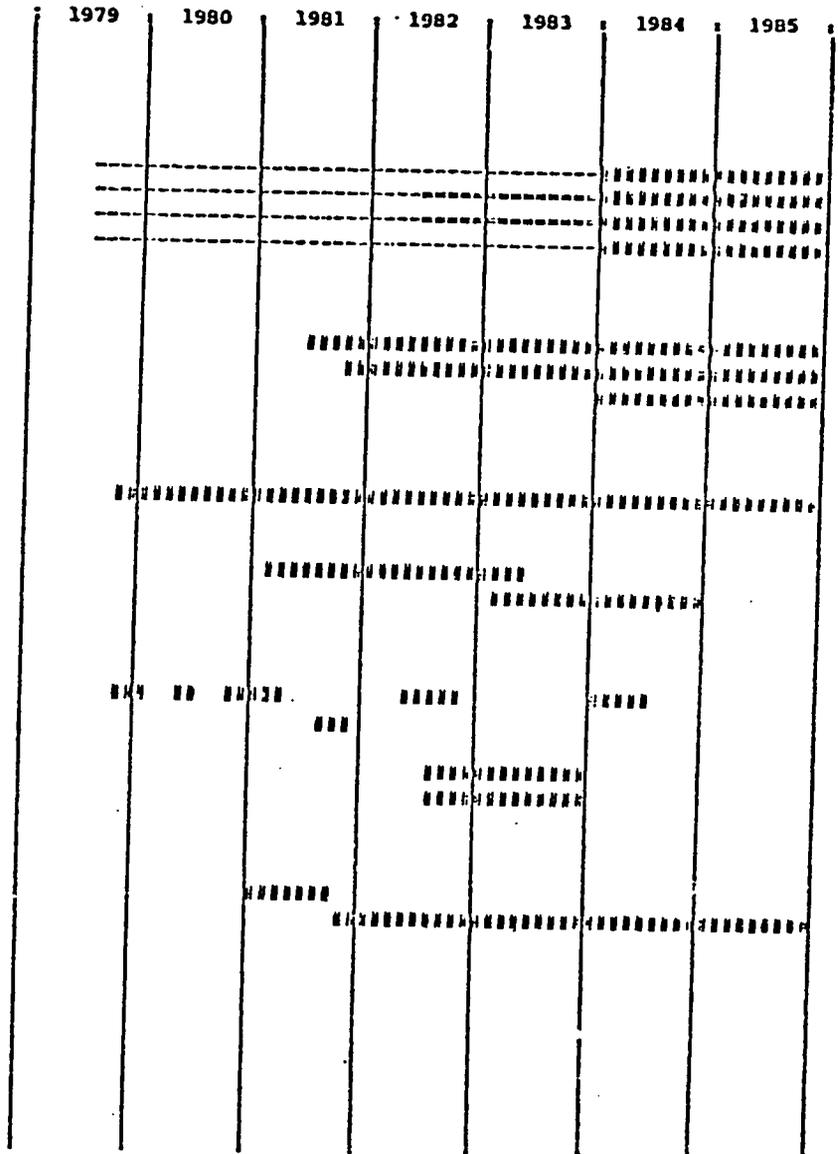


Table 8. REVISED TIME FRAME LIFE OF PROJECT (Prepared October, 1983)¹

	1979	1980	1981	1982	1983	1984	1985
AID/CID Contract Signed	##						
A. Administration							
1. Administration (WSU)	#####	#####	#####	#####	#####	#####	#####
2. Headquarters (Khartoum)	-----#	#####	#####	#####	#####	#####	#####
3. Headquarters (El Obeid)						#####	#####
4. PSU	=====	=====#####	#####	#####	#####	#####	#####
B. Construction							
1. Kadugli							
a. Planning, Tenders and Supervision		######	#####	#####			
b. Facilities		#####	#####	#####			
c. Farm				#####	#####	#####	
2. Other Sites							
a. A/E Activities (Planning, Tenders, Supervision)		#####	#####	#####	#####	#####	
b. El Obeid							
(1) Facilities			#####	#####	#####	#####	
(2) Farm	=====	=====	=====	=====	=====#####	#####	
c. El Fasher			#####	#####	#####	#####	
d. Ghazala Gawazat			#####	#####	#####	#####	
e. Khartoum Office			#####	#####	#####	#####	
f. Force Account		#####	#####	#####	#####	#####	#####
C. Research Programs							
1. Planning/Monitoring/Evaluation	##	##	##	##	##	##	##
2. Kadugli							#####
a. Agronomic	-----	-----	-----	-----#####	#####	#####	#####
b. Other				#####	#####	#####	#####

	1979	1980	1981	1982	1983	1984	1985
3. El Obeid							
a. Gum Arabic	#####	#####	#####	#####	#####	#####	#####
b. Other					=====	#####	#####
4. El Fasher					=====	#####	#####
5. Ghazala Gawazat					====	=====	#####
6. Central Research Support Activities at Headquarters						###	#####
D. Staffing							
1. Khartoum Office							
a. Administration		=====	=====	#####	#####	#####	#####
b. Support		=====	=====	#####	#####	#####	#####
2. Kadugli							
a. Administration	-----	-----	-----	-----	-----	-----	-----
b. Scientists	-----	-----	-----	-----	-----	-----	-----
c. Technicians	-----	-----	-----	-----	-----	-----	-----
d. Support Staff	-----	-----	-----	-----	-----	-----	-----
3. El Obeid							
a. Administration	-----	-----	-----	-----	-----	-----	-----
b. Scientists	-----	-----	-----	-----	-----	-----	-----
c. Technicians	-----	-----	-----	-----	-----	-----	-----
d. Support	-----	-----	-----	-----	-----	-----	-----
4. El Fasher							
a. Administration						#####	#####
b. Scientists						#####	#####
c. Technicians						#####	#####
d. Support						#####	#####
5. Ghazala Gawazat							
a. Administration	-----	-----	-----	-----	-----	-----	-----
b. Scientists	-----	-----	-----	-----	-----	-----	-----
c. Technicians	-----	-----	-----	-----	-----	-----	-----
d. Support	-----	-----	-----	-----	-----	-----	-----

1979 1980 1981 1982 1983 1984 1985

6. US Staff							
a. In Sudan	###	#####	#####	#####	#####	#####	#####
b. In US	#####	#####	#####	#####	#####	#####	#####
E. Training							
1. Long-term			#####	#####	#####	#####	#####
2. Short-term			###	#####	#####	#####	#####
3. Short-courses/Workshops					#####	#####	#####
F. Commodities and Equipment							
1. Supplies	##	#####	#####	#####	#####	#####	#####
2. Research Equipment							
a. Kadugli			#####	#####	#####	###	
b. Other stations					#####	#####	#####
3. Vehicles							
a. Pick-ups/Vans/etc.	###	###	###	###			
b. Lorrays			###	###			
4. Tractors and Attachments/ Other Farm Equipment				#####	#####	#####	
5. Maintenance/Shop Equipment				#####	#####	#####	
G. Aircraft							
1. Purchase			#####				
2. Operations				###	#####	#####	#####
H. Maintenance Program							
1. Vehicles							
2. Facilities						#####	#####
a. Kadugli						#####	#####
b. Other Sites						#####	#####

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1 ----- Represents activities being carried out prior to project initiation or low level inputs including staffing
 ===== Represents moderate level of project inputs, including staffing
 ##### Represents high levels of inputs under project auspices

Table 9. LIST OF WSARP PUBLICATIONS

<u>Publication No.</u>	<u>Title</u>	<u>Date</u>
1	WSARP General Outline of Early Planning and Implementation Requirements	1979
2	Scope of Work for Initial WSARP Activities	1980
3	Consultant Report on Range-Livestock by Dr. D. Dwyer	1980
4	First Annual Report	1980
5	Summary of WSARP Planning Meeting October-November 1980 including Consultants Reports	1980
6	The Horticultural Resources of the Kordofan Region of Sudan	1982
7	Second Annual Report	1981
8	Consultants Report on Research Station Development by Mr. D. Meinhart	1980
9	Consultant Report on Livestock Production by Dr. T. Wilson	1980
10	Annual Report on Range Research by Dr. W. T. Bunderson	1981
11	WSARP Social Perspectives on Agricultural Research and Development in the Southern Kordofan, Sudan: Systems of Agricultural Production Among the Nuba by Dr. F.P. Arango	1981
12	Consulting Report on Range Research by Dr. D. Dwyer	1981
13	Work Plan, Volume I, General Research Program and Plans	1982
14	Work Plan, Volume II, Project History and Functional Structure	1982
15	Work Plan, Volume III, Research Plan for the Kadugli Research Station	1982
16	Review of Seed Program in Sudan by Dr. J. Maguire	1982

<u>Publication No.</u>	<u>Title</u>	<u>Date</u>
17	Report of Visit to Sudan to Review Fruit Tree Research Program and Related Factors by Dr. A. H. Krezdorn, Consultant	1983
18	Work Plan, Volume IV, Initial Research Proposals -- Kadugosi Research Station	1983
19	Fourth Annual Report	1983
20	Summary of Darfur and Kordofan Regional Planning Workshops by Dr. J. Riley	1983

Table 10
WSARP
FURNITURE AND BASIC EQUIPMENT LISTS
AND
COST ESTIMATES

August 20, 1983

SUMMARY OF EQUIPMENT/FURNITURE PURCHASES

SE PURCHASES

Item	Quantity Per Station				Total	Cost/ Unit*	Total Cost*
	EO	EF	GG	K			
Senior Desks	20	7	11	4	42	375	15,750
Middle Desks	17	8	14	10	49	300	14,700
Jr/Sec Desks	13	8	10	5	36	225	8,100
Senior Chairs	20	7	11	4	42	120	5,040
Middle Chairs	17	8	14	10	39	120	4,680
Junior Chairs	13	8	10	5	36	48	1,728
Side Chairs	70	38	42	8	158	145	22,910
Straight Table Chairs	163	71	78	5	317	48	15,216
Lg. Seminar Tables	1	1	1	0	3	235	705
Bookcases	27	10	15	5	57	145	8,265
File Cabinets	55	15	20	10	100	265	26,500
Coffee Tables	22	10	14	2	48	75	3,600
Tea Tables	42	19	27	5	93	40	3,720
Couch Set	2	3	3	0	8	885	7,080
Easy Chairs							
Locking Cabinets	23	16	15	5	59	240	14,160
Sm. Deskside Tables	19	7	11	4	41	150	6,150
Work Tables	41	27	21	10	99	150	14,850
Reading Table 3x1m	9	0	0	0	9	200	1,800
Reading Table 2x.6m	20	0	3	2	25	200	5,000
Podium	3	1	1	2	7	100	700
Dining Table 1x2m	8	3	3	1	15	235	3,525
Flameproof Cabinet (see also \$ purchase)	0	3	3	0	6	?	?
Freezers	5	3	4	1	13	1500	19,500
Refrigerators	13	6	7	2	28	1500	42,000
Twin Beds	19	15	15	8	57	85	4,845
Wardrobes	8	5	5	4	22	450	9,900
Buffets	3	3	3	1	10	1250	12,500
Nightstands	8	5	5	4	22	150	3,300
Lawn Chairs	54	30	36	10	130	100	13,000
Shelving	46	46	11	50	153	380/set	58,140**
Cookers	2	2	2	1	7	1000	7,000
Miscellaneous							10,000
*Cost is figured in 1982 prices							364,364

**Shelving - estimated cost on basis of GPO figures for Metal Shelving @SE 255 +50%

GRAND TOTAL 424,364 adding SE60,000 for KHT

SUMMARY OF EQUIPMENT/FURNITURE PURCHASES

\$ PURCHASES

Item	Quantity Per Station				Total	Cost/ Unit*	Total Cost*
	EO	EF	GG	K			
Stacking Conference Chairs	100	50	50	50	250	80/4	5,000
Microfiche Storage Files	4	1	1	1	7	800	5,600
Copying Machine	1		5	(1)	6	6000	36,000
Microfiche Readers	6	1	1	1	9	250	2,250
Floor Card Catalogs	1	0	0	0	1	1200	1,200
Library Stacks (20" x 4m x 5)	4	1	1	0	6	900	5,400
Periodical Display Racks	3	1	1	1	6	200	1,200
AV Mobil Security Cabinet**	1	1	1	1	4	500	2,000
Lab Stools	36	17	18	10	81	125	10,125
Acid-proof Chemical Cabinets	5	3	3	2	13	550	7,150
Explosion Proof Cabinets	5	3	2	2	12	600	7,200
Glassware Carts	8	5	4	3	20	250	5,000
Sterilizing Oven	1	1	1	1	4	1500	6,000
Stills	4	3	1	1	9	3000	27,000
Autoclaves (In Contract)	(1)	(1)	(1)	1	1	2000	2,000
Air Conditioners	(1)	(1)	(1)	1	1	600	600
Washer	2	2	2	2	8		
Portable Film Screens	2	2	2	2	8	125	1,000
Paraffin Stoves	Miscellaneous St						
Demineralizers**	2	2	2	2	8	250	2,000
Duplication Equipment	1	0	0	0	1	1000	1,000
Mimeograph Equipment	2	0	0	0	2	500	1,000
Projection Table	1	1	1	0	3	200	600
9 x 9 screen	1	0	0	0	1	200	200
Book Trucks**	2	0	0	0	2	150	300
AV Storage Cabinet**	1	0	0	0	1	600	600
Plastic Pamphlet Files**	72	0	0	0	72	.30	240
Grinding Machine**					1	1000	1,000
Miscellaneous							5,000

*Cost using 1982 figures

**Not listed on the separate station needs, added when final equipment lists created.

TOTAL	126,665
SHIPPING	63,333
	189,998

EL OBEID (cont.)

<u>Area</u>	<u>Item</u>	<u>Amount</u>
Guesthouse	Washer	1
Junior (Bachelor) Guesthouse	Washer	1
Guesthouse/Conference Meeting Rooms	Portable Screens	2
Tea Rooms	Paraffin Stoves	4
Map Room	Map Storage Cabinet	1

GHAZALA GAWAZAT

<u>Area</u>	<u>Item</u>	<u>Amount</u>
Tea Kitchen	Paraffin Cookers	3
Research Labs	Laboratory Stools	17
	Clean-up Carts	5
	Autoclave	(1)
	Sterilizing Oven	1
	Stills	4
	Acid Proof Storage	3
	Explosion Proof Storage	3
	Air Conditioner	(1)

NOTE: Items indicated with () around the amount need to be verified on the contract for construction.

SPECIAL EQUIPMENT (DOLLAR PURCHASES)

EL FASHER

<u>Area</u>	<u>Item</u>	<u>Amount</u>
Tea Kitchen	Parafin Cookers	3
Equipment Room	Labstools	4
Research Labs	Labstools	14
	Explosion Proof Storage	2
	Acid Proof Storage	3
Clean-up Room	Autoclave	1
	Sterilizing Oven	1
	Glassware Carts	4
	Stills	2
Conference Meeting Room	Screen	1
	Stacking Chairs	50

EL OBEID

<u>Area</u>	<u>Item</u>	<u>Amount</u>
Main Conference Room	Stacking Chairs	100
	Projection Table	1
	9' x 9' Screen	1
Conference/Library Room	AV Equipment Cabinet	1
Library	Microfiche Storage Files	4
	Copying Machine	1
	Duplicating Equipment	1
	Mimeograph-type	1
	Microfiche Readers	6
	Periodical Display Racks	3
	Floor Card Catalog	1
	Double Stacks (metal 20" x 4m x 5 high)	4
Research Labs (all rooms)	Lab Stools	36
	Explosion Proof Storage	5
	Acid Proof Storage	5
	Glassware Carts	8
	Sterilizing Oven	1
	Stills	5
	Autoclave	(1)
	Air Conditioner	1

EL OBEID (cont.)

	Senior Desks	Middle Desks	Jr/Sec Desks	Senior Chairs	Middle Chairs	Junior Chairs	Side Chairs	Straight Chairs	Ln. Seminar Table Chair	Bookcases	File Cabinets	Coffee Cabinets	Tea Tables	Couch	Lacy Chairs	Locking Chairs	Sp. Lockside Cabinets	Work Tables	Reading Table 3x1m	Reading Table 2x.6m	Podium	Dining Table 1x2m	Flareproof Cabinet	Freezers	Refrigerators	Twin Beds	Wardrobes	Buffets	Lightstands	Loung Chairs	1.2m x .3m Shelf	1.2m x .6m Shelf	.9m x .6m Shelf/Bin	Recy Bins 1.6m approx	Cooler			
Workroom		1		1		6				3					2	2																						
Library Storeroom						1									2	1													5									
Librarian Office	1			1		2			1	2																												
*Naproom						4											2																					
*Reading Room/Stacks	1		1			22				5							1	3	5																			
*Conference Room																	2		15	1																		
Research Building																																						
Sr. Sci. Office (14for16)	16		16		32				16	16	16	16				16																						
Technician Spaces (3)		11		11						3	6																											
*Research Labs (4)															4	6							4	10														
*Equipment Room															1	2																						
*Inoculation Room																	1																					
*Clean-up Room																	2																					
Support Work Room						6			1	2					1	2																						
Maintenance Building																																						
Office (Veh. Maint. Area)		1			1					2																												
Car./Plumb (2 tool rooms)						2											2												4									
Car./Plumb. "Oil Room"																																						
Veh. Maint. Tool Room					1																								2						1			
Veh. Maint. Parts Room																														4					3			

EL FASHER (cont.)

	Senior Desks	Child Desks	Jr/Sec Desks	Senior Chairs	Child Chairs	Junior Chairs	Side Chairs	Strait Chair	Ln. Seminar Table Chair	Bookcases	File Cabinets	Coffee Tables	Tea Tables	Couch	Fazy Chairs	Locking Cabinets	Sm. Ickside Tables	Work Tables	Reading Table 3x1m	Reading Table 2x.6m	Refrigerator	Flameroor Cabinet	Freezers	Refrigerators	Twin Beds	Hard-robes	Buffets	Hinrt-stands	Lain Chairs	1.5m x .3m Shelf (5)	1.5m x .6m Shelf/Bin	.2m x .6m Shelf/Bin	Recg Bins (.6m) oppr	Copier			
*Equipment Room															1	2						1															
*Clean-up Room																						1															
Maintenance/Farm Equip. Bldg																																					
Car/Plumb Tool Room (2)							2																														
Vehicle Maint. Tool Room																																					
Vehicle/Maint. Office			1		1					2					3																						
Oil Storage																																					
*Warehouse Tea Kitchen							1																														
Warehouse Store																																					
Warehouse Office			1		1					1																											
Warehouse																																					
Conference Center																																					
Kitchen															2	2						1														1	
Dining Room							10																			2											
*Meeting Room (1)							25																														
Veranda																																					
Guesthouse																																					
Bedrooms (2)						4					2														6	2		2									
Saloon						3			1		1		1																								
Verandan																																					

Appendix I
Quarterly Reports

WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT
QUARTERLY REPORT
July 01 - Sept. 30, 1982

I. GENERAL

Prof. Mohamed Bakheit Said, Director General-ARC and Dr. Dafalla Ahmed Dafalla, Director-WSARP, traveled to the United States in July and August for consultation with CID officials in Tucson and WSU officials in Pullman. They visited various research stations in the U.S. including Griffin Research Station in Georgia because of their particular interest in groundnuts. They also visited the University of California at Riverside in connection with the ARC/WSARP training program. While in Arizona, they visited the Office of Arid Lands Studies at U of A. Dr. Dafalla visited the Arab Center for Studies in Arid Zones and Dry Lands in Syria on the return trip.

Shirley and David Higgins went on home leave in late July. They will spend several working days in Pullman before returning to the Sudan.

The Riley family returned from home leave in July and Carryll Patrick joined her husband in Kadugli.

Joachim Grube of the architect firm Grube-Zimmer visited the Project in early July.

Mr. Hans Veen, World Bank Project Manager for WSARP, visited the Project in early August. He met with project personnel, USAID and World Bank officials from the Khartoum office regarding the upcoming evaluation.

The Dergmans went on R and R for one month in August-September. Mr. Don Pudertough of G-Z was in Sudan for an initial overlap with Hank Bergman and to represent the Supervising Architect firm while Bergman was on R and R.

Prof. James Maguire, seed technologist from WSU, was in Sudan from 11 August until 09 September. Although he was not funded by the Project, Dr. Maguire consulted on project germplasm management and seed technology requirements in Kadugli, and will prepare a report for the Project. In addition, Dr. Maguire consulted with the regional government in Kordofan, ARC, National Seed Administration and others.

Dr. Bunderson visited Ethiopia and Kenya during July and August where he obtained literature for the library, ordered seeds and consulted with regard to classification of the WSARP herbarium. His trip report is on file.

Dr. Owens travelled to Pullman in September on project business.

Quarterly Report
July 01-Sept. 30, 1962

II. PHYSICAL PROGRESS

A. Construction

KADUGLI

The contractor in Kadugli has been further slowed by fuel shortages and labor problems. It is evident that final completion of construction certificate will not be issued until some time in the fourth quarter. However, contractor has completed key facilities which allowed scientists to begin moving into Senior Houses in August.

OTHER SITES

Water shortages, transportation problems, material shortages and lack of key personnel have slowed construction at El Fasher, Ghazala Gawazet, Shambat and particularly El Obeid. The ban imposed on timber harvesting in North Kordofan last April has slowed brick production. Contractors failure to submit samples of construction material to be imported for Supervising Architect approval are cause for concern.

It is evident that a time extension will have to be granted to contractor (El Khider-Diraga) and it is likely that he will qualify for significant additions to contract amount as provided in the "Economic Dislocation" clause.

B. Force Account

Dr. Patrick supervised force account work in Kadugli during the absence of Dr. Higgins. Work continued on fencing, Seraf drainage and Seraf water supply.

III. STAFFING AND MANAGEMENT

Staff appointments during the third quarter are as follows :

<u>NAME</u>	<u>POSITION</u>	<u>DATE</u>	<u>STATION</u>
Dr. Richard Cook	Livestock Prod.Specialist	21 August	Kadugli
Abdel Magid Zaki	Transport Officer	10 July	Khartoum
Hasir El Din Hassan	Senior Clerk	01 July	Khartoum
Omar Daud	Messenger	06 July	Khartoum
Amal Mahmoud	Secretary	28 August	Kadugli
Kiral Faiwan	Watchman	01 August	Khartoum
Hassan Daud	Resident Engineer	01 August	El Fasher
Mahmoud Awad	Research Assistant	01 Sept.	Kadugli

Quarterly Report
July 01-Sept. 30, 1982

<u>NAME</u>	<u>POSITION</u>	<u>DATE</u>	<u>STATION</u>
El Sheik Bushara	Electrician	01 Sept.	Kadugli
Mohamed Adan	Driver	24 Sept.	Khartoum
Yacoub Juma	Stores laborer	20 Sept.	Khartoum

Various committees were appointed by Mukhtar Kenani, Kadugli Station Director. These were set up in July primarily in connection with the anticipated move to the Seraf.

- Laboratory Utilization : Babu, Gingrich, Cook
- Office Space Allocation : Kenani, Patrick, Abdulgadir and Teitelbaum
- Housing Allocation : Kenani, Babu and representatives from the Laborers Union.
- Landscaping : Kenani, Ali Mohana, Gingrich, Patrick and Maya Teitelbaum.

Osman Abdalla, El Amin and Lee Stenquist (Khartoum Administrator/PSU) visited Kadugli in mid-August for discussions with WSARF administration and to familiarize themselves with operations at Kadugli station.

Several shipments of household furniture, office furniture, fuel and other equipment were sent to Kadugli during the third quarter, primarily on WSARF lorries.

Drs. Dafalla, Owens and Riley visited Kadugli on various occasions during the quarter.

Four trainees were a welcome addition to the Kadugli staff during the third quarter. They are :

Saig El Tayeb	Agr. Economics
Moh. A. El Feel	Agr. Economics
Abdul Gadir Ageeb	Livestock Production
Babiker Abdulla	Soil/Agronomy

IV. FINANCE

The quarterly financial statement is attached.

V. PROJECT IMPACT

Despite the low morale of Expatriate Staff in Kadugli, considerable progress was made in developing the Work Plan, writing research proposals, developing questionnaires, making reconnaissance visits, construction of animal shelters and pens, and planting of agronomy trials.

Quarterly Report
July 01-Sept. 30, 1962

Trials established at Tiloh and El Afin are as follows :

1. Sorghum National Variety Trial
2. Sorghum Local Collection
3. Sesame (Local) Variety Trial
4. Nitrogen Response - Gwar
5. International Sorghum Disease Resistance Testing
6. INPSOY International Soybean Variety Evaluation
7. IITA Soybean Observation Nursery
8. Striga in Sorghum #1 25 varieties
9. Striga in Sorghum #2 8 varieties
10. ICRISAT Evaluation of Striga Resistance
11. Effects of Cultural Practices on Incidence of Striga
12. Elite Experimental Sorghum Hybrid Yield Trials
13. Elite Experimental Sorghum Hybrids-Advanced Regional Testing
14. Seed Dressing Trial-Control of Covered Smut
15. Elite Sorghum Variety Trial-(Open varieties)
16. AVRDS (Taiwan) Soybean Evaluation Trial

The French animal traction team SATEC, GtZ and others also conducted agronomy trials in South Kordofan.

A group of Dinka people were engaged to construct an animal shelter of the type used further south where animals remain throughout the rainy season. This shelter, known as the Dinky Dome is constructed altogether with local materials and will accommodate more than fifty cattle. Smudge fires inside the shelter protect cattle from biting flies at night.

III. FUTURE WORK PROGRAM.

Much of the fourth quarter will be devoted to final preparations for the external evaluation, and for the evaluation itself. We expect WSU Campus Coordinator to arrive before and remain throughout the evaluation. The evaluation team will have to be provided with an overall WSARP Research Work Plan, a detailed work plan for Kadugli station, specific research proposals and background material.

Observations will be continued of the WSARP agronomy trials during the fourth quarter and the trials will be harvested.

Soil sampling of the research farm and range enclosures will be carried out during the fourth quarter. Range Vegetation sampling and analysis will continue.

Ordering and shipment of research equipment and supplies will continue during the fourth quarter, and the wet lab. in Kadugli will be set up.

Quarterly Report
July 01-Sept.30, 1982

the range/livestock section will harvest and store grass hay for supplemental feeding trials.

Diagnostic surveys will be initiated and conducted in connection with various livestock problems such as :

- herd characteristics; sedentary and transhumant
- livestock pests
- mineral deficiencies

A special effort will be to investigate the problems of livestock maintained year-round in the South on cracking clay soils.

Staff at Kadugli Station will continue efforts in defining production systems and identifying constraints. Specifically, formal surveys will be designed to study the Transhumant system and the Sedentary system. A marketing study is under consideration, which will probably be done in cooperation with an AID consultant group due in Western Sudan in late 1982.

VII. ISSUES

Numerous complaints were received from Senior expatriate staff in Kadugli, all of which were cited as contributing to low morale.

- lack of counterpart personnel
- inadequate backstopping by the Project Support Unit in Khartoum, or failure to deliver supplies; research equipment, beer, groceries, publications.
- poor communications at various levels, i.e. from Khartoum to Kadugli and between Sudan and WSU.
- delays in recruitment of administrative, technical and skilled labor personnel.
- erratic and sporadic service by the WSARP aircraft
- shortage of vehicles and spare parts
- lack of forward planning by Project management.

WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT
QUARTERLY REPORT
October 01 - December 31, 1982

I. GENERAL

A great deal of WSARP activities were devoted to final preparations for the external evaluation and to the evaluation itself. WSU Project Managers Henson and Noel arrived in Sudan on 24 October. Mr. Stuart Marples, World Bank Project Manager, arrived in early November. Dr. John Fischer, Managing Director of CID, arrived on 12 November. The evaluation team was composed of :

Dr. Kenneth Turk	Cornell Univ.	Team Leader
Dr. Micahel Collinson	CIMMYT	USAID Representative
Dr. John E. Vercoe	CSIRO	IBRD Representative
Dr. Hussein Idris	UNDP	GOS Representative

The major part of the review was undertaken during the period 13-29 November. Dr. Vercoe participated from 16 November to 18 November, and Dr. Collinson from 14 November to 25 November.

The external review team concentrated on the WSARP Work Plan and technical aspects of the project.

The Evaluation Team visited all project sites, including a four-day visit to Kadugli where they interacted with senior administrative and scientific staff, trainees and technical staff. They also visited ARC headquarters and Gezira Station in Wad Medani. In addition to their meetings with ARC and WSARP personnel, contractor personnel and donor representatives, the Evaluation Team met with representatives of Khartoum University, Regional Government officials, Ford Foundation, AID Director Mr. Arthur Mudge and the Minister of Agriculture, Dr. Osman Abdul Rahman Hakim.

A separate but related review of construction activities was conducted in October and November by USAID Engineering Consultant Mr. David Gephart. He worked with the Architect's representative in Sudan, Hank Bergman, officials of Karplen Consultants, Project Engineer Dr. David Higgins and others. Mr. Gephart made a careful review of project documents including contracts, and visited all construction sites. He met with Mr. Joachim Grube, senior partner of the A and E firm Grube-Zimmer and made a detailed presentation of his findings and recommendations on 14 November.

Mr. Osman Abdalla Mohamed, WSARP Assistant Director for Administration; Mr. El Amin Awad, Inspector of Accounts; Mr. Stenquist and Mrs. Higgins attended an AID sponsored Procurement Workshop held in Khartoum on 4 to 7 October.

Quarterly Report
October 01-December 31, 1982

Mr. James Hedrick, CID Secretary/Treasurer and Mr. Douglas Swenson, CID Auditor, visited the Project from 16 to 20 October. They did a sample audit and reviewed accounting procedures with WSARP staff in Khartoum.

Zakaria Saad, Station Director, WSARP/El Obeid, attended a desertification conference in October. Drs. Dafalla and Owens attended some sessions.

The first meeting of the WSARP Advisory Council, chaired by Prof. Mohamed Bakheit Said, Director General, ARC, was held on 25 October. The major item for consideration was the WSARP Work Plan.

The Sudanese pound was devalued about 40 percent on 15 November. This is expected to impact on project budgets, especially construction costs.

WSARP scientists interacted with members of an AID sponsored rural marketing study team in November. The work of this team, which included Dr. Ed Reeves, of Sorghum CRSP fame, and Mr. Noel Sanford, is of special interest to WSARP since marketing is an important extraneous element in both the sedentary and transhumant systems which must be carefully considered in development approaches.

Dr. Jean Kearns, CID Project Manager for WSARP, visited the Project in November and December.

Kadugli senior scientific staff visited Khartoum en masse from 30 November to 6 December. Unfortunately, they missed the wrapup meeting held by the Evaluation Team. They did participate in rehash sessions of the evaluation, visited ARC in Wad Medani and met with scientists from Khartoum University.

A meeting of the advisory committee for Range Science candidate Moustafa Rahma was held in Khartoum on 1 December. His research progress at Ghazala Gawazet was reviewed, and minor changes were suggested for his program.

Radios were installed and operating in Kadugli and Khartoum.

Several of the Kadugli staff participated in a SATEC field day, held at Hamra and Umm Serdiba. The field day demonstrated SATEC's activities in animal traction and agronomy trials.

Dr. Ernest Nunn, Station Manager and head of Physical Plant Construction and Services Division for ICRISAT in Andhra Pradesh, India, did a short consultancy for WSARP in November and December. His major objective was to assist in planning the development of Kadugli Station. He held discussions and made preliminary recommendations on a number of subjects.

- layout of experimental farm lands
- land utilization at Kadugli Station
- operations and maintenance - physical plant

- staffing requirements, O and M section
- supplies, tools and equipment requirements and management.

Dr. Nunn also reviewed plans for other WSARP stations for the purpose of making recommendations regarding construction, layout, staffing and operations. Dr. Nunn's final report is expected in early 1983.

Grube-Zimmer engineer Doug Shaw and Dan Pickett visited Sudan in late December to work with the Supervising Architect, Karplen Consultants and contractor personnel on electrical and mechanical engineering aspects of construction.

Significant quantities of imported items, including twenty vehicles arrived during the fourth quarter.

II. PHYSICAL PROGRESS

A. Construction

KADUGLI

The final certificate of completion for Kadugli Station was issued to the Contractor Construction and Trading Company (CAT) by Karplen Consultants.

EL OBEID

On-site inspections made on October 14 (Gephart, Bergman) and November 9 (Marples, Vescoe, Bergman).

Fourteen senior houses have brickwork complete to roof line. Placement of concrete tie beams in progress. These buildings will be ready for metal roofing within the next weeks. Roofing and framing is in Port Sudan.

Brickwork at exterior walls and internal partitions in progress at administration and research buildings. Conference center brickwork started and completed to 1 1/2 meter height.

Excavation nearly complete for sewage lift pump station. Excavation of sewage lagoon under sub-contract to Rural Water Corporation due to start third week November.

Brick production remains a problem at this site. Contrary to expectations, the new seasons local production is not yet available and in order to carry on the work, the contractor is importing bricks from Kadugli and Sennar. The Kadugli brick is of good quality but dimensions and color are not quite compatible with that produced in El Obeid. The one building started with this brick will be completed with the same brick but all future shipments from Kadugli will be produced from standard molds furnished by contractor. Sennar brick was rejected for use in

visible surfaces.

The contractor expects to make all the brick required to complete the station during this production season. Wood for firing and fuel for transport are still major obstacles.

Quality of workmanship is improving but there is still room for improvement.

The Resident Engineer has left the Project and his work is currently being done by the Clerk of the Works. A new Resident Engineer should be found as soon as possible.

EL FASHER

Inspection made November 1. (Datalla, Gephart, Higgins, El Amin, Bergman).

Work at this site was shut down from October 5 to 30 due to lack of cement. 30 tons arrived at Site on October 20 and work was getting underway with about six of 33 masons working. Contractor will supply 30 tons of cement each two weeks until stock is sufficient for whole job.

El Fasher has experienced a major drought this year with the worst conditions in 33 years. There has been no wadi flow and catchments are empty. All water is coming from boreholes and there is a crash program for water supply on a Regional basis. All construction and brick production have been banned except for the WSARP station. The Minister of Housing and Public Services has pledged all necessary water for construction and brick making.

The contractor will buy all suitable brick remaining and enter into contract with local brickmaker for the remaining brick requirements.

GHAZALA GAWAZET

Inspection made November 2 (Datalla, Gephart, Higgins, El Amin, Bergman).

Construction has been slowed due to shortage of fuel for pumping water. An agreement was reached whereby the contractor will furnish fuel for night pumping of water and daytime generation of power for construction. The remaining 1 1/2 million brick needed for completion can be produced this season.

Cement supply is low. Contractor has pledged to supply this station the same as El Fasher, 30 tons every two weeks.

Birckwork at Administration/Research and Conference/Guesthouse is complete to roof level. Foundation work is in progress at other areas. Work has caught up to and passed El Fasher.

Work at the station is being monitored by the Clerk of the Works. A resident engineer is needed as possible.

ARC HEADQUARTERS, KHARTOUM

Work has been stopped due to lack of imported materials. Very little further can be done until this arrives.

Warehouse building is complete to roof line, headquarters building shell and partitioning complete.

Air conditioning Variation Order will be executed as soon as Contractor completes pricing.

GENERAL

The construction activities underway to date are by nature time intensive and relatively inexpensive. Therefore completion percentages based solely on construction funds expended are misleading. Operations due to begin shortly, such as roofing, require much more money than time and this will alter markedly the completion percentages. Even so there is no question that the Project is behind schedule.

The contractor realizes the seriousness of this situation and has recently added a project manager to his staff charged with overall coordination of construction and purchasing. He is Sayed Ibrahim Omar El Amin, a qualified engineer with many years of experience who was until recently managing a major air base construction project in Saudi Arabia. He has been most cooperative to date and some of the urgent items we have been requesting for some time are starting to come forth. We will be meeting frequently from now on to expedite such things as product approval and purchases.

A Variation Order extending the construction period by 166 days has been executed. The new completion date is January 28, 1984 for all stations except Khartoum which remains at August 7, 1983.

A Variation Order for increased payment due to economic dislocation has been in negotiation for some months. It is currently in review at the Ministry of Finance and in the last few days the contractor has filled additional data for review. It is hoped that this matter can be resolved in the next two weeks. Additional costs have been estimated at LS 463,000.000.

Major obstacles to effective monitoring and administration of construction continue to be :

- A. Erratic and unpredictable scheduling of project aircraft. One visit per week to El Obeid and twice monthly to Fasher and Ghazala Gawazet are minimum at this stage of the work. More critical construction activities later will require more frequent trips.
 - B. Lack of communication with outlying sites. Rapid completion of the radio/telephone network would be of inestimable value and could conceivably cut down the number of flights required.
 - C. Inadequate transportation for project and consultant personnel at the sites i.e. inoperative or poorly maintained vehicles, lack of reasonable fuel supply for vehicles and aircraft.
- B. Force Account

KADUGLI

- Seraf-to-Farm Road

- Detailed surveying in order to map the marshy terrain between the seraf and the farm as a basis for understanding its hydrology and for recommending a road alignment and construction plan.
- Designed a drainage scheme for the marsh in the vicinity of the proposed road alignment.
- Liaison with COS Roads and Bridges and COS National Water Administration in Khartoum, Dilling and Kadugli to arrange their building the road.
- Road construction scheme failed due to Project having no fuel when R & B was ready, and to unavailability of R & B equipment when Project finally had fuel.
- Obtaining authorization from Kadugli authorities to build the seraf-farm road and to fence the airstrip.
- Prospected for and found some sand and gravel deposits near the seraf which may be useful in road building.

- Seraf Roads

- Construction of box culvert near entrance to station. Hand excavation in the stream bed to enlarge drainage capacity of channel downstream of culvert.

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- Mapping the natural surface drainage on the western portion of the station in order to plan drainage facilities and to coordinate them with internal roads.
- Changed the main gate location to suit the approach road requirements and the internal road plan.
- Drainage Works
 - Built some drainage works: masonry gully control weirs, masonry diversion walls and concrete wasteway.
 - Placed stone riprap along stream bank in vicinity of powerhouse to prevent further bank erosion. Riprap placement is unfinished.
- Fences
 - Fabricated some 4000 fence posts from steel angle iron with homemade facilities.
 - Finished fencing the seraf (4km), the airstrip (2km) and about 50 percent (7km) of the farm.
 - Arranged the seraf fencing so as to allow the cattle herders access to nearly all their traditional shallow wells.
- Seraf Water Supply
 - Designed and installed a pipeline and booster pump between the two elevated storage tanks. This allows either the northold well or the new well to serve either the tank, and allows either the tank to serve all station water distribution systems.
 - Tested new well for flow.
 - Received pump for new well.
 - South old well test revealed evidence of surface pollution.
- Farm water Supply
 - The new borehole drilled on the farm was dry. We have now turned to the seraf water system for the source of farm water. A new design is ready for implementation. It includes gravity flow from the smaller elevated tank on the seraf thru a 5000 meter pipe to ground storage and distribution systems on the farm.

- Airstrip
 - Completely fenced the airstrip and its parking stand.
 - Made plans for improving visibility of runway markers
 - Ordered a windsock in March. No delivery yet.

EL OBEID

- Supplementary Water Supply
 - Investigated the groundwater in El Obeid as a source of supplementary station water.
 - Prepared a report on a preliminary design of the supplementary supply system.
 - Tests of existing wells for the supplementary scheme proved to be disappointing and leave the scheme in limbo.
- Fencing
 - No arrangements have been made for fencing the station other than to have stock piled fencing materials in El Obeid for all the stations other than Kadugli.
 - There is a possibility of finding a contractor in El Obeid who will fabricate all the fence posts for El Obeid and the other stations.

EL FASHER

- Supplementary Water Supply
 - Two boreholes were drilled. The first, next to the station, was dry. The one near the airport will be satisfactory as to volume of flow. However, it has excessive nitrates and is not recommended for human consumption. We are tentatively proceeding with plans to use it for stock water with appropriate safeguards if used as an emergency potable water supply.
 - Completed planning studies for the design of the entire supplementary water system. These were based on incomplete well data, estimated water consumption and simple compass and pacing surveys.
 - Requested a right-of-way alignment for the pipeline from the public utilities department.

CHAZALA GAWAZET

- Airstrip

- Cleared and rough graded an airstrip which lies within a short walk of the Administration building, after surveying several sites close to the station. This strip will require some sort of improvement to make it completely dependable in the wet season.
- Windsock ordered in March. No delivery yet.
- Requested in February that a truck load of fencing materials be sent to Chazala Gawazet for airstrip fencing. No action.

SHAMBAT

- Examined the non-functioning Nile pumping station of the AKC in Shambat as the first step of a rehabilitation program. The Project site in Shambat may use water from this station for its irrigation.
- Designed a simple engine hoist for Project lorry repair in Shambat. Fabrication underway.

III. STAFFING AND MANAGEMENT

WSARP Staff appointments during the fourth quarter were as follows :

<u>NAME</u>	<u>POSITION</u>	<u>DATE</u>	<u>STATION</u>
Barbara Michael	Research Associate	Oct. 01	Kadugli
Musa Adam Musa	Guesthouse Inspector	Oct.02	Kadugli
Hassan Moh. Omer	Purchasing Clerk	Oct. 06	Kadugli
Mohamed Barima	Mechanic	Oct. 01	Kadugli
Ibrahim Kua	Driver	Oct. 23	Khartoum
El Tahir Ahmed	Driver	Oct. 26	Kadugli
Antony Odera	Store laborer	Nov. 01	Khartoum
Ali Sheik El Din	Asst. Technician	Nov. 06	Kadugli
Mohamed Suleiman	Asst. Technician	Nov. 06	Kadugli
Omer Moh. Salim	Asst. Technician	Nov. 06	Kadugli
Ahmed Moh. Loua	Asst. Technician	Nov. 06	Kadugli
Taha Kandu Musa	Driver	Nov. 09	Kadugli
Sid Musa	Electrician	Nov. 13	Kadugli
Mukhtar Ahmed	First Class Cook	Nov. 21	Kadugli
Jamal Moh. Kafi	Electrician	Nov. 21	Kadugli
Ahmed Ali Ahmed	Asst. Technician	Dec. 01	Kadugli
Moustafa Ahmed	Senior Storekeeper	Dec. 01	Kadugli
Moh. Musa Hamad	Cashier	Dec. 09	Kadugli

The World Bank requires an annual audit of WSARP accounts, none of which have been submitted to date. Several discussions with World Bank officials, GOS Auditor General staff and AID officials were held regarding the preparation of a consolidated statement for the period "beginning of project" to 30 June 1981. This statement must be prepared and audited before March 31, 1983.

IV. FINANCE

The quarterly financial statement is attached.

During the fourth quarter, meetings were held with Brian Falconer of the World Bank who delivered a sample format of a Consolidated Financial Statement which must be prepared by WSARP and audited by GOS by March 31, 1983. This audit is long overdue, primarily because some of the vouchers and other substantiating documents from the earlier days of project operation have been misplaced. In addition, some of the original documents for dollar budgets are on file in the United States. GOS auditors have agreed to accept an audit statement from CID external auditors covering these expenditures. The CID Treasurer, Mr. Jim Hedrick and CID External Auditor Mr. Doug Swenson visited the Project October 16 to 20 at which time they conducted an audit survey and consulted with project management regarding accounting procedures.

Considerable progress was made on updating the overall project budget in light of program modifications and the recent devaluation of the Sudanese pounds.

V. PROJECT IMPACT

Observations were made on trials planted for the 1982 growing season. Most crops were harvested and weighed during the fourth quarter and considerable analysis of data was carried out.

Abraham Moh. Dow El Madina departed for training at Riverside in December.

Observations were taken of cattle in both the sedentary and migrating sentinel herds. The migratory herd did not move as far north as usual during the rainy season because of lower than normal rainfall. The sedentary herd did not perform well, evidently, due to both malnutrition and biting flies.

Soil samples from the research farm were taken to Wad Medani by trainee Babiker Abdulla Ibrahim, who will oversee analysis. WSARP is particularly concerned about phosphorous and available phosphorous in cracking clay soils.

Some difficulty was experienced in harvesting grass hay, but an adequate supply will be available early next year.

VI. FUTURE WORK PROGRAM

Major construction will continue under supervision of the A & E firm and within the constraints of the delayed equipment orders, water shortages and construction bans. Efforts will be made by the A & E firm during the next quarter to arrive at an equitable solution to the problems posed by the devaluation and other government interventions beyond the control of the contractor (adjustments to contract timing and amounts as provided in the "economic dislocation" clause).

The major force account activity will be concerned with building the farm to seraf road at Kadugli. Additional activities include completing the seraf water supply, piping water from seraf to the farm and constructing water storage at farm, completing the farm fencing at Kadugli, planning animal pens and shelters for Kadugli, improving airstrip at Ghazala Gawazet, planning and constructing water system at El Obeid and El Fasher, erecting radio antennas and fencing at Shambat. The Project Engineer, Dr. David Higgins, has carefully scheduled and charted upcoming force account activities, and listed the requirements in terms of personnel, material and transportation.

A major activity in Kadugli will be carrying out the Production Systems Survey to provide baseline data against which project interventions can later be evaluated, and to provide more detail on the production systems and constraints to production in South Kordofan.

The Work Plan prepared during 1982 is a guide to how WSARP intends to conduct its activities in the future. It is presented in varying degrees of detail, the most specific being the plan for Kadugli Station from October 1982 through June 1984. The Work Plan is subject to change and will be updated annually on the basis of new information, review, evaluation, etc.

The basic approach of the Work Plan is to describe the production systems of target groups, assess their resource base, identify constraints, determine research priorities and describe research activities. The major constraints, research priorities and research activities for Kadugli Station are as follows :

Low Soil Fertility

Crop screening trials on sorghum, sesame, soybeans, cowpeas, beans, guar, and forage legumes will be implemented on the research farm starting in 1983. Several of these trials will be conducted in association with INTSOY, AVRDC, ICRISAT, INTSORMIL and others and represent continuing efforts that began some years ago at Kadugli. The purposes of these trials is to select non-leguminous food and cash crops that

produce satisfactory yields in South Kordofan and to identify legumes that can be utilized to increase soil nitrogen while producing grain or forage crops that can be utilized as cash crops or feed for humans and/or livestock.

In close conjunction with the above, trials will be run on many varieties and species of legumes, both annuals and perennials to identify grain and forage types that can be incorporated into crop rotations. If crops can be identified that have the capacity to maintain or increase nitrogen fertility then continuous cropping of a given piece of land may be possible. A trial will be run using sorghum (the most prevalent grain crop) to determine fertility levels. Soil tests indicate that phosphorous may also be a limiting nutrient. This thesis will be also be comprehensively tested.

Poor Animal Health and Nutrition

Several studies, to be conducted over the next 20 months, will provide data to further describe and quantify this constraint. The Transhumant Production Systems study will seek information regarding the extent of the health and nutrition problems in migratory livestock herds. It will define what the perceived problems are and what is currently being done about them. The Sedentary Farmers Production Systems Survey will accomplish the same objective in sedentary livestock herds.

An in-depth study of health and nutrition will be conducted using three sentinel herds. Two herds of cattle are currently owned by the Project and a third will be selected from sedentary farming villages near Kadugli. Production and health data will be collected quarterly and blood, insect and other relevant samples will be analyzed in the laboratory.

Once a problem is identified for which a feasible solution exists, attempts will be made in collaboration with herders, veterinary/animal production staff and research station scientists to implement adaptive research trials. For problems where adaptive technology does not appear feasible, applied research trials will be conducted on the research farm.

An evaluation of the prevalence and significance of pests on livestock will be made. Traps will be tested to determine if fly populations can be decreased and slow insecticide release formulations will be investigated for insect control on individual animals.

The Rangeland Classification and Evaluation Study will be completed in a few months. The final report will provide information regarding the types, quantities and distribution of various herbage prevalent on the rangelands of the Nuba Mountains region in relation to its potential.

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Two studies will examine grazing practices and their effect on livestock health and nutrition. One will inventory present rangeland use and grazing practices and the second will test supplemental feeding grains and dry forage using an on-farm trial approach. Supplemental feeding of hays may improve nutrition during the dry season and subsequent changes in grazing patterns may result in less demand on rangeland and improved animal health and production. Efforts will be made to identify appropriate forage legumes for crop rotations and for supplemental feeding programs.

Measures to contain and control the human causes of fires will be examined and the extent of burning will be determined.

To better utilize available forage in South Kordofan and to undertake adaptive supplemental feeding trials, it is essential that commonly available forage species and crop residues be analyzed for their TDN value, calcium and phosphorous content at various stage of bloom.

Some preliminary investigations will be undertaken on mineral deficiencies, especially phosphorous. If phosphorous proves to be a problem (as indicated by forage analysis) attempts will be made to initiate an adaptive research trial with a domestically available phosphorous supplement. Other suspected deficiencies include vitamin A, vitamin E, selenium and possibly zinc.

Inefficient Land and Water Use Management Cultural and Husbandry Practices

The Sedentary Farmers Productions Systems Survey and the Transhumant Production Systems Study will more fully specify land use and cultural practices involved in both crop and livestock production. Identification of weaknesses and strengths of these existing practices and of factors inhibiting change will assist researchers to develop on-station and/or on-farm trials. These will have significant impacts on productivity in a short time frame. The studies will also identify long term priorities and second generation constraints.

The encroachment of bush, particularly on the clay soils, tends to reduce the cover and productivity of the herbaceous layer, thereby effectively reducing the carrying capacity for livestock.

Bush control methods will be tested in an attempt to improve the utilization of range resources while simultaneously improving range productivity. Control of range burning should also reduce the loss of valuable grazing thereby making it possible to support higher densities of livestock.

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A study will be instituted on cracking clay soils to evaluate methods of increasing water availability to the crop through vertical mulching. Nitrogen, phosphorous and potassium, as commercial fertilizers, will be applied to sorghum in a factorial experiment to determine the response. Experiments will be established to determine the most desirable row spacing, spacing within rows and plant populations for both sorghum and sesame. This work will be in cooperation with SATEC to determine the most efficient plant populations.

Conflicts Among Target Groups

The Sedentary Farmers Production Systems Survey and the Transhumant Production Systems will identify the sources and the degree of conflicts within and between the two target groups. The impact on the productive capacity of each system will be assessed. Identification of sources of conflicts is a prerequisite to developing methods for overcoming other production constraints.

VII. ISSUES

The morale problem seems to have improved considerably now that the radios have been installed, fuel is more readily available, the aircraft is operating more regularly and progress has been made in clearing and transshipping supplies and equipment.

WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT
QUARTERLY REPORT
01 January 1983 - 31 March 1983

REVISED

I GENERAL

Dr. Dafalla A. Dafalla, Project Director, traveled to the U.S. on 8 January 1983 to attend an INTSORMIL meeting in Scottsdale, Arizona. He also worked with Dr. Henson at WSU and held meetings with World Bank officials in Washington D.C., returning to Khartoum on 24th January.

Grube/Zimmer engineers Shaw and Pickett completed their consultancy and returned to the U.S. on 8 January.

Babiker Abdulla Ibrahim departed Sudan on 21 January to begin training to the MS level in Soil Science at WSU.

Mr. Frank Ruddy, AID Assistant Administrator for African Affairs, visited Kadugli on 27 January. He attended a briefing on project activities and went on a field trip in the Kadugli area.

Dr. Owens was on annual leave from 01-19 February.

Mr. Joachim Grube of the supervising firm visited the project from 15 to 28 February. He held meetings with project management, contractors and government officials regarding effects the November 1982 devaluation on contract costs.

Zakaria Saad, Jim Riley and Joel Teitelbaum attended a desertification conference in Khartoum from 20-24 February. Dr. Teitelbaum presented a paper entitled "Socio-Cultural Factors in the Monitoring and Control of Desertification". The conference was sponsored by the Environmental Training and Management in Africa Project (ETM).

Mr. Lee B. Stenquist completed his contract and departed for the U.S. on 22 March after overlapping for two weeks with his successor, John B. Hannum. Mr. Hannum's permanent appointment is expected to become effective in April 1983, after orientation at WSU in Pullman.

Dr. Riley, Senior Advisor to ARC, attended a horticulture workshop in Wad Medani on 20 March. The workshop was sponsored by ARC and the International Society for Horticultural Science.

Dr. Milton Coughenour of INTSORMIL and Mr. Hassain of USIS visited Kadugli 26 to 30 March. The purpose of their visit was to gather information to be used in drafting Phase III of the INTSORMIL program in Sudan.

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Dr. Mohamed Bakheit Saeed, Director General, ARC, traveled to Egypt and Syria in the second half of March.

Mr. Brian Falconer of the World Bank held meetings with Dr. Dafalla, Mr. El Amin, WSARP Inspector of Accounts and others on 23 March. The major topic for discussion was the GOS audit of WSARP accounts.

Dr. Albert C. Yates, Academic Vice President and Provost, WSU arrived Sudan in company of Dr. Jan C. Noel on 13 March. Dr. James B. Henson arrived the following day. Yates, Henson and Noel consulted with project personnel and visited El Obeid and Kadugli before flying to Nairobi on 21 March. Drs. Henson and Noel returned to Khartoum on 29 March to participate in a series of workshops to be held in April. Dr. Jean Kearns, CID Project Manager for WSARP, arrived in Khartoum 23 March to conduct project business on behalf of CID. She was accompanied by her husband, Desmond.

II. PHYSICAL PROGRESS

A. CONSTRUCTION

EL OBEID

Foundation work is complete for all buildings and excavation and concreting is in progress for the building compound walls. The senior housing compounds are to be completed first followed by middle and junior in that order.

Brickwork is essentially complete at senior houses and is in progress at middle houses. Brickwork had been stopped on administration/research and guesthouse/conference awaiting new supplies of the proper brick but is now proceeding.

Brick has been a major problem due to the ban on timber harvesting which has resulted in a drastic curtailment of local brick. The contractor has been obtaining brick from Kadugli, Rahad, and Sennar. There are some minor differences in dimension and color and we are insisting that all brick in a given building shall be from a single source. This sometimes leads to interruptions in work if the right brick is not available temporarily. The Sennar brick has been rejected for fair-faced brickwork but can be used in plastered partitions and underground site utilities.

One half million brick are now in production at El Obeid and are arriving on the site. This will complete the production of local brick. The contractor has contracted for two million each of Kadugli and Kanad brick which will be sufficient to complete the Station. All required brick will be on the site during this production season.

Water is in short supply and contractor has been trucking it from outlying wells for construction use. The sewage lagoons have been rough excavated and site utility work for manholes and sewage lines is in progress. The water course at the Lagoons has been re-aligned.

Metal roof framing has been delivered to the site and workshop and fabrication jigs set up. Erection is in progress at the senior houses. The system works very well and is producing a very clean structure. When the crews become more familiar with the process, they should be able to complete framing for two houses in three days.

EL FASHER AND GHAZALA GAWAZET

Work is proceeding smoothly when materials are available. There have been delays due to brick and cement shortage. All brick production stopped by official decree on 6 March in El Fasher because of water shortage. Construction water has been a recurring problem at both sites with water being hauled at Fasher and persistent mechanical failures in the pumping facilities at Ghazala.

ARC HEADQUARTERS

Work at the Shambat site has been shut down for several months. Nothing further can be done until doors, windows, roof framing etc. arrive.

GENERAL

Work generally is behind schedule with El Ubeid the most critical site. The contractor (El Khidir) insists that all stations will be completed on time. Contractor was notified by letter dated 12 March that the supervising architect seriously questions contractor's ability to complete construction within the contract period which ends 28 January, 1984. Contractor was again requested to provide revised work schedules by site.

The problem continues to be in the procurement of the foreign materials. The required submittals for material approvals are still not forthcoming with doors, windows, and hardware as very critical items. Roof framing for Fasher and Ghazala have not yet been ordered. All this in spite of pressure from us to get the required data from the contractor so that orders can be placed. In the instance of plumbing fixtures, last August we prepared a building by building schedule of the required items from incomplete catalogue data supplied by the contractor. This is work which should rightfully be done by the contractor. We are still awaiting a response on the missing items needed to complete the schedule and issue approval. In the meantime

all sites are complete enough so that plumbing work could be getting on.

It is apparent that there is a serious lack of planning, coordination and unified job administration in the organization of the joint venture as well as evidence of friction between the partners. A project manager has been hired with, supposedly, the responsibility for overall administration of all sites. It is doubtful that he is being given the authority required to successfully carry out such responsibility. The tendency for the work to be treated as two contracts rather than one is still apparent. If anything, it is probably worse.

We have still not received the accounting of the advance payment which was promised last November. To the best of our knowledge, the bulk of these funds have never been expended for their intended purpose, purchase of imported materials.

In an efficiently run building operation it is usual for the various trades to work hard upon the heels of the preceding trade: roof trammers taking over as soon as the masons finish a building, plumbers and electricians right after the framers, plasterers right after that, etc. This is not the case with our project and the lag in the arrival of critical materials precludes it. The contractor assures us that this will improve but based on past performance one cannot be too convinced. Until such coordinated activity occurs, progress will be slower than necessary.

Another common device for accelerated building is the double shift. This does not appear feasible due to lack of site engineers, contractors superintendents, and suitable foremen. Increased work crews and overtime work appear to be the only other options. These should be explored.

Lack of site engineers and clerks of works continue to be a real obstacle to the proper administration of construction. This situation will not be overcome until properly qualified people with experience in working with private contractors and familiarity with the building systems involved can be obtained. In our opinion this will never occur within the salary scale presently available. Some formula must be found to make this relatively short-term employment at remote sites more attractive to the kind of people we need.

The question of currency devaluation has been the subject of several meetings with the Ministry of Finance, WSARP, and ourselves. Several proposals have been examined but the issue is too complex and no satisfactory solution has yet been found. We were unable to reach agreement during Mr. Grube's recent visit due to the absence of the Ministry representatives at our last three scheduled meetings. We will continue to pursue the matter so that a workable policy can be realized during Mr. Grube's forthcoming visit in April.

Although he has not yet made any formal complaint, the contractor is very unhappy over the slow and sporadic payments of the local currency component after issue of certificates for payment. He has consistently been paid only a percentage of funds due him with balances being paid in small amounts at irregular intervals. The amount owed him is currently in excess of LS 100,000.- total, he claims.

B. FORCE ACCOUNT

KADUGLI

- Fence

Farm boundary fence is complete for gate installations and the painting of several hundred fence posts.

The layout of farm interior fences had not been decided.

Several hundred meters of interior fencing within the main station remain to be planned.

- Farm Building and Animal Handling Facilities

A well drained building site has been located within 50 meters of the road entry point at the farm. Cost for road and pipeline construction, and travel time will be appreciably lower than those for the previously planned site in the southeast corner of the farm.

A site development plan and building materials quantity estimate was submitted early in the month.

- Farm Water Supply

The pipeline has reached the farm. One of the three water hammer protection riser pipes is partially erected.

- Seraf-to-Farm Road

The continued delay by Roads and Bridges in signing a contract and starting road construction puts WSARP in a position where we must look for an alternate way to build the road.

Dr. Dafalla ordered the Project Engineer on March 20 to start building the road without R and B assistance. He said the PE would share authority for administering the construction program with the Station Director. However, no monies were sent to back up this mandate. A query on March 21 about the need to follow GOS construction contract advertising procedures was unanswered.

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A search for heavy equipment in the Kadugli area was nearly fruitless. UNICEF's equipment, except for a backhoe, is either tied up in their hafir program or down for lack of spare parts. Nuba Mountain Corporation and local government building authorities, while having some heavy equipment such as motorgraders, loaders and compactors, are not in a position to offer it for W/SARP use.

Arrangements for building the road entirely with Project resources and equipment were continued. UNICEF civil engineer Shawgi explained how he built a stretch of road near the UNICEF facilities in Kadugli with no heavy equipment other than a loader and some dumptrucks. He simply placed flat rocks on the clay soils and topped them with a layer of Shair aggregate. The dumptrucks provided the compaction. The method is appropriate for our situation. It could be improved with controlled compaction using tanker and roller, and by limiting gravel size in the upper layer.

The Irish bridge is substantially complete. Both ramps are cut, the gabions are in place and filled with stone, and khor bank rip-rapping is in progress.

There is a water take off point installed on the farm pipeline at the Irish bridge. This will be used for filling tankers for road construction as well as providing water for putting a mortar topping on the Irish bridge. Khor channel improvements and supplementary drainage channel excavation is better than 50% completed. Efforts were made to assure cattle herders that road construction will not restrict the mobility of their herds.

The road reference post system was extended onto the farm.

The contracted road topographic survey was finished.

The young Sudanese foreman El Shafia can now do simple contour surveys with the Wild level and has worked in several areas where we needed topographic information for drainage studies.

- Landscaping

A two-inch pipe was installed between the old water tank and the orchard on the serai.

- Agronomy Section "Dirty Lab"

Modifications to convert the agricultural machinery shed into a clean lab and dirty lab for agronomy research were planned and most of the brick walls are finished.

Miscellaneous Progress Items

The float from the high water tank inflow valve was removed and stored. The problem was that the automatic float control systems for turning the pump on and off has still not been installed. Although the pump can run against a closed valve it may overheat in the absence of flow around the submerged motor. The consequence at the tower is that it will overflow occasionally.

The station now has welder and a stationary welding machine. The welder began work March 20.

Force account budget for Fiscal Year 83/84 was developed and submitted to project management.

A set of concrete culvert pipe forms were located in Kadugli in case we need to build such pipe.

The electric water table probe and one inch nylon pipe fittings arrived from US.

A response to a request for a bid to supply a solar driven pump for use in the West was received. The system is American and is sold by a Swiss firm.

The last check dam on the gully control system moved closer to completion with partial placement of impervious backfill.

Miscellaneous Problems

Station maintenance in Kadugli continues to be a big problem which impacts on force account work and will affect station research operations. Kadugli lacks the organization, staffing and Project support for an effective maintenance program.

Mr. Cenidoza is charged with responsibility for station maintenance programs. However, his efforts to fulfill his responsibility have been blocked by at least three of the usual Project problems - planning, staffing and money.

Too often requests to Khartoum for information, equipment and supplies are unacted on - lost on desks or in files.

Kadugli station labor policies retard progress. Records are inadequate, pay scales are too low, delegation of authority is almost unknown, and purchasing of simple tools and supplies is very inefficient.

Evidently local technical training does not include the reading of technical drawings. This had led to expensive mistakes on several minor force account projects when the foreman or technician ignored important information on the drawing.

Airstrip maintenance including filling some ditches caused by rain runoff and the cutting of brush will require a training program. Every bit of work done this month was a struggle. On one day large rocks were left scattered across the runway by the maintenance gang.

On three instances lorry deliveries of rock and gravel were dumped where they prevented any further work until they are moved. One pile weighed about 100 tons. There seems to be the thought that if it is to be used at this point it should be dumped on this point.

III. STAFFING AND MANAGEMENT

WSARP staff actions during the first quarter 1983 were as follows :

<u>NAME</u>	<u>POSITION</u>	<u>STATION</u>	<u>DATE OF APPT.</u>	<u>DATE OF TERM</u>
Dr. Usman Adam Osman	Scientist	El Obeid	01/03/83	
Sid Ahmed Sid Ahmed	A/Scientist	Kadugli	15/02/83	
Salah Hag Arabi	P/Manager	Khartoum	02/01/83	
Yousir Ahmed Salih	Sr. Clerk	Khartoum	01/03/83	
Adam Mohamed Ali	Sr. Technician	Kadugli	19/03/83	
Abdel Rahman El Amin	Sr. Technician	Kadugli	19/03/83	
Wol Wol Eli	Driver	Khartoum	06/02/83	
El Amin Abdalla Bashru	Driver	khartoum	09/02/83	
El Faki El Smid Mohd.	Driver	khartoum	09/02/83	13/03/83
Paul Oloya	Messenger	Khartoum	30/01/83	19/02/83
Arbab Khamis El Tom	Messenger	Khartoum	14/03/83	
Ishag Mohd. Morgan	Mechanic	khartoum	08/02/83	
Adam Ishag A/Hadi	Watchman	Khartoum	08/02/83	
Ibrahim Ahmed Said	Sr. Technician	Kadugli		14/02/83
Zeinab Ismail Ahmed	Secretary	Kadugli	05/03/83	

The Project consolidated statement from beginning of project to June 1981 was prepared and forwarded to the World Bank, along with an audit statement from CID auditor covering accounts controlled by CID/WSU. Audit of accounts controlled by WSARP/GOS is in progress by a team of GOS auditors.

IV. FINANCE

The quarterly financial statement is attached.

The original WSARP budget has been revised to take account of the devaluation of the Sudanese pound, and to reflect various changes

occasioned by revision of government and banking policy. WSARP dollar accounts in Sudan have been temporarily frozen at times during the past year. From time to time, it has been difficult or impossible to purchase airline tickets or pay hotel bills with Sudanese pounds. The revised budget is under consideration by USAID.

V PROJECT IMPACT

Project scientists spent time in preparing research proposals and in revising existing proposals. All scientists spent significant time in preparing for the Farming Systems Workshop and the two Regional Workshops to be held in April 1983. In addition, considerable time was spent in consultation with project management (WSU, CID and WSARP).

A number of exploratory/diagnostic surveys were carried out during the quarter. Dr. Cook spent about 3 weeks in February and March in the Dar Kababish area of N. Kordofan in the identification of pastoral production systems. Informal diagnostic surveys were conducted in four villages in the Kadugli area by an interdisciplinary team. A survey of dry season livestock grazing and watering practices in S. Kordofan was conducted. A survey, by examination, measuring and interview, was conducted to provide additional information on transhumant and sedentary herds in S. Kordofan. Of interest were productivity, age, sex (F-lactating, pregnant, dry; M - bulls, castrates), breeding history, calving season, age at first calving, kidding or lambing, weaning age, mortalities and causes of mortality. A special diagnostic survey of burning explored extent, reasons, the relationship between burning and population density, ecological impact and the perceptions of various groups toward burning. Landsat imagery was used in establishing the extent of burning.

Drs. Gingrich and Cook spent significant time in setting up the station laboratory.

Dr. Bunderson identified participants for the nutrition experiment involving feeding of native hay. Data was obtained on weight and other characteristics of animals to be fed, and of a control group of animals.

About 50 feddans of land was cleared on the experiment station to be used for agronomy trials during the 1983 growing season.

Sites for on-farm trials and experiments were identified at Shair, Belinga and Hamra, S. Kordofan.

The Kadugli Station library opened in February.

The data collection phase of the Sedentary Farmers Production System Survey was completed in March by a team of 10 interviewers including some personnel from the Extension Department.

VI. FUTURE WORK PLAN

Considerable time will be spent on the Farming Systems Workshop to be held in Khartoum in early April, and on the Regional Planning Workshops to be held in Kordofan and Darfur Provinces in mid-April.

The Farming Systems Workshop is designed to inform a general audience of scientists and officials from various research and development organizations about the FS approach adopted by WSARP. In addition, a group of internationally known FSR scientists such as Michael Collinson of CIMMYT and Fred Winch of USAID will participate in the exposition of the FS approach and assist WSARP in refining and focussing its own activities in Western Sudan.

The purpose of the Regional Planning Workshops is to inform Regional officials and other development agencies about the WSARP mandate and approach, and to learn about constraints and priorities from the standpoint of people in the regions.

A three tiered research management system will become functional in the second quarter. This is to consist primarily of a station research committee, a systems research committee and an advisory committee for project management. Research proposals will be considered by the station committee (s) who may approve, disapprove or suggest revisions. When approved, the proposals will be sent to the systems committee, a single body which functions for all stations, and from there to the advisory committee which makes recommendations to the Project Director regarding final disposition.

The livestock section will continue observations in sentinel herds. The major portion of the supplemental feeding of native hay experiment will be conducted during the second quarter. Senior scientists from the livestock section plan field trips to Darfur Province during the second quarter to meet and interact with scientists of the Western Savanna Development Corporation (WSDC) and to begin preparation of a work plan for Ghazala Gawazet. They will also meet with Moustafa Rahma who is doing his PhD research project in range science in Southern Darfur. The livestock section plans to work with nutrition consultant Dr. Jerry Holecheck from New Mexico State University in setting up a methodology for assessing diet composition, foraging behavior and nutritional constraints.

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01 January 1983 - 31 March 1983

The agronomy section will be occupied with preparations for on-farm trials and on-station experiments. Seed and other material must be prepared, soil samples taken and plots measured and laid out. The economic and social section will assist in making arrangements with cooperating farmers, and will lay plans for social and economic input and analysis for on-farm trials.

"Hard" scientists will continue setting up both the clean and dirty labs for use in Kadugli.

The Social Science and Economic section will continue their efforts in system definition and constraint identification through analysis of data already collected through formal and informal survey and by continued diagnostic surveys. They will provide inputs to ongoing activities and research projects such as the supplemental feeding experiment and agronomy trials and experiments.

WSARP scientists will refine our understanding of the production systems, resource base and constraints during the second quarter. Strategies for overcoming constraints and meeting objectives will be refined and written up.

The major force account activity during the second quarter will be the completion of the bridge and construction of the farm to Seraf road. Other important activities include water supply works at all stations, fencing and improvement of the airstrip at Ghazala Gawazet. A complete report of project force account activities is on file with project management.

Efforts will be continued during the second quarter to arrive at an equitable solution to the problem of extra construction costs occasioned by devaluation. The supervising architect will work with contractor to develop a detailed construction schedule, and assist in ordering materials from abroad.

Audit of GOS accounts through FY 80/81 and 81/82 should be concluded during the second quarter.

Discussion of revisions to project budgets will be held with AID, World Bank and GOS.

VII. ISSUES AND ACTIONS

Lack of Sudanese professional and support staff continues to hamper progress in Kadugli. Some senior scientists are without counterparts and technicians. The shortage of competent support staff results in already overworked senior scientists having to carry out menial tasks such as turning on the water pump. Recruiting efforts are under way in both Khartoum and Kadugli.

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The efforts of the Range and Social Scientists are hampered by lack of reliable transportation. A request for the assignment of two new four-wheel drive vehicles is under consideration by the Project Director.

Laboratory operation is presently constrained for lack of supplies and equipment. Most of the critical items have been ordered and are expected soon. Seed for forage/legume trials are required for planting in the 1983 growing season. Many varieties and strains are on order.

A major concern at present is lack of a road from the Seraf to the farm, and this will be a critical constraint to many project activities if it is not completed before the onset of the rains. The two approaches currently under consideration are 1) contracting the entire job, including design and supervision, to a Sudanese Government organization (Roads and Bridges) and 2) for the project engineer to supervise roadbuilding with input from local subcontractor such as hauling of aggregate, labor and compaction.

WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT
QUARTERLY REPORT
1 April 1983 - 30 June 1983

I. GENERAL

Most of the first half of April was devoted to Workshops.

A Farming Systems workshop was held in Khartoum at the Ministry of Agriculture Conference Room on April 2, 3 and 4. The objectives of the workshop were 1) to reinforce basic concepts of the FSR approach for ARC/WSARP staff, 2) to examine the suitability of the FSR approach for Western Sudan, 3) to review the WSARP research approach and 1983 season plans in light of discussions and evaluations, and to revise plans as necessary, 4) to strengthen ARC input and ability to contribute to FSR, particularly in Western Sudan, and 5) to promote the establishment of a collaborative network among the farming systems programs in Western Sudan. Dr. D. A. Dafalla delivered the opening address and Dr. Mohamed Bakheit Said, Director General of ARC welcomed the participants. Dr. Fred Winch of USAID delivered the keynote speech entitled "A Critical Appraisal of FSR - Its Strengths and Weaknesses." In addition to ARC/WSARP, the following organizations participated in the FS workshop :

Ministry of Agriculture and Irrigation
CIMMYT (Nairobi)
INTSORMIL (University of Kentucky and El Obeid
University of Khartoum
ICRISAT (Sudan and Nigeria)
Blue Nile Integrated Agricultural Development Project
Utah State University
Ford Foundation
Washington State University
USAID-Sudan Mission and A/W Sudan Projects Officer
Consortium for International Development
World Bank
Hunting Technical Service
Mechanized Farming Corporation

Regional Workshops were held in El Obeid on 9 - 10 April and in El Fasher on 11 - 12 April. Major objectives were 1) to explain the WSARP approach and program to Regional Government Officials and scientists, 2) to learn more about regional programs, priorities and objectives for development and 3) to forge linkages for better cooperation and communication between ARC/WSARP and the Regions. In addition to the Regional Ministers of Agriculture, Dr. El Tag Fadalla (Kordofan) and Dr. Abdel Rahman Dosa (Darfur) and their staffs, several other organizations were represented.

Farmers Union (Kordofan)
Nomadic Affairs Administration (Kordofan)
Gumbelt Project (Kordofan)
Planning Unit (Kordofan)
INTSORMIL
CARE (Kordofan)
Nuba Mountains Corporation (Kordofan)
National Administration for Water
Livestock and Meat Marketing Corporation (Dartur)
Council of Minister (Darfur)
Darfur Regional Assembly
Ministry of Finance (Darfur)
Sag El Naam Ag. Scheme (Darfur)

Also resource persons from the following organizations participated :

University of Khartoum (Dept. of Rural Economy)
Mechanized Farming Corporation
Utah State University (Dept. of Range Science)

Dr. James J. Riley, ARC Senior Advisor, served as coordinator for all three workshops.

An in-house review of the workshops was held in Kassigli on 13th of April. This was attended by WSARP scientists and officials, and by project management from CID, WSU and USAID.

A review of the Mid-term Evaluation (November 1982) was held in Khartoum on 6 April. Present were Drs. Henson and Noel of WSU, Dr. Jean Kearns of CID, Dr. Dafalla and Dr. Owens of WSARP and Ms. Joyce Turk of USAID.

Dr. D. A. Dafalla was in Kenya in April to attend a Farming Systems seminar. The seminar was sponsored by CIMMYT for Senior Research Administrators for Eastern Southern Africa. It was held in Nairobi between 18-20 April 1983. The seminar was on Conceptual Features of On-Farm Research with a Farming Systems Perspective (OFR/FSP) and their Organizational Implications. The conceptual features of OFR/FSP was presented to the seminar and emphasized the need to adopt the perspective of the local farmer as a decision maker in order to identify locally appropriate technologies. The implications of using OFR/FSP in this way for the organization of research and for the structure and staffing research institutions were highlighted. Both these conceptual features and their organizational implications were opened to the seminar for discussion.

A meeting about the El Obeid work plan was held in Khartoum on 19 April. Present were Drs. El Haz, Berhe, Jain and Owens.

Dr. Jerry Eastin of INTSORMIL visited the project during the latter part of April. Dr. J. J. Riley met with several INTSORMIL personnel, including Drs. Fredericksen, Mueller and Berhe during the quarter in regard to their cooperative program with ARC.

Dr. Alfred H. Krezdorn, citrus and tropical fruit specialist from the University of Florida, arrived in Sudan on 2 April for a two week consultancy for ARC/WSARP. Dr. Krezdorn visited fruit producing areas in the Nile Valley and in Western Sudan. He visited ARC research stations, gave advice and made recommendations for major pomology programs. Dr. Krezdorn's Report of Visit to Sudan to Review Fruit Tree Research Program and Related Factors has been distributed to all concerned parties.

Dr. Joe R. Gingrich was on R and R from 6 April to 4 May.

Dr. Neil A. Patrick was in the U.S. from 30 April to 15 June. Part of this time was spent at work at WSU.

A joint tour of South Darfur was made by scientists of WSARP and the Western Savanna Development Corporation (WSDC) from 3-7 May. The major purpose of the tour, and meetings held in conjunction therewith, was to explore areas of future collaborative efforts. The tour included visits to WSDC settlement site at Qoz Afain and the development center at Dimsu. The trip provided WSARP scientists with a better understanding of traditional land-use practices and environmental conditions in the area which will be served by the WSARP research station at Ghazala Gawazet. A comprehensive trip report was prepared by the WSARP Range-Livestock section.

Dr. Jerry Holecheck spent about three weeks in June at Kadugli. He worked with the range-livestock section on methodologies for determining diet composition and grazing preferences. Dr. Holecheck is from New Mexico State University and came at no cost to the project. His input is appreciated.

A planning workshop for the WSARP research station at Ghazala Gawazet was held in Khartoum on 31 May and 1 June. Objectives of the workshop, entitled Ghazala Gawazet, a Historical Perspective, were as follows :

1. To obtain information about previous activities and research at the Ghazala Gawazet Station.
2. To obtain information and ideas about lines of research to be followed in the future under the auspices of WSARP.

In pursuit of the above listed objectives, a group of distinguished scientists with a background of experience at Ghazala Kawazet was convened. This group was composed of :

1. Dr. Hashim Abdel Mutalab
2. Dr. Mustafa Bedawi
3. Mr. Mohamed El Hassan Kambal
4. Dr. Mohamed Beshir Mufarin
5. Dr. Yousif Rizgaallah
6. Mr. Ali Dirage
7. Dr. Hassan Abou
8. Dr. Yousif Atabani
9. Dr. El Kheir Mustafa
10. Dr. Ibrahim Khalil
11. Dr. Mohamed Abu El Azaim Medani
12. Prof. Abdel Hamid Osman
13. Dr. Mohamed Ahmed Esawi
14. Dr. Hassan El Hag
15. Dr. Abdul Wahid Alam El Dien

Also in attendance were scientists and officials from ARC, WSARP and USAID.

Dr. Ahmed Nasr Ballah, ARC National Coordinator for Entomological Research, visited Kadugli Station in late June to consult with Dr. Gingrich and other station personnel.

Activities of the ARC Senior Advisor included ordering and distributing seed to ARC, WSARP research stations and to other development agencies in Sudan, arranging travel and coordinating meetings among scientists of various organizations, assisting in finalizing a cooperative workplan between ARC and the Peanut CRSP and a coordinating role in finalizing WSARP research proposals.

Four fisheries experts from Auburn University - Singh, Wheelock, Caples and Jones - visited with the ARC Senior Advisor, who assisted in their contacts with Dr. T. T. George of the ARC Fisheries Station.

II

PHYSICAL PROGRESS

A. Construction

General construction at all sites continues to be adversely affected by lack of imported materials. Delays in ordering on the part of the contractor are cause for serious concern by the Supervising Architect and the Project.

Meetings were held in May between supervising Architect (J. Grube and H. Bergman) and contractor to discuss a revised time schedule. Final draft of schedules was presented and discussed. It was pointed out that critical dates are shown; July 7 deadline for all submittals, end of contract period, Punch list inspection (substantial completion), and project close-out. It was also pointed out that building activities extending beyond completion dates of contract do not represent time extensions to the contract. It was agreed that the final draft accurately reflected decisions made at the May 4 meeting.

Meetings were also held to discuss the effects of recent devaluations on contractor costs as covered by the economic dislocations clause in the construction contract. A formula/methodology for evaluating contractor damages were proposed and discussed with officials of the Ministry of Finance. Further meetings and negotiations will take place in August when Mr. Grube plans to return to Sudan.

At present it is estimated that devaluation and other economic dislocations will add about five million pounds to the construction contract and about one million pounds to force account costs.

Due to difficulties in recruiting resident engineers for Western Sudan, at GOS pay scales, it was agreed that three engineers would be recruited and supported by CIB.

B. Force Account

KADUGLI

Bids for the seraf-farm road were opened on 3 May; contract was awarded to a Kadugli contractor whose low bid was £179,400.

Seraf-farm road construction started about the middle of June. The Project Engineer spent four days early in June writing a contract based on a form commonly used in American practice. It not only specified the road design but spelled out the obligations and rights of each party, as well as providing reasonable means for handling the inevitable changes due to material or weather problems.

The resignation of Osman El Sheikh in May left the Project without a capable road construction inspector. On June 26th, a labor foreman was appointed to act as inspector and Project representative until the arrival of Mirghani A. Mahgoub who is a civil engineer working with Roads and Bridges in Dilling. Mirghani will serve as WSARP inspector while on vacation from R & B.

It is encouraging that the contractor was able to continue his work on the day following a 3-inch rain occurring within one hour the previous evening.

- A waiver has been requested from USAID in order to expedite the purchase of two Mono pumps for the two old wells.
- Dr. Bunderson will arrange planting some grass on the sewage pond banks which are eroding. He will later gather seed from a more appropriate grass which grows on dry jebel slopes.
- The farm building site layout is firm. A tent camp for laborers and supplies has been established next to the site. A beginning was made on the corral construction. However the resignation of Osman El Sheikh and the slow delivery of building supplies has essentially stopped the farm construction program.
- Rain runoff from the middle housing area has been ponding between the administration building and wet laboratory. A large part of that flow will be diverted to the Khor by a low stone wall built near the guesthouse.
- The electrician's workshop, the gatehouse and the shelter at the airstrip have all reached the roof installation point and await supplies of corrugated sheets.
- The flood following the 3-inch/1-hour rainfall on 24 June washed out the road adjacent to the box culvert near the entrance to the seraf. That portion of the road has been partially redesigned as an overflow section and has been partially reconstructed using some gabions. Additional work is required.
- CAT still has not performed the remedial services specified in the letter from Karplen to CAT dated 10 April 1983.

EL FASHER

- N.A.W. has made no progress on cleaning and testing our well. They claim now to not have the English 10,000 gallon elevated storage tank for which we already have paid them. Instead they will assemble locally a 5,000 gallon Yugoslav spherical water tank beginning in August.
- The Minister of Housing and Public Utilities and the Project Director have agreed to install a Carvens electric submersible pump already in stock in El Fasher.

GHAZALA GAWAZET

- The Ghazala Gawazet airstrip was discussed with Edgar Metz, who is Held and Francke's Nyala-Zalengei road project manager.
- There has been no response to the Project Engineers recommendation that the Project begin to build up a store of materials and equipment to support force account construction at Ghazala Gawazet.
- In spite of the generators not belonging to the project, it is recommended that they be rehabilitated and used to drive an electric submersible pump.

EL OBEID

- A check for £S10,051 was sent to NAW for drilling a new well in the Felaata area. This will be the second attempt to find a supplementary water source. The first hole drilled was dry.

PROBLEMS

- There has been little progress in acquiring the materials equipment required for force account construction and listed in the April Engineer's report. Of the items on that list only some of the cement has been delivered to Kadugli. Since then stainless steel sinks for the agronomy laboratory and lumber for the animal corral have been requested with no resulting action.
- The inability of Kadugli station staff to read engineering drawings slows force account progress. The road construction inspector, Mirghani, may assume broader responsibilities at some time in the near future but presently progress is almost nil.
- With no fuel or materials or equipment stockpiled for force account support at Ghazala Gawazet and El Fasher we have no way to react quickly to needs that will arise there.
- There is still no project radio communication with Ghazala Gawazet or El Fasher. Radios intended for them are defective and antennas are not installed.
- There is still no skilled resident station maintenance officer at Kadugli. Fence wire is loose, damage to masonry walls goes unrepaired, the ceiling system above the office balconies is collapsing under wind load and requires replacing, rubble and trash dot the station, inoperative

light fixtures and insect screen damage go unreplaced or unrepaired, loosened bolts on the Rolls Royce generating systems break under excessive vibration, small station building projects go unsupervised and are sometimes poorly or incompletely done, water faucets and valves leak, etc.

III. STAFFING AND MANAGEMENT

WSARF Personnel actions during the second quarter 1983 were as follows :

NAME	POSITION	DATE OF APPOINTMENT	PLACE OF WORK	DATE OF TERMINATION
Dr. Osman Adam Osman	:Scientist	: 1/4/83	:El Obeid:	
Mohamed Yacoub Barson	:H/Clerk	: 1/4/83	:Khartoum:	
Dr. El Hag Abu El Gasim	:Scientist	: 1/5/83	:El Obeid:	
Yousif Mohamed Taha	:A/D Finance	: 1/5/83	:Khartoum:	
Abdel Rahman El Khidir	:Scientist	: 1/5/83	:El Obeid:	
Ahmed Hashim Ahmed	:Technician	: 1/5/83	:Kadugli :	
Paul Ejek Atanya	:R/Operator	: 1/5/83	:Khartoum:	
Hashim Khidir Mukhtar	:A/Scientist	: 1/6/83	:Kadugli :	
Mohamed Yousif Bakri	:Accountant	: 18/6/83	:Khartoum:	
Salah El Din Adan Abaker	:Clerk	: 20/6/83	:El Obeid:	
Abu El Gasim Mahdi	:Librarian	: 27/6/83	:Khartoum:	
Adam Aburas Modu	:Head Clerk	:	: (Transferred to Kadugli)	
El Amin El Awad	:A/D Finance	:	:	: 12/6/83
Ebeid El Awad Ebeid	:Accountant	:	:	: 12/6/83

IV. FINANCE

The quarterly financial statement will be forwarded at a later date.

Revised estimates of budget requirements have been made in light of devaluation and extension of the project for two additional years. These requirements (for PL 480 pounds) have been submitted to the Ministry of Finance through USAID.

V.

PROJECT IMPACT

With the addition of WSARP Workplan Vol. IV ("Initial Research Proposals - Kadugli Research Station") the WSARP Publication Series now numbers eighteen reports. In addition, there are five staff publications, nine WSARP consultants reports and about 30 staff reports. The WSARP library include about 60 resource reports of direct relevance to WSARP, twenty of which deal directly with the Farming Systems approach.

WSARP Senior Scientists spent an inordinate amount of time in meetings and in the preparation and revision of research proposals. The Station Research Committee at Kadugli was particularly active during the second quarter. Planning of field trials and pursuits of ongoing research continued during the quarter.

The Agronomy Section at Kadugli visited farmers selected for on-farm experiments in Shaer, Bilenga and Hamra. Land for experiment station trials was prepared at the WSARP farm in hopes the farm-serat road will be completed in time.

Personnel from the Kadugli Extension Department assisted in organizing the distribution of dura seed at Keiga Timnero for the technology adoption study.

The following forms of observations were made on transhumant households this quarter : late dry season livestock grazing and watering patterns; residential change of transhumant camps from cracking clay soils to Gardud (non-cracking clays); transhumant group responses to outbreak of epidemics of livestock and human communicable diseases; funeral ceremonies and mourning practices; wedding ceremonies and marriage customs; cognatic and affinal networks between transhumant households and with sedentary households; lineage group handling of a blood-debt cattle compensation case; a case of homicide between lineage groups using the same transhumance route and grazing areas; governmental actions of an administrative and judicial nature involving livestock trespass in crops, legal proceeding for homicide and provincial administration of justice. Also dry season food purchases, and food consumption change of pattern during Ramadan; first stage of livestock movement during early rains; scouting of future migration areas; response of transhumant household to multiple livestock deaths at end of dry season/early rains; livestock sales.

Work continued on the analysis of data from the sedentary farmers survey. A draft of a paper titled "Constraints to Agricultural Production within the Sedentary Farmer Systems of the Nuba Mountains Area" was prepared and distributed to senior scientists and project administration for review. A research proposal concerning technology adoption was drafted and presented to the Kadugli Station Research Committee.

Several meetings were held with a USAID team who were preparing a project proposal to strengthen extension capabilities in Kordofan.

Considerable amounts of seed were obtained from WSU, INTSORY, ICRISAT and AVRDC for distribution to Kadugli and El Obeid for the 1983 cropping season. This effort was coordinated by Dr. Riley who also assisted in procurement and distribution of seed to other ARC stations to other development agencies such as Western Savanna Blue Nile Project and the Jebel Marra Rural Development Project.

The hay feeding experiment was completed in June and results are being analyzed. A preliminary report has been written.

Forage screening trials were planted at Kadugli Station.

The Range Livestock Section evaluated the effects of fire on woody composition in specific vegetation communities.

Kadugli station scientists cooperated with GtZ in evaluating problems associated with weeds on the fallow land. They worked with the SATEC animal traction team to establish a cooperative effort for housing maintenance and utilization of draft animals at Kadugli Station.

Sampling began in May for a Disease Seasonability Impact Study. Preliminary results have been reported.

Clinical examination of sentinel herds began with arrival of necessary laboratory equipment.

VI. FUTURE WORK PLAN

Most of the third quarter of 1983 will be the growing season, and the season for transhumance. WSARP scientists will devote most of their time to transhumance observations, the planting and attending of crop trials on-farm and on-station and to continuance of surveys.

Research proposals for 1983/84 should be completed early in the third quarter and have been reviewed by the Station Research Committee.

The social science section will continue follow-up interviews on the sedentary farmer survey, and analyze data. Assistance to rotation studies will be given with collection of relevant economic data. An adoption study will be conducted with Gadem El Hamam sorghum seed. Additional planning will be done for marketing studies. Simple criteria for an assessment of quality of life, developed during the current quarter, awaits inclusion in a later formal survey essential to both the transhumant and sedentary systems.

The livestock section plans a meeting early next quarter with Regional Ministry staff to discuss camel and sheep production studies in North Kordofan. Wet-season sampling for the Disease Seasonability Impact Study will continue during the third quarter.

VII. ISSUES AND ACTIONS

With field work beginning on the Kadugli Research Farm, a need for communications (radio or telephone) between the farm and the Seraf has become apparent.

It has been suggested that the Project would benefit greatly from closer ties with the University of Khartoum. They could provide both expert advice (faculty consultants) and studies (supervised graduate students).

WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT

QUARTERLY REPORT

01 July 1983 - 30 Sept 1983

I GENERAL

The growing season in Western Sudan began in the third quarter, initiating agronomic field work on the WSARP experimental farm for the first time. The farm to seraf road was completed in August.

Dr. D. A. Dafalla attended a two-week workshop on Agricultural Research Management at Arusha, Tanzania; organized and conducted by the International Services for National Agricultural Research (ISNAR) and the Eastern and Southern African Management Institute (ESAMI). The overall objective was to expose the participants to skills and tools which they can apply directly to their task as agricultural research administrators. The workshop covered a range of topics including economic analysis, financial management, the management of human resources and organizational behavior.

Dr. Jean R. Kearns, CIB Deputy Executive Director, visited the project August 9 - 16. Dr. Kearns met with Dr. Bakheit, Director General, ARC as well as project management, USAID officials, expatriate scientists in Kadugli and several of the Sudanese scientists.

Mr. Frank Donatelli, AID nominee for the post of Assistant Administrator in the Africa Bureau, visited the Kadugli Station in late July. He held informal meetings with the station staff and was taken on a tour of the area.

Mr. Joachim Grube of the A&E firm Grube-Zimmer visited Sudan 5 - 19 August. He worked with contractor personnel and GOS officials toward resolution of issues relating to the economic dislocation clause in the construction contract. Mr. Grube visited construction sites in Western Sudan on 16 - 17 August.

ARC National Research Coordinators were taken on a tour of WSARP research stations in August. The tour was conducted personally by Dr. Dafalla, Director, WSARP. The purpose of the visit was to further familiarize ARC officials with the WSARP research program and to solicit assistance in planning and research coordination. Those making the trip were :

Prof. Osman Cameel, ARC Deputy Director General for Finance and Administration

Prof. Iqani Mohammed El Amin, Director, Gezira Research Station

Prof. Mahmoud Adam Ali, National Coordinator, Plant Pathology

Prof. Ibrahim Ahmed Babiker, National Coordinator, Soil
Prof. Mahmoud M. Salih, National Coordinator, Horticulture
Prof. Faisal Mirghani Ali, National Coordinator, Wheat
Prof. Badr Ahmed Saleem, National Coordinator, Cotton
Prof. Osman Ahmed Ali Fadl, Soil Physicist, Faculty of Agriculture, Gezira University.

Dr. George Ghobrial, USAID agronomist, visited El Obeid Station on August 20 - 21, and Kadugli Station September 10 - 11. Dr. Ghobrial inspected experimental plots at both sites and discussed the research programs with Station scientists. His trip reports are useful and most welcome.

Messrs. Douglas Swenson and Ali El Gahary, CID auditors, visited the project from 6 - 13 September. They conducted a partial audit of project accounts controlled by CID/WSU, and consulted with project administration.

AID Auditor Tom Marr conducted a management audit of the project in September - October 1983. He visited Kadugli and El Obeid.

There were many visitors to the project during the third quarter, in addition to those mentioned above :

<u>VISITOR</u>	<u>AFFILIATION</u>	<u>PERSON WANTED</u>
Dr. Hobbs & Mackenzie	ISNAR	Drs. Dafalla, Riley
Dr. Judith Bale	US Academy of Science	Riley, ARC Wad Medani
P. Rivett, R. Holden	ICI	Riley, Kadugli Station
Dr. Bateman	Agr. Statistics Proj.	Riley
Dr. L. Musselman	Fullbright	Riley
Dr. Babiker Mohamed	U of Khartoum	Riley
Dr. Bromley	U of Wisconsin	Riley
Drs. Burford, Gebisa, Jain	ICRISAT	Riley, Kadugli Station
Chris Lomas	HTS	Riley
Messrs. Shukri, Ibrahim	Pioneer Seed Co.	Riley
Dr. Hensley	Purdue University	Dr. Bakheit, Riley
Messrs. Reynolds, Grimes Danauskas and Carlson	TEMK	Riley

Dr. Riley's duties as Senior Advisor to ARC included the following activities :

Liaison with :

INTSORMIL (Dr. Coughenour)
Western Savanna Development Corporation
National Academy of Sciences

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Australian Centre for Int'l. Agr. Research
Council for International Pest Control
ICARDA
University of Khartoum
Centre for Overseas Pest Research (UK)
Yambio Research Station, (ARC)
Asian Vegetable Research and Development Center
Environmental Training and Management for Africa/
University of Khartoum

Dr. Riley also coordinated the distribution of seeds to various research entities. He continued to oversee the distribution of publications and information among various research organizations in Sudan and abroad.

Dr. Riley assisted ARC and INTSORMIL with arrangements for a conference on Hybrid Seed Production to be held in Wad Medani in November 1983.

Dr. Tom Nordbloom, Agricultural Economist, ICARDA FSR program, presented a seminar to scientists at Kadugli Station. His seminar, given on 23 August was on : "Economic Evaluation of Barley for Grain and Fodder".

Dr. Neil Patrick, Agricultural Economist, WSARP presented a seminar at Kadugli on 24 August entitled "Design and Implementation of Sedentary Farm Survey in South Kordofan".

Dr. Riley attended annual meetings to review research by ICARDA/IPAD project on Fava Bean Improvement in the Nile Valley. ARC in Sudan and Egypt conduct cooperative research with the International Centre for Agricultural Research in Dry Areas (ICARDA) based in Aleppo, Syria.

Mr. Zakaria Saad, Director, El Obeid Station, went to the U.S. in August for a nine-month training program in agroforestry at Idaho State University.

Sid Ahmed Hassan Sid Ahmed Beteik traveled to the U.S. on 24 September to begin a MSc program in agricultural economics at WSU.

Farouq Mohamed El Hadi returned from WSU in September after completing requirements for the MSc in forestry. He expects to return to a PhD program at Oregon State University in the near future.

Dr. Babo Fadlalla went to the US and the UK for short-term training in July and August. He also went to ILCA in Addis Ababa, Ethiopia for a three-week short-term training program in late September.

Dr. El Hag Abuelgasim attended a month-long String workshop in North Carolina, USA.

The following expatriates were on leave at some time during the third quarter :

Perlita P. Sulit
David and Shirley Higgins
John B. Hannum
Hank P. Bergman
Joel M. Teitelbaum

Pam and Michelle Bunderson were in the U.S. from 26 July to 24 Sept.

II PHYSICAL PROGRESS

A. Construction

EL OBEID

All foundation work complete and most buildings have brickwork complete to roof line except for some junior housing. Roof framing and roof complete at senior houses and 12 middle houses. Roof trusses in progress at administration building. Underground water storage tank and sewer line manholes complete. Sewage lagoon 50% complete. Compound wall foundations and brickwork in progress. Major roads laid out.

EL FASHER

Foundation work complete and brickwork up to roofline complete for most buildings. Compound wall foundation and septic tank concrete work in progress. Roof framing in transit to site. Due to brick shortages, contractor was instructed to concentrate on buildings before starting compound walls.

GIAZALA GAWAZET

Foundation work and building; brickwork complete to roof line. Compound walls nearing completion. Roof framing in transit to site. Underground water storage tank complete. Further progress on imported materials.

ARC HQ KHARTOUM

Structural shell of buildings complete. Electrical rough-in complete. Some plastering has been done but work has been suspended pending receipt of imported materials.

GENERAL

Now that the rainy season is over and water supplies near normal at Fasher and El Obeid, brick and water problems should ease.

Some of the Chinese crews at Fasher and Ghazala are still on leave but are scheduled back at the sites with metal workers phased to coincide with arrival of materials, and others arriving as needed. All are scheduled back mid-November.

The most important problem currently effecting construction apart from contractor internal organization, the ban on fuel-wood for brick firing and the ban on water for brick making, is recent Government actions banning importation of a wide variety of imported goods. Many of the materials needed for the project are included. While the obtaining of the necessary import licenses is the contractors responsibility, delays are certain to occur.

The G.O.S. is also now requiring a 100% letter of credit through the Bank of Sudan for all imported materials. This was formerly 25% and the increase represents a major problem for the contractor. Preliminary conversations between the Consultants and Mr. Marples of the World Bank have been initiated to see what might be done.

To minimize these effects, WSARP requested a waiver from the Ministry of Commerce on banned imported items. The Minister of Agriculture and Irrigation has also been requested to contact the Governor of the Bank of Sudan with regard to the Letter of Credit.

Construction Schedules :

Original contract signed June 23, 1981
Mobilization period-45 days following signature
Start of construction - August 7, 1981
Original completion date - August 1, 1983
Variation Order No. 2 extended completion date to January 28, 1984 for El Obeid, El Fasher and Ghazala.
Completion date ARC HQ August 1, 1983.

Contractor is in default on completion of ARC HQ and has been notified that damages of LS 150 per day until completion will be deducted from his billings.

A revised schedule for all sites was developed during May 1983 by the Consultants working jointly with the Contractor. This schedule left the completion date at January 28, 1984, but projected construction, final inspections and project close-out

continuing to August 1984. Unless further time extensions are granted for circumstances beyond the control of the Contractor, this means the Contractor will also be in default on the other sites and liable to damages. Total damages for the three sites will be LS1350 per day.

PAYMENT CERTIFICATES ISSUED TO DATE :

El Obeid	2,209,949.00	30.1	
El Fasher	769,416.00	22.5	
Ghazala Gawazet	818,504.00	25.6	completion as percent
ARC HQ	<u>234,520.00</u>	54.9	of funds expended
TOTAL	LS 4,032,389.00	28.0	

B. Force Account

EL OBEID

- Fencing initiated on peanut research plots and horticultural farm
- Farm boundary survey made by Survey Department
- Drilling of well for the horticulture farm was given priority over well for the main station.

KADUGLI

- The farm to seraf road was completed with some damage to Irish bridge by heavily loaded trucks. Repairs are underway
- A design for a cantilevered parking shelter was completed
- A wall was built at the east end of the senior housing complex to discourage entrance of snakes
- An outline of a station maintenance plan was prepared
- Additional work was done on seraf drainage and on gully control. Grass was planted on banks of sewage ponds by Dr. Bunderson for erosion control
- Construction was begun on animal handling facilities at the farm.

GHAZALA GAWAZET

- Discused employing a soil mechanics specialist to advise solving wet weather airstrip performance problems
- Telexed manufacturer of Danish generators about spare parts
- Bids received for electric submersible pump.

EL FASHER

- No activities.

GENERAL

- Twenty four lorry-loads of construction material (cement, plastic pipe, steel angles) was transported from Shambat in Khartoum to El Obeid and Kadugli
- The project has employed a young Sudanese Civil Engineer to assist in force account engineering. He reported for work in late September.

III STAFFING AND MANAGEMENT

WSARP personnel actions during the third quarter 1983 were as follows :

<u>NAME</u>	<u>POSITION</u>	<u>DATE OF APPOINTMENT</u>	<u>PLACE OF WORK</u>	<u>DATE OF TERMINATION</u>
Dr. Lalit Arya	Sr. Scientist	Sept 83	El Obeid	
Abdel Malik Khamis	Messenger	07/07/83	Khartoum	
Abdalla Ibrahim Musa	Messenger	18/07/83	Khartoum	
Khalil Ibrahim Hussein	Messenger	27/07/83	Khartoum	
El Hag Hassan A/Gasim	Scientist	01/08/83	El Obeid	
Ahmed Salah Umbadi	Technician	01/08/83	Kadugli	
Abdel Aziz A/fatih	A/Scientist	24/08/83	Kadugli	
Musa Yousif Adam	E.A. Engineer	01/09/83	Kadugli	
Budur Awad Babiker	Clerk/Typist	01/09/83	Khartoum	
Ernesto Okec	Labourer	06/09/83	Shambat	
Obang Fedik	Labourer	06/09/83	Shambat	01/10/83
Daniel Robert	A/Driver	13/09/83	Khartoum	
Joseph John	A/Driver	27/09/83	Khartoum	
Omer Daud	Messenger		Khartoum	19/07/83
Mohamed Miso Hamad	Cashier		Kadugli	22/08/83
El Amin Abdalla	Driver		Khartoum	01/08/83
Wol Wol Ali	Driver		Khartoum	01/09/83
Adam Ibrahim	Driver		Kadugli	01/09/83

IV FINANCE

The quarterly financial statement will be forwarded at a later date.

V PROJECT IMPACT

The following agronomy trials and experiments were conducted by WSARI in the Kadugli area (planting dates are shown in parenthesis) :

Telo

1. INTSOY 16 variety soybean trial, 4 reps (July 5)
2. Freely nodulating soybean trial, 11 varieties, 4 reps (July 6)
3. AVRDC vegetable soybean trial, 20 varieties, 3 reps (July 6)
4. AVRDC soybean trial, 12 varieties, 4 reps (July 6)
5. Soybean (5 varieties) - fertilizer (0 and 40kg P₂O₅/ha) trial, 4 reps (July 6)
6. Abu Naama soybean trial, 4 varieties, 4 reps (July 27)
7. Sudan national sorghum hybrid trial, 24 entries, 3 reps (July 21)
8. Sudan national sorghum variety trial, 24 entries, 3 reps (July 21)
9. Sorghum variety (6 varieties) - fertilizer (0 and 40-40-0) trial, 4 reps (July 16)
10. Local sorghum collection trial, 19 selections, 4 reps (July 16)
11. N (0,20,40 and 60 kg/ha) x P (0,20,40 and 60kg/ha P₂O₅/ha) factorial on sorghum, 4 reps (July 19)
12. Elite sorghum variety trial, 20 varieties, 2 reps (July 27)
13. Elite sorghum hybrid trial, 20 varieties, 2 reps (July 27)
14. Advanced sorghum breeding lines, 64 entries, only 1 rep(July 26)
15. International sorghum disease and insect trial (Texas A&M), 30 entries, 2 reps (July 18)
16. Sorghum leaf disease reaction- variability trial, 40 entries, (July 21)
17. International leaf disease observation nursery, 30 entries, 2 reps (July 21)
18. Sunflower variety trial, 4 varieties, 3 reps (July 26)
19. International cowpea variety trial, 19 varieties, 4 reps (July 14)
20. International mungbean variety trial, 22 varieties, 4 reps (July 9)

Assarat

21. Pearl millet national trial, 15 varieties, 5 reps (July 28)
22. Millet populations trials, 3 population, 4 reps (July 28)
23. Rainfed groundnut variety trial I, 18 varieties, 4 reps (Aug 2)
24. Rainfed groundnut variety trial II, 22 varieties, 4 reps (July 28)

Elafin

25. Millet for Striga infected clays, 9 varieties, 4 reps (July 21)
26. Two University of Khartoum Striga resistance sorghum trials, (July 20)

New Agronomy research farm.

27. Three forage legume and storage legume grass evaluation trials, 28 entries in each with 4 reps, jointly with range science (July 15 and 20)
28. Three $\frac{1}{2}$ feddan nonreplicated forage legume plots and four $\frac{1}{2}$ feddan nonreplicated grass plots, jointly with range science, (July 3 and 5)
29. INTSOY 1b variety soybean trial, 4 reps (August 4)

On-farm trials

30. On-farm trials consisting of the following practices were put out at nine locations :
 - A. Gadam El Haman with seed dressing, high plant population, and good weeding practices
 - B. Farmers with seed dressing, high plant population, and good weeding practices
 - C. Farmers variety and his own cultural practices.

The nine locations are : Hamra - 3; Shaer - 3, and Bilenga - 3.

In addition, and jointly with range science, two one-feddan plots in the Bilenga area and one in Hamra have been seeded to Clitoria.

As construction of the road to the new agronomy farm did not commence until around June 15, the decision was made to establish most of the trials and experiments on NMAC land at Telo, near last year's site. Because of unusually high infestation of Striga at Elafin, two University of KRI dura/Striga trials and one millet/Striga trial were located there. All trials at Telo and Elafin were sown during July.

Two national groundnut trials and two millet trials were established on the coarse textured soils inside the Seraf compound. Sites selected were not 'ideal' but were about the only areas that did not require any bush or tree removal.

Several storage trials were established jointly with the Range Science section on the agronomy farm in July. It was thought that these trials once seeded would not require monitoring as often as typical crop experiments and therefore would not be contingent on completion of the new farm road. Later, on August 6, a 16 variety INTSORMIL trial was sown on fallow land on the agronomy farm. It was around the third week of August before passage over the new road was assured.

On-farm trials were sown during the last half of July and early August at three different sites in each of the three villages : Bilenga, Hamra and Shaer. Lack of timely precipitation made it necessary to delay planting in some cases and made it necessary to re-plant in others.

Rainfall over the area will be below normal this season. The ICRISAT Elite Sorghum Hybrid, Elite Sorghum Variety, and Advanced Breeding Lines trials and the Abu Naama Soubean trial all planted at Telo on July 26/27 and the Millet for Striga Infested Clay Trials at Elafin failed because of inadequate rainfall after sowing. Often there is sufficient seed left over for some infilling but very seldom enough for complete replanting. Rainfall during August was close to normal or above at all sites. However, for September the amount and/or frequency of precipitation decreased again and all crops were stressed much of the month.

Quantity and quality of seeds supplied for some of the trials were low. This was especially true of the vegetable soybean trial from AVRDC as low germination doomed this trial from the start. Ten kg of each of seven varieties of soybeans were requested for the soybean phosphorous trial. Approximately 450 gr each of five varieties were received. Some of these varieties also had low germination with the end result being poor stands. Nevertheless, it is quite clear that several of the varieties responded to 40 kg P_2O_5 /ha applied in the row with the seed.

The two fertilizer trials on sorghum also show a marked response to phosphorous fertilizer. Surprisingly, application of nitrogen without phosphorous shows no response, in fact treatments which included nitrogen but no phosphorous seemed to make the plants more susceptible to anthracnose. After observing the phosphorous responses on dura at Telo, two nonreplicated mini trials were started on the agronomy farm on August 31, one on fallow land and one land previously cropped for a number of years. The mechanics of sowing was in the traditional manner, i.e. making a hole with the sulukab, adding a pinch of triple superphosphate to each hole or hill, then dropping the seeds in the hill with the fertilizer, and covering by foot. Although this sorghum will probably never mature the trials do show a marked increase in growth with added phosphorous.

The forage trials put out jointly between Agronomy and Range Science on the agronomy farm have not been encouraging from the standpoint of introducing new types to the area. All seeds were weighed and broadcasted by hand over each individual 2m x 8m plot and then raked with a garden rake. The soil appeared to be in very good condition for doing this. Weeds and native vegetation at sowing were still not abundant even on the trial located on nonsprayed fallow land. Still, at the end of the quarter, none of the grasses could be detected and the only legumes identified were the indigenous types: Vigna, Cajanus and Clitoria. Some additional legume and grass seedings made in Telo in July also showed that the only grasses that survived were Bracheria and another local type called Schima isch and the only legumes that survived were local types: Clitoria ternatea, Phaseolus trilobus, Cajanus cajan, Lablab purpureus, and Vigna sp. With the exception of Lablab purpureus, (formerly called the Dolichus lablab) all were well nodulated and active. Observations made of the larger one-feddan

plots of Clitoria sown at Bilenga and Hamra as well as the land surrounding these plots show that Clitoria is already present either from seed or from roots. The problem seems to be how to increase its abundance in the dense grass vegetation that eventually takes over.

Sorghum planted at Telo, Elafin and on some of the on-farm trials was attacked by shoot fly at very early state. Although this caused an early setback it recovered remarkably well. Soybeans, cowpeas, and mungbeans required frequent spraying to keep blister beetle in check.

Forty tons of native hay were harvested and stored for use in feeding trials during the upcoming dry season. In addition, a number of cooperating farmers were assisted in harvesting and storing hay for own use. The oxen and carts provided by SATEC were used in transporting hay by cooperating farmers and it is expected that oxen and carts will be used by some farmers to transport sorghum grain from far fields to villages for threshing and storage.

The Range-Livestock section continued observations on range conditions and data gathering for system definition and constraint identification.

Preliminary analysis of production data from migratory and sedentary herds indicate comparable weight losses during the dry season (15%-20%). Milk production and reproductive performance were also comparable between the two herds. Disease incidence and losses were significantly higher in the sedentary herd than in the migratory herd (losses 26% vs 8%; disease incidence 20% vs 10%).

Preliminary conclusions are that ectoparasites are a significant problem when combined with poor nutritional status during the dry season.

Data are being analyzed in support of several papers, most of which are in the process of preparation.

1. "Pastoral System - Basic Problems in Resource Management; An Opportunity for Farming Systems Research".
2. "Pastoral System in Arid Africa - A Conceptual Approach".
3. "Nutritional Status of Transhumant Cattle in South Kordofan - a First Approximation".
4. "Nutrition and Disease Interactions and Their Impact on Cattle Production in South Kordofan".

Analysis of data from the Sedentary Farmers Survey was completed. However due to the quality of data in certain areas, and additional questions that surfaced during the data analysis, a decision was made to visit each of the 14 villages again in October and November to supplement and verify previously collected information.

Data collection began on the Market Study at the Kadugli Livestock Market. A sample of cattle, sheep and goats are being examined to determine sex, age, weight, source and condition in relation to sale price. Daily sales data was collected starting August 1, 1983.

The Technology Adoption Study was begun with bags containing 1kg of treated Gadam El Haman Sorghum seed distributed to 24 farmers at Keiga Timmero. An extension demonstration was conducted regarding cultural practices and several visits were made to monitor adoption and progress. Data is informally being collected to develop an in-depth research proposal concerning crop rotations. It is hoped to institute this research formally in 1984.

A manuscript entitled "Constraints to Agricultural Production within the Sedentary Farmer System of the Nuba Mountains Area" was finalized and submitted to project administration for publication as a WSARF staff report. A draft of a paper entitled "A Plan for Integrating Extension and Research in the Nuba Mountains Area of South Kordofan Sudan" was completed and forwarded to senior scientists and project management for review.

The economics subsection provided assistance to the Agronomy, Soils and Water Section in experiments concerning on-farm trials of improved practices for increasing sorghum production, crop responses to fertilizer and establishment of legumes to maintain soil fertility. Assistance was given the Range and Livestock Section in work related to introduction of forage legumes in cropping systems and supplementary feeding of livestock. Work was begun to analyze costs of maintaining animals for draft purposes.

Dr. Patrick spent a week at El Obeid in reviewing research currently underway and planned by Agronomists. The purpose was to evaluate the data being collected for use in economic analysis and to recommend revisions of the data collection process.

Following a meeting of senior scientists in Kadugli regarding needed market research a proposal was developed with assistance from Drs. D'Silva and Humeida of the Department of Rural Economy at the University of Khartoum to involve Masters level students in this effort. The proposal was submitted to project management.

Work continued on the Transhumant Production System Study by the Senior Social Scientist, the Social Science Research Associate and the Junior Technician. Interdisciplinary assistance was provided by the Range Ecologist and the Animal Production Specialist. The Research Associate spent time with one transhumant camp during its northward trek in July and August; then camped with this group at its northern site during parts of August and September. The Senior Social Scientist made several visits to transhumant camps in July, August and September.

Observations made during the third quarter on transhumant production system activities and human behavior included :

1. organization and management of the northerly camp movements.
2. herding and living conditions en-route and in the 'near north' including soil types, animal and human water supplies, and disease stress on livestock and humans.
3. timing of northward migration, length of stay at points along route in relation to grazing, water and social economic situation.
4. attempts at cultivation en-route north.
5. marketing activities and market locations along the migration route: sales and barter of livestock, milk products and consumption needs of households.
6. festive and religious occasions and tribal meetings by transhumants during northward migration period.
7. leadership and labor division among transhumant; men's and women's roles.
8. labor migration to Saudi Arabia and Haj Pilgrimage preparations and related livestock sales.
9. interactions of transhumant households with their sedentary kin en-route.
10. hut construction, dismantling and loading of pack animals for trek.
11. beliefs and attitudes toward the purpose and importance of transhumant movements among camp members.
12. child-rearing practices and socialization of children during the trek.

The Senior Social Scientist reports that during this quarter strong evidence was discovered by field observation that the transhumance phenomenon represents a very complex entity with many possible variants by household and camping group in management of herds and crops in the production process. A zoning activity on one migration route (the Western route) was carried out; the entire route was determined to constitute a single zone over time and space with important ecological and seasonal contrasts. Within this zone from south of Kadugli in the dry season to south of El Obeid in the wet season, various processes serve to maintain and change transhumance. Sedentarization takes place not only at the southern pole, but also along the route north. Other households are undergoing nomadization, i.e. becoming transhumant from Moroland in S. Kordofan, to Kadugli and Dilling areas. Former sedentary farmers or sedentarized ex-nomads are joining the transhumant stream at a faster rate than others are "settling out". This increases the pressures on northern ranges where cultivation is also expanding.

The Senior Social Scientist also reports that strong market forces operate on the northern migration route and in the "near north", attracting transhumants to make animal sales and increased milk sales. Transhumants find increasing difficulties in carrying out agricultural cropping activities during this period, due to management and labor scarcities and loss of manpower to transhumance and out-migration.

The critical importance of livestock and milk markets were highlighted by the preliminary information obtained, in order to develop appropriate WSARP interventions. Grain-market and household food and clothing needs are also important marketing factors during the transhumance.

During this quarter, visits of a reconnaissance nature (farmer identification and recommendation domain characteristics) were done in connection with the On-farm Sorghum Package of Practices Study. Also, interaction with farmers involving superimposed management of experimental plots of sorghum on their fields were undertaken. These visits were made in Agronomy-Social Science and Range teams to two major sites :

1. Shaer and Seraf Iddae villages and farms
2. Bilenga and Hajar'Ranaba villages and farms
3. Hamra area farms.

Several visits to farmers fields with the farmers and interviews with farm families were carried out by social scientists. This allows improvement in WSARP understanding of the interactions of constraints on crop production and the choices made by farmers during the course of the cropping season. It also permits better definition of the farming systems within the zones selected. The assessment of current interventions from the farmer's perspective helps make for an improved package of practices and permits the generation of new hypothesis for appropriate intervention and/or support thrust research.

VI FUTURE WORK PLANS

The Agronomy Section will harvest the remainder of trials during the fourth quarter and analyze data. They plan to make additional collections of local dura types from the Nuba Mountains area. The agronomy/soils lab will become operation and analysis of representative soils for available phosphorous will begin. The Agronomy Sections plans to complete work on the "dirty lab" for seed cleaning, storage, etc.

Follow-up work for on-farm trials will continue through the fourth quarter.

A major activity will be the planning and lay-out of the agronomy farm for next seasons research.

Planning cooperative research efforts with other agencies such as SATC and GtZ will continue.

Data collection for the Rotation, Technology Adoption and Market Studies will continue. A formal research proposal to study crop

rotations will be developed by scientists of the Agronomy, Range and Livestock and Social Science Sections. The possibility of a joint proposal with GtZ and SATEC will be explored. Data analysis will be accomplished for the Technology Adoption Study.

Visits to villages to collect supplementary data for the Sedentary Farmer Survey will be accomplished by the Economics Subsection in October and November. A first draft of the final report will be written.

The Economics Subsection will work with other sections to analyze research results from the 1983 cropping season.

The Senior Social Scientist will complete his tour of duty in Sudan during the fourth quarter. Some field work remains to be done in the Transhumant Production Systems Study and the On-Farm Sorghum Package of Practice Study. Report writing will be a major activity in the Social Science Unit during the fourth quarter.

VII ISSUES AND ACTIONS

Failure to complete construction of the road to the new agronomy research area prevented initiation of any long term rotation experiments. Work should begin during the next few months of laying out the agronomy farm and constructing the roads thereon. Brush will have to be cleared again before next planting season.

Lack of adequate machinery and implements for preparing any type of seedbed was one of reasons for poor stands. The old three-disc plow could not be set properly or it is worn out. Smoothing with large chain and heavy tool bar was not adequate to remove undulations caused by poor plowing. An attempt to make furrows by attaching old cultivator shanks at specified intervals to a regular tool bar. This caused great variation in planting depth.

Machinery and implements should have been liberated from Customs in Port Sudan and transported to Kadugli early in the third quarter. Someone with the necessary skills should be hired to assemble the various units when they do arrive.

The present method of conducting on-farm trials is inefficient and wasteful of time and benzine. The senior agronomists suggest that consideration should be given to establishing trained cadre in each village or area where trials are to be conducted. These cadre would be given intensive training by WSARP scientist before being reassigned to the village or area from which they came. They could supervise the trials and collect the necessary information from the farmer.

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Although perhaps not a major constraint this season, the shoot fly attack on sorghum, blister beetles on the soybeans, and some type of stem borer on some of the cowpea varieties point out the need for a senior scientist in pest management on the WSARP staff.

There were a few times when the transportation was a problem for the Agronomy Section. They were told at the beginning of the season that an extra vehicle would be assigned to agronomy during the daytime for use by Ahmed K. Elseed primarily. Later, during the most crucial part of the season, Agronomy had to compete with other sections for use of this additional vehicle. Toward the end of the quarter the vehicle was pretty much assigned to Agronomy again.

If research on coarser textured footslope soils is to be expanded at this station we should either clear more land within the Seraf compound or look for a suitable area elsewhere.

The Senior Agricultural Economist reports that a shortage of staff continues to constrain economics research. The subsection is still without a senior technician. With the arrival of a Sudanese senior scientist additional technicians should be assigned.

Lack of personnel in other sections, especially the Agronomy, Soils and Water Section, has made interdisciplinary work difficult. Additional technicians should be employed.

The Kadugli Station library remains largely inoperable due to the continued absence of a librarian. A librarian was hired and trained at USIS in Khartoum, but is long overdue to take up his position in Kadugli.

/pps

WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT

SUMMARY AND RECOMMENDATIONS

Substantial progress has been made in the early phases of the rather complex Western Sudan Agricultural Research Project (WSARP). An administrative structure, with a project support unit, has been established and is functioning. Good working relationships exist between project administration, the donors, staff at headquarters, the coordinating staff at Washington State University, and the staff of the Consortium for International Development, the prime contractor for technical assistance.

An aircraft has been purchased and is functioning to help meet project needs for transport and communications. A radio network soon will be functioning to provide improved communications between administration and each of the field stations and they with each other.

Some research has been initiated at the Kadugli station in South Kordofan and further projects are in various stages of planning. On the basis of the original time frame, the research program and plans for the future are slightly ahead of schedule. Early investigative work was initiated in range management and social anthropology that has built up a strong base of description and understanding of the local range environment and of household, farm and community organizations in South Kordofan. This and other accumulated information has been of value to incoming scientific staff allowing their rapid orientation to the local situation. Project scientists have become thoroughly involved with farmers and have developed a working knowledge of traditional farming practices. Three disciplinary sections: range management and animal production, socio-economics, and cropping systems-agronomy have proposed research programs for the 1983-84 season and in some cases 1984-85.

Members of the evaluation team were impressed with the apparent enthusiasm for the implementation of a systems approach as a new tool of agricultural research. In the Western Sudan, with its nomads, transhumants, and sedentary farmers, with strong interfacing of crops and animals, both within and between farming systems, the WSARP has tremendous opportunity for impact on the orientation and methodology of the systems research approach.

General work plans have been developed for the other stations but no specific research proposals have been prepared.

The construction program at the stations is considerably behind schedule due to many factors. The major facilities at Kadugli have been completed and some staff positions have been filled. Much remains to be done to develop roads and driveways, parking areas, the station farm and maintenance and repair shops. Construction of buildings, houses and other facilities at El Obeid, El Fasher and Ghazala Gawazat will not be completed until February 1984. Headquarters staff of the project will move from Khartoum to El Obeid at that time.

The major constraint to the success of this project is a lack of experienced, qualified Sudanese staff at all levels - scientists, technicians, and operational support staff. Full value of the technical assistance scientists will not be obtained without adequate, qualified Sudanese counterpart scientists to provide the continuity necessary for research to be effective. A second constraint is a lack of adequate mechanisms and personnel for maintenance of vehicles and other equipment and physical facilities at each of the stations.

The alleviation of these and other constraints and deficiencies which would improve overall project administration and operation, are dealt with in the summary recommendations that follow. They are arranged in groups according to the major sections of the report. The reader is referred to the text for comments relating to the recommendations given for consideration by project management and others concerned with the project and the ARC. Additional specific recommendations and suggestions are given in the report.

Integration Into ARC and Coordination with GOS Institutions

Recommendation 1. There is a need for the WSARP to operate as an integral and complementary part of the ARC. Close linkages and informational exchanges must be maintained between project and management and ARC on budgets, research project appraisal and approval, in research operations and in staff recruitment and career development. (p. 4)

Recommendation 2. The transfer of the ARC headquarters to Khartoum would aid in the development and strengthening of the WSARP stations and other units of the ARC system. In addition, it would give a national posture and outlook that would ensure continuous liaison with officials concerned with national development planning and donor agencies. It would be in keeping with the ARC's nationwide responsibilities as the technical arm of the Ministry of Agriculture, Food and Natural Resources. (p. 5)

Recommendation 3. To facilitate liaison and collaboration between the agencies cooperating in the development of the WSARP, a Project Coordinating Committee should be established to meet twice annually to discuss and decide issues of concern to all parties. Composition of the committee would include the Director General of the ARC, the Project Director, representatives of the World Bank, USAID, CID and GOS. (p. 6)

Recommendation 4. To strengthen its role in transfer of technology and agricultural extension, it is recommended that WSARP appoint a sufficient number of production specialists (minimum of three specialists in every station) to cooperate with the research scientists and the provincial extension services in the conduct of on-farm trials and the training of extension personnel and farmers. (p. 7)

Recommendation 5. It is suggested that a consultant be appointed to carry out a short term study of one or two months to explore possibilities of financial contributions to WSARP from levying of assessments on marketed crops, livestock and forest products from the Western Regions. (p. 7)

Project Management and Support

Recommendation 6. With many demands on the time of the Project Director and Deputy Director, it is essential for them to delegate routine details to subordinate staff in order to allow them the time for a better overview of project needs and basic policy decisions. Control of delegated responsibilities should be achieved by a reporting system monitored by the Project Director. (p. 8)

Recommendation 7. The line between the duties of the Deputy Director and his dual role as Chief of Party for technical assistance should be clearly defined and clear to all, especially the expatriate technical assistance staff. (p. 9)

Recommendation 8. The WSARP should take advantage of training courses of varying length offered by the International Centers, i.e. ICARDA, ICRISAT, IITA and ILCA, for selected members of the staff. Also, other opportunities for short term training should be explored, such as a course on research management offered by the Economic Development Institute, sponsored by the World Bank and the International Service for National Agricultural Research (ISNAR), and a training course given in the Netherlands supported by the European donors of the CGIAR at which development oriented research procedures, based on a systems approach to research, are taught. (p. 12)

Recommendation 9. It is suggested that WSARP follow up on preliminary discussions that have been held with CIMMYT's East African Economic Program and arrange for participation of some staff in training workshops on farming systems research. (p. 12)

Recommendation 10. Mechanisms for circulation of journals, articles and reports among the scientists at the stations need to be clearly defined and developed. The appointment of a chief librarian is needed to get a system working within the WSARP and to assist in gathering relevant information from other institutions in the Sudan and elsewhere. In the meantime, it is recommended that the scientists utilize the library materials at the other ARC stations, especially the Gezira Station at Wad Medani, for information in earlier research reports and current scientific journals as a complement to the materials that will be available in the libraries of the four western stations. (p. 13)

Recommendation 11. With some evidence of slippage in communications between the large number of organizations participating in this project, the evaluation team urges that the administration define channels of communication and procedures and that those involved recognize the

importance of adequate communications and make an honest effort to achieve this objective. (p. 13)

Recommendation 12. It is recommended that project management proceed, as early as feasible, to arrange a schedule for regular aircraft flights to the stations. This would make possible closer working relationships between the field staff and the headquarters staff. (p. 13)

Recommendation 13. If funds are available and if a qualified Sudanese can be recruited, the team recommends that consideration be given to the addition of a program information-communications officer. After the position is filled, the use of an experienced consultant could be highly useful to assist in the organization of a communications and information infrastructure throughout the research system. (p. 13-14)

The WSARP Research Approach and Work Plan

Recommendation 14. The evaluation team recommends that the project systems approach be defined as complementary to the present commodity and disciplinary research activities of ARC. Further, it is recommended that the project adopt a three stage strategy to encourage a sustained use of a systems approach by ARC after donor withdrawal: (1) identification with ARC and the full use of ARC procedures; (2) build up of credibility in the eyes of ARC management and scientists by its field-work; and (3) modification through convinced ARC channels of those procedures not wholly consistent with the organization and management of a systems approach in research. (p. 16)

Recommendation 15. The team recommends an open approach and an operative model which clearly draws on applied research done by others, particularly from past and present ARC programs, but also from international applied research efforts in the IARC's and CRSP's. (p. 17)

Recommendation 16. After a detailed operating model has been finalized, a 2-3 day workshop is recommended with two objectives: (1) to familiarize all project scientists new to a systems approach with its operational characteristics and interdisciplinary needs; and (2) to brief ARC administrators and researchers, particularly available national commodity coordinators, on the role and operation of the WSARP systems approach and the vital linkages with ARC institutions and scientists, and with other GOS agencies. (p. 17)

Recommendation 17. The team recommends that research activities proposed for the project be evaluated as 'central' or 'support' thrusts and that through the project period, central thrust activities dominate the research program. Further, research proposals need to be reviewed for the importance of their objectives to the central 'interventionist' thrusts and the appropriateness of the methodology to achieve those objectives at the lowest possible cost. The desirability of an intervention must be judged on its relevance and its likelihood of success. (p. 19-20)

Recommendation 18. It is recommended that project management ensure that at least one animal production scientist, one socio-economist and one crop agronomist be allocated to each station (with the possible exception of El Fasher if a crop agronomist is not essential there). These are the core of any adaptive research team where both animals and crops feature in the system. (p. 21)

Proposed Research Programs

Recommendation 19. The team feels it is imperative that a better balance is achieved for the experimental program in the next season, and is confident that practical relevant, interventions can be identified using rapid diagnosis techniques and by drawing on past technical research done in the Sudan or elsewhere. It recommends, therefore, this work be undertaken immediately with a view to including more on-farm experiments, derived from a systems approach, in the 1983-84 season research proposals. (p. 22-23)

Recommendation 20. Detailed comments on the methodology are presented in the text. Overall it is recommended that proposed methodology be reviewed to include a much greater use of informal survey methods to identify possible interventions which can be included in central thrust adaptive research programs, and less dependence on formal surveys. (p. 24)

Recommendation 21. The team recommends that: (1) evaluation criteria be kept as simple as possible; (2) data to monitor these criteria are collected in the course of formal surveys essential to the central thrust of the project; and (3) that the need for these data do not dictate the collection methods used or the size of samples to be covered. (p. 25)

Recommendation 22. With reference to the specific research proposals reviewed, the team recommends that any direct interventions which are identified take priority if there are inadequate resources to implement the whole of the revised program. (p. 27)

Administration

Recommendation 23. With existing difficulties in staff recruitment, the team recommends that project administration proceed immediately to identify and recruit scientists, technicians, and maintenance staff that will be needed for El Obeid, El Fasher and Ghazala Gawazat so that research can be planned and started soon after the facilities are completed. (p. 31)

Recommendation 24. To improve recruitment the WSARP should consider immediately implementation of incentives which do not contravene Government regulations. These would include, for instance, provision of free fully furnished houses to senior and junior Sudanese scientists and senior technicians. Negotiations with the Ministry of Agriculture and the Ministry of Finance should be stepped up at a high level to implement the 25% increase in salaries of the WSARP and ARC staff on newly determined basic salaries. (p. 34)

Western Sudan Agricultural Research Project

Evaluation of Infrastructure Development and Project Support Unit Operations
by Mr. D. Gephart, USAID/KRT Consultant

Recommendations:

1. CID provide conformed copies of the following contracts to USAID:
 - A. The CID/GZ contracts, with costs, and any amendments.
 - B. The CID/Karplan contract, with costs, and any amendments.
 - C. The WSARP construction contract for El Khidir and Diraige (2 copies of this, one for Controller, one for Project File).
2. The Grube Zimmer monthly construction progress report be copied to USAID/Sudan starting with the month of October, 1982.
3. The USAID Project Operations and Support Office immediately assume continual engineer monitoring of the project.
4. CID submit a budget break-down for the project local cost trust account, showing the period of time the project line item covered by the LS. 849,880 as they requested in April 1982.
5. CID reexamine their role and responsibility regarding the development of project infrastructure and take the necessary action to fulfill the requirements of the contract scope of service related to this function.
6. CID redirect the present functions of the CID project engineer to fulfill the scope of work as initially established for the Project Architect/Planner.
7. CID, through the Project Director, Deputy Director, Project Engineer and the A&E firm of Grube and Zimmer take immediate steps to fill the full time positions of resident engineer and clerk of works, as applicable, at each of the four sites being constructed by AID funds under the project.
8. CID, with the visit of the senior partner Grube of G&Z in mid November, 1982 schedule a meeting to include the CID Project Engineer, USAID Engineer and the resident architect for reviewing construction operation, interpretation of contract conditions and developing a strategy for dealing with the anticipated additional time and cost overrun associated with completion of the project construction work.
9. That WSARP approve the placement of a full-time Karplan resident engineer supervisor of construction at the El Obeid construction site. This position should come under the direct supervision of the GZ resident architect (Bergman) and would be included under the GZ contract for services for payment and salary level.

10. That WSARP review and revise their Project Support Unit operations to:
 - A. Establish lines of responsibilities;
 - B. Develop a maintenance capability for buildings, vehicles, and equipment;
 - C. Develop alternatives for vehicle spare part support;
 - D. Establish a working budget and maintenance operation plan to accommodate the present level of infrastructure and equipment on project.
11. That WSARP, under the PL 480 Title III Local Currency Project Account, revise and submit for USAID review and approval a project budget for 1982-83 to adequately cover the building maintenance cost requirements and site development requirements in support of the 1982-83 project operations. This budget would reflect the pro-rated share of costs to be funded by the GOZ through their annual budget allocations.
12. That WASRP take immediate steps to resolve the problems of vehicle support for engineering personnel doing construction inspection and supervision of site work and take immediate steps to resolve the problem of lack of aircraft and radio communications with each WSARP field center.



Appendix IV
CONSORTIUM FOR INTERNATIONAL DEVELOPMENT

Executive Office
5151 E. Broadway, Suite 1500
Tucson, AZ 85711-3766
U.S.A.

Phone: (602) 745-0455
Telex II: 910 952 1102
Cable: CIDCOR TUC

July 18, 1983

Mr. Arthur Mudge, Mission Director
USAID/Khartoum
Agency for International Development
Washington, D.C. 20523

Mr. Stuart Marples
The World Bank
1818 H Street N.W.
Washington, D.C. 20433

Gentlemen:

As you know, the mid-term evaluation of the Western Sudan Agricultural Research Project was conducted in November, 1982, and the report finalized early this year. I received a copy of the document while in Sudan last April. After receiving the evaluation report, I have examined it in detail and have discussed its contents with Drs. Dafalla, Owens, Noel and Henson, Ms. Joyce Turk of USAID, as well as the senior scientists of the project. Those meetings have been very productive and the project personnel are keenly interested in activating recommendations so as to improve the project. In fact, several recommendations were anticipated and activities were initiated prior to the issuance of the final evaluation report.

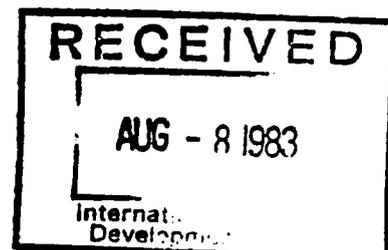
It seems appropriate for CID, as prime contractor, to respond to the recommendations contained in the report. We see this as an opportunity to further define and implement project related procedures and/or activities in assisting the project to realize its goals. Therefore, we are including for your information comments on all of the recommendations relative to our stance and progress toward relevant recommendations.

Sincerely,

Jean Ruley Kearns
Jean Ruley Kearns, Ph.D.
Deputy Executive Director

JRK:mll
enclosures

cc: Henson
Noel
Turk
Owens
Dafalla



Subtopic: Integration Into ARC and Coordination with GOS Institutions

Recommendation 1. There is agreement in CID relative to this recommendation. The necessity to develop and maintain linkages and exchanges between the project management and ARC is self evident. WSARP is a part of the ARC and must function as such. The Project Director serves as the main conduit from the WSARP to ARC. Appropriate management structures and procedures must continue to be developed and implemented for optimal integration. These have been partially addressed in the operational guidelines described below. The development of routine procedures by which information can be shared and interactions occur must be developed and fine tuned.

Since the evaluation process, a document outlining research planning and administrative procedures was prepared and circulated for comment. These operational guidelines for WSARP research have not been implemented at this writing. One of the duties of the Project Research Committee should be to review the guidelines, modify them if necessary, and implement the approval process for project activities. This document defines the committee and involvement of ARC scientists and administration.

Recommendation 2. The transfer of the ARC headquarters to Khartoum appears to be desirable; however, there are no monies in the project budget to achieve this. The amount of money necessary to move the ARC personnel and headquarters to Khartoum would be considerable. Early project discussions in Sudan have indicated that the ARC would establish a liaison office in Khartoum but would not move its headquarters, due to lack of funds for the necessary construction requirements.

Recommendation 3. CID agrees with this recommendation. The need to facilitate coordination and information transfer among the agencies cooperating in the development of the WSARP is clear. However, the need to define the difference between the proposed Project Coordinating Committee and the Project Advisory Committee is clear. The composition of the Project Coordinating Committee should be as proposed in the recommendation, with the addition of the Deputy Project Director and/or the Campus Coordinator. This is to insure that all project aspects are represented and adequate input is assured.

Recommendation 4. CID agrees with this recommendation. The present project plan identifies a minimum of three specialists in every station. However, there is a concern about the apparent lack of adequate training

facilities at Project headquarters in El Obeid. In addition, no housing has been provided for trainees.

Short term in-country training appears to be possible under the present budget. No formal training activities have been conducted at this time. There is obvious benefit to the project to train support, technical, and scientific staff. The necessity to determine where and how these newly trained personnel will ultimately fit into the ARC system is clear. The development of such a procedure should be pursued by a joint effort of the ARC and Project management.

Recommendation 5. CID is prepared to identify a qualified consultant for the proposed short term study. Project personnel are prepared to assist the Government of Sudan in responding to this recommendation.

Subtopic: Project Management and Support

Recommendation 6. This is a critical issue which is ultimately of extreme importance to the overall management of the project. Qualified support staff have been limited both in Khartoum and in Kadugli. The inability to adequately delegate duties and responsibilities in the past has caused undue pressures and excessive time commitments on project administration.

One method to monitor management improvement would be to involve the proposed Project Coordinating Committee. The PCC should request detailed progress reports from the Project Director on a regular basis in order to provide timely input.

Recommendation 7. The topic of this recommendation is a frequent problem in similar projects. Communication problems within the project have contributed to the lack of a clearly defined set of responsibilities/duties of the Chief of Party/Deputy Director.

Drs. Noel and Henson prepared a job description while they were in-country in April, 1983. This job description was circulated to the USAID Mission, Dr. Owens, and Dr. Dafalla. Additional follow-up and/or revisions may be necessary to correlate Project modification generated in response to Recommendation 6.

Recommendation 8. Training is very important, especially for the Sudanese scientists; however, opportunities for short term training has been limited at this time. A annual schedule for each scientist should be developed by the Project Director and presented to the Project Coordinating Committee for approval. The scientists' ultimate professional aims, project objectives, rationale for each training meeting, and the possible impact of the

training on the work of the project should constitute the key elements in the decision making process relative to each scientist's annual training plan.

Specially planned training sessions separate from regular academic programs should be set up for Sudanese when they are studying for university degrees in the U.S. Special training topics should include research management, management techniques, farming systems, as well as other topics which would be helpful when the person returns to full time work on the project. Opportunities should be provided to allow students to participate in agro-business on an internship basis.

Recommendation 9. The WSARP sponsored workshop on Farming Systems Research held in April, 1983 in Khartoum incorporated information and personnel from CIMMYT. Additional follow-up programs should be planned with sufficient lead time to insure increased participation of WSARP and ARC scientists.

Recommendation 10. The need for a project chief librarian (Sudanese) to develop a system which will mesh with the ARC system is acute at this time. It would be feasible to employ a expatriate librarian who could work with the project chief on a TDY basis to set up the system. Project Director approval is needed for hiring a TDY. In order for the work of the TDY to provide effective input to the project, the project librarian should be hired immediately.

Recommendation 11. Inadequate communication appears to be at the center of many project issues. Regular radio connections and a regular aircraft flight schedule have been established. However, there is no one person with the sole responsibility of coordinating communication, investigating needs and organizing an information infrastructure.

In April, 1983, Drs. Kearns and Owens developed a job description for a WSARP Communications/Information Officer. Discussions were held with Dr. Dafalla, who agreed to advertise and fill this Sudanese position. A Communications Officer is urgently needed to develop an adequate information sharing/distribution system both within the project and between the Project and the ARC.

Recommendation 12. Regular aircraft service for the Project is absolutely necessary for the successful work of the project. The cost of the plane on the ground as opposed to flying is not significantly lower when the impact of non-scheduled, non-frequent flights is considered with on-going fixed costs of the plane.

Plans must be defined relative to an in-place alternative pilot when the project pilot is unavailable.

The flight schedule should be reviewed periodically by the Project Coordinating Committee relative to project needs, research objectives, as well as other factors.

Recommendation 13. This recommendation was discussed with Recommendation 11 earlier in this paper.

Subtopic: The WSARP Research Approach and Work Plan

Recommendation 14. It appears that the approach described in this recommendation was basically part of the collective understanding of the project personnel from the beginning. Clarification of number 3 in this recommendation should be acquired from the original evaluation team as it is unclear as reproduced in the evaluation document.

Recommendation 15. The requirements relative to this recommendation are clearly identified in the project workplan. A close involvement of ARC scientists would contribute in implementing this recommendation. Efforts should be made to identify and involve ARC scientists for both short and long term assignments on the project.

Recommendation 16. The proposed Farming Systems workshop was held in April 1983; however, there was a limited number of participating ARC scientists. A follow-up workshop is desirable so that more ARC scientists may be involved. In order to achieve this, the next workshop should be scheduled at the ARC headquarters. Timely follow-up is necessary so that the advances made during the first workshop can be built on and expanded.

Recommendation 17. A draft of the proposed research operational procedures was prepared in April. Later input by project scientists and by Dr. Collinson were sought. The Project Director currently has the draft document and is seeking suggestions for any alterations.

Recommendation 18. CID agrees with this recommendation; however, the definition of personnel may need to be broadened. The present WSARP staffing patterns generally reflect this recommendation.

Subtopic: Proposed Research Programs

Recommendation 19. This recommendation was discussed at length among project management and the research scientists after the evaluation report was circulated in April, 1983. Currently this recommendation is being addressed within the project.

Individual research proposals should be carefully reviewed and monitored relative to the suggested balance. This subject is also addressed in the proposed operational procedures referred to in Recommendation 17 previously in this paper.

Recommendation 20. As the project completely adopts the Farming Systems Research mode, the need for diagnostic surveys is obvious. Dr. Collinson's criteria for informal survey methods should be reviewed carefully by the project researchers and the relevant components incorporated. The role of formal surveys has already been deemphasized in the Project research plans and in the aforementioned operational procedures.

Recommendation 21. The unapproved draft of the Operational Guidelines for WSARP Research (attached) incorporates the information contained in this recommendation. The Project Research Committee should monitor the research evaluation criteria and assure that necessary background data are collected.

Recommendation 22. CID agrees with this recommendation. Specific plans are described in the attached draft of the Operational Guidelines for WSARP Research document.

Subtopic: Administration

Recommendation 23. The need for increased numbers of Sudanese counterparts is critical when the life of the Project is considered in relationship to its goals. There are not sufficient numbers of Sudanese scientists and the need for support (mechanics, technical staff, maintenance staff, secretaries) staff is acute. Most of the present trainees will not finish their overseas training before the end of the current project period. If trained Sudanese are not available, the Project Director should take immediate steps to begin in-service training. A Project Training Officer is needed to assume the leadership role in developing training programs. Due to their extensive knowledge of the WSARP research needs, Project scientists should participate in the selection of Sudanese technicians. In-service training should be viewed as a continuing process over time.

Consideration must be given to the fact that recruitment for the western part of Sudan is difficult. Training possibilities may entice more personnel to the West or Sudanese from the West should be trained. This possibility should be investigated as soon as possible.

Recommendation 24. This recommendation implies some far-reaching effects. Budgeting issues and government regulations must be carefully addressed. The Project Director must take a leadership role in investigating

incentive possibilities and developing a system by which these incentives may be offered. In the past the project has interacted with USAID, The World Bank and the GOS attempting to define and implement incentives.

JRK:m11
7/8/83

WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT

MEMORANDUM

TO : Drs. Dafalla and Henson
FROM : D. Higgins
DATE : 29 November 1982
SUBJ : Activities and Plans for Force Account

Each of you has asked for a report about my activities and plans with respect to force account.

I have attached a report of last year's accomplishments and a proposed schedule of activity, and a discussion of resource needs to plan and execute these activities.

In addition, I will discuss later a modification of my role as Project Engineer to allow me to manage a Project-wide force account construction program.

The last year has seen progress in force account construction, especially at Kadugli where I have spent a great deal of time. However, a lot of work remains to be done there as well as at the other stations. Specific items of work are listed in Part B of the report.

Also shown in Part B is a time schedule suggesting completion of about 60% of the tasks by the onset of the next rainy season. This is an unrealistic goal. However, we might accomplish 25% of the list of April and the remaining 75% by a year later if we plan more thoroughly and if we apply more Project resources to implementation.

As a result of my last year's experience in Kadugli and more particularly as a result of the visit of USAID engineering consultant David Gephart, I realize that my role as Project Engineer ought to be rewritten for us to see substantial force account progress in the next 18 months. I should spend more time in planning and managing on a Project-wide scale and spend much less at the foreman level in the field.

Memorandum
Drs. Dafalla/Henson

I have suggested the engineering management plan in Part C which is a flow chart of those planning and design activities which ought to be begun immediately.

I would welcome the opportunity to discuss these ideas with you before the departure of Drs. Henson and Noel.

DTH:pps

2. Mapping the natural surface drainage on the western portion of the station in order to plan drainage facilities and to coordinate them with internal roads.
3. Changed the main gate location to suit the approach road requirements and the internal road plan.

C. Drainage Works

1. Built some drainage works: masonry gully control weirs, masonry diversion walls and concrete wasteway.
2. Placed stone riprap along stream bank in vicinity of powerhouse to prevent further bank erosion. Riprap placement is unfinished.

D. Fences

1. Fabricated some 4000 fence posts from steel angle iron with homemade facilities.
2. Finished fencing the seraf (4km), the airstrip (2km) and about 50 percent (7km) of the farm.
3. Arranged the seraf fencing so as to allow the cattle herders access to nearly all their traditional shallow wells.

E. Seraf Water Supply

1. Designed and installed a pipeline and booster pump between the two elevated storage tanks. This allows either the north old well or the new well to serve either tank, and allows either tank to serve all station water distribution systems.

2. Tested new well for flow.
3. Just received pump for new well.
4. South old well test revealed evidence of surface pollution.

F. Farm Water Supply

1. The new borehole drilled on the farm was dry.
We have now turned to the seraf water system for the source of farm water. A new design is ready for impementation. It includes gravity flow from the smaller elevated tank on the seraf thru a 5000 meter pipe to ground storage and distribution systems on the farm.
2. Dr. Bunderson and I built a steel tower for support of a water tank at hig Kadugli house. It may be useful at the farm.

G. Airstrip

1. Completely fenced the airstrip and its parking stand.
2. Made plans for improving visibility of runway markers
3. Ordered a windsock in March. No delivery yet.

H. Maintenance Program, Infrastructure

1. I have kept a file on which to base a maintenance program for some of the station's systems.

II El Obeid

A. Supplementary Water Supply

1. Investigated the groundwater in El Obeid as a source of supplementary station water.
2. Prepared a report on a preliminary design of the supplementary supply sytem.
3. Tests of existing wells for the supplementary scheme proved to be disappointing and leave the scheme in limbo.

B. Fencing

1. No arrangements have been made for fencing the station other than to have stock piled fencing materials in El Obeid for all the stations other than Kadugli.
2. There is a possibility of finding a contractor in El Obeid who will fabricate all the fence posts for El Obeid and the other stations.

III El Fasher

Supplementary Water Supply

1. Two boreholes were drilled. The first, next to the station, was dry. The one near the airport will be statisfatory as to volume of flow. However, it has excessive nitrates and is not recommended for human consumption. We are tentatively proceeding with plans to use it for stock water with appropriate safeguards if used as an emergency potable water supply.

2. I have completed planning studies for the design of the entire supplementary water system. These were based on incomplete well data, estimated water consumption and simple compass and pacing surveys.
3. I have requested a right-of-way alignment for the pipeline from the public utilities department.

IV · Ghazala Gawazet

Airstrip

1. After surveying several sites close to the station, we have cleared and rough graded an airstrip which lies within a short walk of the Administration Building. This strip will require some sort of improvement to make it completely dependable in the wet season.
2. We ordered a windsock in March. No delivery yet.
3. I requested in February that a truck load of fencing materials be sent to Ghazala Gawazet for airstrip fencing. No action.

V Shambat

1. I examined the non-functioning Nile pumping station of the ARC in Shambat as the first step of a rehabilitation program. The Project site in Shambat may use water from this station for its irrigation.
2. I designed a simple engine hoist for Project lorry repair in Shambat. Fabrication underway.

PART B

NEEDS FOR ACCOMPLISHING PROJECTED ACTIVITIES

Force Account

Force account projects are those major and minor constructed facilities necessary to Project operation which lie outside the construction contracts with C.A.T. and El Khider and Diraige. They vary from road and water systems to small storage facilities. Budgeted funds for force accounts lie between two and three million pounds.

In-house Capability

Normally the term force account would imply construction by Project forces. For example, Kenana Sugar might build a small pump installation using their own maintenance forces - teams of supervised, trained and equipped pipefitters, carpenters, etc. backed by Kenana's support facilities.

WSARP has no such forces. A brickmason, two or three exceptional Project laborers, and I are all the in-house "force" there is. There are no vehicles dedicated to this group.

Government Support

Calling on GOS construction agencies for assistance has, in general, led to disappointing results. Survey departments do not have maps nor do they survey. The National Administration for Water does drill wells. But they don't finish them well, nor do they provide reliable well tests nor competent support in pipeline installation or storage tank rehabilitation. The Roads and Bridges Public Corporation has made genuine efforts to help us which were thwarted by fuel shortages and equipment breakdowns. Public Electricity and Water Corporation in El Obeid provided water and power to the El Obeid site in an effective, business-like manner, but their performance in El Fasher and North Khartoum was slow and painful.

Small, Private Contractors

The story with using small contractors in Khartoum and Kadugli has been spotty. An experienced contractor on a LS30,000.000 job took quality-cutting shortcuts in the absence of full specifications and timely job monitoring. Smaller job shops do not follow specifications even if provided, although at times their product may be admirable and sometimes useful.

IMMEDIATE REQUIREMENTS

In the eighteen months that funds have been available only a few force accounts facilities have been partially constructed. On the other hand, a lot of mapping, planning and design has been accomplished. However, it is clear that without an immediate and substantial increase in force account activity almost none of the major scheduled tasks will be finished on time.

Simply stated we will need the following: trained men, vehicles, fuel, organized stores systems, easily accessible funds, and a responsive radio and airplane communication systems.

Men

How many men we'll need and with what skills will depend upon how fast we want to complete the force account construction program and on how much work we can contract out. It is remove upon probably a fact of life that we'll have to depend on GOS construction agencies for building the major water supply systems (Kadugli, El Fasher, El Obeid, Ghazala Gawazet, North Khartoum). They have the tools and trained labor. In this case we'll need men with appropriate technical experience to watch over all construction details on a daily basis. They'll need the status to enforce standards and to encourage scheduling and satisfactory rates of progress. Two such men could work several months at these jobs.

(No time schedules have been prepared for the several water-associated jobs).

Road building in Kadugli will require supervision. How much will depend on the quality of roads we aim for and who build's them. In any case some experience will be required. This person might also be assigned to complete drainage and erosion protection facilities in Kadugli and the Ghazala Gawazet airstrip improvements.

A fourth experienced builder could be in charge of the construction of the simple structures needed in Kadugli at farm and seraf.

We can expedite fence construction at the several sites by sending Rabih of Kadugli to each site in turn in order to train a local cadre in our fencing methods. This task would be simplified if we contract in El Obeid for fabrication of the 20 thousand or so posts required at all the sites. The steel angles are already in storage there. Rabih or his assistant Mohammed Abdalla might oversee post fabrication.

In addition to the field supervision echelon there may be need for foremen and craftsmen. A number of smaller force account jobs in Kadugli could be handled by experienced station maintenance personnel if they exist and if they have tools. In this case force account needs will be met by satisfactory station maintenance staffing.

It may be that Project resident engineer at each site outside Kadugli could function as supervisors of force account work. We would have to hire a new man for supervision at Kadugli. These men, with suitable authority and funds, could employ necessary technical assistants.

Summary :

- 4 men with engineering construction experience to supervise GOS contractors on big jobs, and Project authority and funds to staff and execute smaller jobs.
- 1 or 2 men, specifically Rabih and Mohammed Abdulla of Kadugli, to train fence building cadres at other stations.
- part time assistance of motor mechanic for regular maintenance of field equipment and emergencies.
- drivers, storekeeper-guards.

Equipment

Lack of a pick-up or large truck for force account work in Kadugli occasionally caused serious delays in construction. The pick-up is the main need for sometimes almost hourly fetching and carrying. Less frequently a large truck is needed for bulky or heavy cargo. At every station at which there is ongoing force account construction there should be a pick-up truck for its support. There will be times when three pick-ups could be used for force account support. Heavy truck support is less easy to predict. It will depend on the job and the likelihood of hiring suk lorries. One will be needed at Kadugli for hauling stone for awhile. If we build the roads a substantial volume of aggregates will be required. Large tonnages of pipe, steel angles, cement and wire must be hauled to the outlying sites and distributed around them. Either one Project truck or the equivalent in suk lorries should be busy over the next few months on force account business.

A trailer-mounted water tank is necessary whenever substantial field concrete work occurs. Drums of water on a lorry are not so convenient to work with. The Project has one tank trailer in Kadugli. It should have one at each station.

Concrete mixers also are justifiable when quality concrete is required or when large volumes are needed in a short time. There are two in Kadugli. Three more mixers may be justifiable.

Without specific tasks in mind we should anticipate buying one or two portable generators of 2-4KW, a couple of electric drills and several dozen shovels and pick axes.

I may ask approval the purchase or fabrication of light road building and maintenance equipment such as drags, sprinkler and compactors.

In addition, we may need more gabions for Kadugli, plastic filter cloth for the Ghazala Gawazet airstrip, and another surveying level for road and airstrip construction.

To summarize - equipment needs may be listed as :

- 3 pick-up trucks
- 1 heavy truck
- 3 trailer mounted water tanks
- 3 concrete mixers
- 2 portable generators
- 2 power drills
- shovels and pick-axes - several dozens
- road drag, sprinkler and compactor
- gabions
- plastic filter cloth
- surveying level, rod, tripod

- 50 tons of cement
- 3 tents for field site guards

Fuel

Without delay the Project should buy and dispatch to the several sites sufficient diesel fuel to complete planned force account construction. It is evident that GOS construction teams will ask the Project for fuel for their Project-associated activities. Accordingly, until better estimates can be generated, we should arrange to send fifty drums each to El Fasher and Ghazala Gawazet, one hundred drums to El Obeid and four hundred to Kadugli. ^Some benzene may be useful, too.

Summary :

<u>Station</u>	<u>Drums of Diesel</u>	<u>Benzene</u>
Kadugli	400	?
El Obeid	100	?
El Fasher	50	?
Ghazala Gawazet	50	?

PART B PROJECTED ACTIVITY SCHEDULE

Projected Activities are Organized by Site

	CRASH	COMPLETION DATE	
		END OF DRY SEASON	UNDETERMINED AT TIME OF THIS REPORT
	February 1983	April 1983	
11. Solve worst drainage problems on road from Kadugli to seraf			x
12. Build seraf-to-farm road		x	
13. Acquire road maintenance equipment		x	
<u>Kadugli Airstrip</u>			
14. Solve drainage problems			
15. Improve runway markers		x	
16. Provide runway approach guides	x		
17. Install windsock	x		
18. Build guard-cargo-passenger shelter			
19. Arrange for emergency night lighting system		x	
	x		
<u>Kadugli Fence</u>			
20. Finish farm fence			
21. Finish sewage stabilization pond enclosure fence			x
22. Build additional double fence near Senior houses			x
23. Custom fit lower wire to seraf boundary fence			x
			x

PART B PROJECTED ACTIVITY SCHEDULE

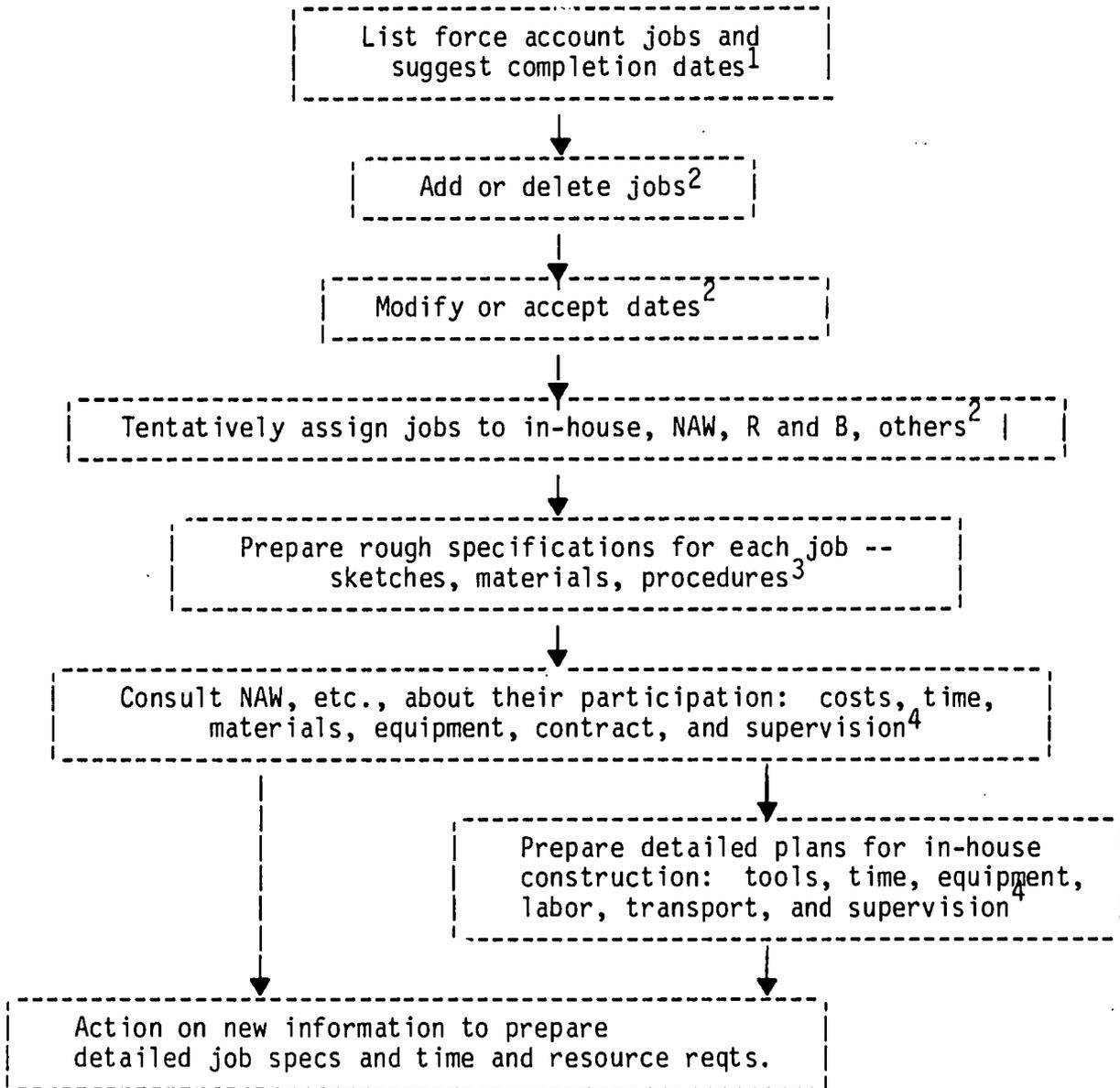
Projected Activities are Organized by Site

		COMPLETION DATE		
		CRASH	END OF DRY SEASON	UNDETERMINED AT TIME OF THIS REPORT
		February 1983	April 1983	
<u>Kadugli</u> <u>Seraf Drainage</u>				
24.	Finish west side gully controls		x	
25.	Finish Khor bank protection		x	
26.	Solve other drainage problems		x	
<u>Kadugli</u> <u>Additional Facilities</u>				
27.	Farm structures			x
28.	Seraf gate guard shelter			x
29.	Dirty laboratory for agronomy-seraf			x
30.	Water system for agronomy-seraf			x
31.	Consider cargo unloading facilities			x
32.	Kadugli radio antenna installation	x		
33.	Kadugli maintenance program design	x		
<u>El Fasher</u>				
34.	Build fence			x
35.	Build supplementary water system	x		
36.	Erect radio antenna	x		
<u>El Obeid</u>				
37.	Build fence at station (and at out-lying range?)			x
38.	Build supplementary water system for station (and for outlying range?)			x

PART B PROJECTED ACTIVITY SCHEDULE

Projected Activities are Organized by Site

	COMPLETION DATE		
	CRASH	END OF DRY SEASON	UNDETERMINED AT TIME OF THIS REPORT
	February 1983	April 1983	
39. Erect radio antenna	x		
<u>Ghazala Gawazet</u>			
40. Improve airstrip performance		x	
41. Construct runway approach guides and side markers	x		
42. Install windsock	x		
43. Provide guard-cargo-passenger shelter			x
44. Build fences			x
45. Improve water supply system outside Grube/Zimmer system for station and ranch			x
46. Arrange emergency airstrip lighting	x		
47. Consider airstrip radio beacon			x
48. Erect radio antenna	x		
<u>Shambat</u>			
49. ARC irrigation pump rehabilitation			x
50. Cargo handling facilities			x
51. Erect radio antenna			x
<u>Other</u>			
52. Kadugli tennis court			x

FLOW CHART OF FORCE ACCOUNT PLANNING AND DESIGN ACTIVITIES

¹ This is already done.

² These steps might be accomplished in one meeting of Project Management.

³ Work to varying degrees has been done on items 1-3, 6-8, 10, 12, 14-17, 20-25, 31-37, 39-42, 44, 48, 50, and 51 listed in Part B.

⁴ These items are not really mutually exclusive as shown. In fact, all the steps (1) through (8) will be subject to reconsideration periodically.

WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT
Project Office: French 333
(509) 335-6211 or ~~335-5535~~ 335-2541
Telex 510-774-1099 COLL AG PMAN

College of Agriculture

July 6, 1983

Ms. Joyce Turk
Project Manager
USAID, Khartoum
Sudan

Dear Joyce:

Jean Kearns, Jan Noel, Joachim Grube, and I recently had an opportunity to discuss in detail the construction program for the Western Sudan Agricultural Research Project. One aspect of the discussions centered on the impact of devaluation on the contract.

Mr. Grube held discussions with representatives of various ministries, with Dr. Dafalla, and with Mission staff on the subject. Subsequently, Dr. Owens prepared a document entitled, "Analysis of Additions to Sudanese Pound Component of WSARP Construction Budget Due to Variation Orders and Devaluation." Mr. Grube indicated that this topic was further discussed with Director Mudge, Mr. Sherpa, and I assume you participated in the deliberations.

This letter is written to indicate to you the additional pound requirements as estimated by Mr. Grube and to request official confirmation from the Mission that these funds will be forthcoming. Obviously, if these additional requirements are not available, decisions will have to be made concerning the scope and details of the construction program for the Western research stations.

I am including a copy of a field report prepared by J. Grube resulting from his last trip to Sudan in April and May. Included as a part of that is the analysis of additions to the Sudanese Pound Component that was prepared by Dr. Owens. The following is a synopsis of the analysis of additions prepared by Gerry plus the result of discussions between Dr. Noel, Dr. Kearns, Mr. Grube, and myself on June 14 and the results of discussions with Mr. Grube today. The additions can be summarized as follows:

1. Additional requirement for Sudanese pounds.
 - a. Additions due to devaluation of November, 1981 (12 per cent) and variation Order No. 2--600,000 Sudanese pounds.
 - b. Estimated increase in construction costs due to devaluation in November, 1982 (44 per cent)--2,640,000.

July 6, 1983

- c. Estimated increase in construction costs due to devaluation in November, 1983 (50 per cent)--2,320,000.
- d. Additional estimated devaluations between November, 1983, and July, 1984--500,000.

TOTAL: 6,060,000

2. Sources of additional Sudanese pounds.

- a. From current Sudanese pound contingency--350,000.
- b. Conversion of \$800,000 is current dollar contingency to pounds at a rate of 2.06--1,650,000.

TOTAL: 2,000,000

3. Difference between (1) and (2) above equals 4,060,000

The above difference figure indicates the maximum additional Sudanese pounds estimated to be required for the life of the Project assuming the above indicated devaluation impacts on the construction program. The above also assumes that additional pounds will not be forthcoming directly from the GOS, but will have to be generated in their entirety from PL480 funds. Whether this a completely valid assumption, we are not in the position to say. The question of whether there is a match between USAID PL480 Sudanese pounds and GOS regular budget Sudanese pounds we are also not sure about. One point that was discussed during our meeting here with Mr. Grube indicated that there might be a pound match requirement. Again, we are not sure about this, but it is certainly something that needs to be defined.

In addition to the above impact of devaluation on the construction program, a number of the station requirements are having to be met by force account. Examination of the "Summary of Western Sudan Agricultural Research Project Budget by Amount, Source, and Currency" provided you in February with an updated edition in April indicates an estimated force account requirement of 1,477,000 pounds. The above actual and assumed impact of devaluation on the contract also will impact on the force account amounts required. Thus, we would estimate that an additional 1,000,000 Sudanese pounds will be required for the force account work. This would have to be added to the above indicated figure of 4,000,000, making the total an estimated 5,000,000 pounds addition required.

We have not had an opportunity to discuss this figure with Dr. Dafalla, Dr. Bakheit, or other project staff. Therefore, the estimates for additional force account requirements are based upon previous estimations prepared by the Project as well as our understanding of the current expenditure of pounds for force account activities.

Ms. Joyce Turk

July 6, 1983

The estimated extension of the Project will also require an extension of the Grube-Zimmer contract. Dr. Kearns is working on this at the present time. We discussed this during the afore-mentioned meeting here at Pullman and have determined that an additional \$175,000 will be required to extend the Grube-Zimmer contract. Note that the budget summary that you received previously assumed an extension of the Project to August, 1984. Discussions with Mr. Grube indicate that Grube-Zimmer activities will be extended to July, 1985, at a reduced level to supervise the one year guarantee period. This means that the Grube-Zimmer contract extension and the additional financial requirements will have to be included in the budget.

Examination of page 5 of the budget summary previously provided you indicated an estimated expenditure of \$25,567.8 million with 26 million being approved by USAID. Therefore, it will be possible to finance the additional Grube-Zimmer contract requirements out of the unincumbered portion of the USAID dollar component. Again, note on page 5 of the budget summary under "Total by Source of Funds," the A/E costs should be increased from the 2,812.3 million given in the summary to include the above figure for a total of \$2,987.3 million.

These figures and this letter have not been discussed with Drs. Dafalla and Bakheit. It is essential, however, that the necessary steps be taken as soon as possible to determine the availability of these additional funds.

If you have any questions about this matter, please let me know and I will be happy to supply any additional details that I can. Mr. Grube plans to be in Sudan in early August and will also be available to answer any questions.

Very truly yours,


J. B. Henson, Coordinator
Western Sudan Agricultural Research
Project

Enclosure

mej

cc: Dr. Bakheit, ARC
Dr. Dafalla, WSARP
Dr. Owen, WSARP
Dr. J. Kearns, CID
Mr. J. Grube, Grube-Zimmer

GRUBE-ZIMMER, INC.
FIELD REPORT WESTERN SUDAN AGRICULTURAL RESEARCH STATIONS

The following issues related to the construction of the W.S.A.R.P. Stations were reviewed during Mr. Grube's Sudan visit from 28 April to 12 May, 1983.

1. Devaluation of Local Currency (Nov. 1982)

After several meetings, attended by Dr. Dafalla, representatives of the Ministry of Finance, Ministry of Planning, Ministry of Construction and Public Works, Mr. Bergman and Mr. Grube, consultants were authorized to discuss with the contractor the following format for the submission of his claims under the "Economic Dislocation" clause (General Conditions of Contract) for increases in the construction contract amount due to the devaluation of the Sudanese currency (Nov. 1982). Claims relate to the local currency component only.

Construction Component	Total %	Foreign Currency %	Local Currency %
Imported Materials	30%	30%	—
Customs (33% average)	10%	—	10%
Defense Tax	3%	—	3%
Local Materials	11%	—	11%
Labor	10%	2%	8%
Transportation	10%	5%	5%
Overhead & Profit	26%	13%	13%
	100%	50%	50%

Affected Local Currency Component as of Nov. 1982: LS 5,774.500

The contractor has to submit evidence supporting his request for cost increases in the above established categories which will be reviewed by consultants. The consultants will then determine a percentage increase for each of the categories for later negotiation with the contractor. Negotiations to be held during Mr. Grube's next scheduled trip in the second half of August.

Negotiations will have to take into account time delays caused by the contractor resulting in cost increases after devaluation, especially delays in the ordering of imported materials (customs, defense tax, transportation, etc.). Consultants shall also examine any off-setting advantages related to the foreign currency component.

Consultants outlined the following procedure in settling this issue with the contractor:

1. Discuss with the contractor the recommended format for submission of requests.
2. Consultants to review the submitted claims and related evidence and to make assessments of justified requests, considering deductions for time delays caused by the contractor, etc.

3. Reconvene the Committee for review, suggestions and approval.
4. Consultants to negotiate amount of final claim with contractor.
5. Advise USAID and GOS of the resulting budget increase for the local currency component and get approval.
6. Prepare a variation order for processing.

Consultants presented a memorandum of a May 5, 1983 meeting with S. Fadl, Head of the Estimating & Quantity Survey Section of the Ministry of Construction & Public Works citing cost increase percentages for labor and materials as documented by the Ministry. According to this information (Khartoum area) labor costs have risen by an average of 40%. Material costs have risen by an average of 48%. In their initial assessment of anticipated cost increases due to devaluation, consultants arrived at an average of 35.5%, or LS 2,045.7000 (see attached tabulation).

It was further discussed that this format be considered for future anticipated devaluations. Since the Nov. 1982 devaluation which resulted in a new official exchange rate of LS 1.3 for one US dollar, a non-declared devaluation is taking place because the government (Bank of Sudan) is officially purchasing dollars at the rate of LS 1.89 for one US dollar.

2. Budget Considerations

In view of the current and expected future increases in the local currency component due to devaluation, meetings were held at the USAID offices in Khartoum attended by Mr. Mudge, Mr. Sherper, Ms. Turk, Dr. Owens, Mr. Bergman and Mr. Grube to discuss budget requirements for an additional LS 4 million.

Mr. Mudge stated that the required increases can be covered by P.L. 4/80 Title III funds and that formal requests should be initiated. A preliminary budget outline was prepared by Dr. Owens, assisted by consultants, which could serve as a basis for the request procedure.

3. Construction Completion Time Schedule

A. Construction Progress

After two visits to the Western Stations and several meetings with the contractor in Khartoum, the following conclusions were reached despite continuing problems of water supply, ban on timber harvesting for brick production and transportation difficulties. Substantial progress has been made towards completion of brickwork at all stations with all buildings completed except for junior houses. It was agreed that completion of buildings should have priority over brickwork for compound walls. The general quality of brickwork is improving.

Considerable progress has been made at the El Obeid site where roof framing has been completed for senior houses and has started at middle houses. All El Obeid roofing system materials are on site. Because of past separate material purchasing procedures, roofing materials for El Fasher and Ghazala Gawazet will not be available for several months. (See Time Schedule).

Electrical sub-contract has been signed for the ARC Headquarters office building final negotiations with the same sub-contractor are underway for the western stations. The contractor, under pressure from consultants, is recruiting plumbing engineers foremen and skilled labor from the open market since plumbing sub-contractors are not available in Khartoum.

While most foreign materials have been approved, ordering has been slow, especially since El Khidre and Deraige have two separate management structures for their respective projects.

B. Foreign Materials Ordering Status

Consultants held meetings with joint presence of S. El Khider, S. Deraige and staff in order to review the status of each foreign material item and to force the parties into forming a single management team for the ordering and processing of foreign materials. Both partners committed themselves to this approach and agreed that all outstanding approval requests be in the hands of Mr. Bergman before July 7, 1983, and that all material orders be placed with a single manufacturer/supplier for joint handling at Port Sudan and transportation to the sites.

C. Time Schedule

In the absence of specific schedules which had frequently been requested from the contractor, consultants assisted the contractor in developing such time schedules for each of the sites. Major building activities were graphed for two time sequences -- one for fabrication, shipment, Port Sudan handling and transportation to sites for foreign materials and one for installation and completion of work (see attached).

According to these schedules, the contractor shall request the certificate of completion on May 1, 1984 and the consultants shall issue the certificate of completion on July 1, 1984, leaving two months for final inspections and pick-up of punchlist items.

The contractor committed himself to these schedules and it was agreed that semi-monthly construction meetings be held to monitor the schedule from now until the end of construction.

4. Landscaping: Planning and Installation

In view of the construction program at all sites consultants recommend that the project initiate steps to provide landscaping for the three western stations and for the ARC Headquarters site. Landscaping is not included in the current construction. Mr. Grube and Mr. Bergman met with Dr. Dafalla, Dr. Owens, David Higgins, and suggested the following steps for consideration and action:

1. Appointment of a project landscape coordinator to establish liaison with all parties contributing to provide planning, tree and plant material, manpower and equipment, maintenance and funding.
2. Consultants are prepared to assist in landscape planning, layouts and specifications to be coordinated with irrigation features included in the construction contract.

3. Landscape areas under consideration are identified on the architectural plans as follows: Residential court, central open spaces in each compound, courts of guest houses complexes, courts and surrounding areas of lab - administration buildings, roads and parking areas, tennis and recreation areas.
4. Establish a landscape budget based on outline plans, specifications and bills of quantities. Landscaping is an integral part of the project and should be funded by the construction contingency budget.
5. Develop an interim (construction period) and long-term landscape maintenance plan involving budget, manpower, material and equipment for all sites.
6. Establish a time schedule and arrange for tree planting, tree protection and manual irrigation during the remaining construction period in areas designated by consultants as safe from further construction activities.
7. Coordinate with local authorities completion of well construction (El Obeid) and installation of pipes from the well to the site (El Obeid, El Fasher).

5. Maintenance of Stations Facilities

In meetings with Dr. Dafalla, Dr. Owens (project), Mr. Mudge, Mr. Sherper and Joyce Turk (USAID), consultants have stressed the need for development of a maintenance program for all stations considering manpower/equipment/spare parts/budget and scheduling issues. Consultants have offered any assistance they may be able to contribute, especially with regard to identifying spare parts, either to be supplied through the contractor or to be purchased directly through the project.

The issue was raised in conjunction with the need for a landscape maintenance program at all stations.

TABULATION OF LOCAL CURRENCY COMPONENT AFFECTED BY 44% DEVALUATION (Nov. 1982)
 Prepared by Grube-Zimmer, Inc. for Committee Use Only

Construction Component	Total %	Foreign Currency %	Local Currency %	Affected L.C. %	Non-affected L.C. %
Imported Materials	30%	30%	-	-	-
Customs (33% average)	10%	-	10%	10%	-
Defence Tax	3%	-	3%	3%	-
Local Materials	11%	-	11%	9%	2%
Labor	10%	2%	8%	6%	2%
Transportation	10%	5%	5%	4%	1%
			<u>37% : 50=74</u>	<u>32% : 50=64</u>	<u>5% : 50=10</u>
Overhead & Profit	26%	13%	13%	13% : 50=26	
	100%	50%	50%		

1. Remaining local currency component (Nov. 1982) : LS 5,764.500
 2. Local currency component affected @ 64% (excluding overhead & profit) : LS 3,690.000
 3. Devaluation index @ 44% x LS 3,690.000 : LS 1,623,600
 4. Profit & overhead @ 26% x LS 1,623.600 : LS 422.100
- LS 2,045.700 = increase of 35.5%
 Remaining local currency component after devaluation adjustment : LS 7,810.200

G.P. Owens
12 May 1983

ANALYSIS OF ADDITIONS TO SUDANESE POUNDS COMPONENT OF WSARP CONSTRUCTION BUDGET
DUE TO VARIATION ORDERS AND DEVALUATION

Basic Tender	£6,353,610	
Variation Order No. 1	<u>1,028,390</u>	
Contract Cost - not including contingency		£7,382,000
Addition due to devaluation of Nov. 1981 (12%) and Variation Order No. 2		+ <u>600,000</u>
	7,982,000	
Vouchers paid thru Oct. 1982 (approx)	- <u>1,982,000</u>	
Estimated Balance, November 1982	6,000,000	
Estimated Increase in Construction Cost due to Devaluation of November 1982 (44%)		+ <u>2,640,000</u>
Estimated Payments December 1982-Nov.1983	4,000,000	
Estimated Balance November 1983	4,640,000	
Estimated Increase in Construction Costs due to Devaluation of November 1983 (50%)		<u>2,320,000</u>
Estimated Total Pound Cost of Construction		£ <u><u>12,942,000</u></u>

It is reasonable to expect that contract costs in Sudanese pounds will increase from 7.4 million to about 13 million before the end of CY 1983, due to devaluation and to variation orders already executed. See attached Table. There is even a possibility of an additional devaluation before end of construction which might result in another half million pounds escalation.

A portion of the approximately six million pound escalation may be offset by contingency reserves, although it is estimated that most of the contingency will be needed for landscaping, furniture and other items not originally included in the contract. (The contingency reserves in the contract are \$2,306,880 and £1,845,510 of which as much as \$800,000 and £350,000, or equivalent £2,000,000 might be used to offset increased costs due to devaluation).

Measures to obtain an additional £4 million should be initiated soon in order to avoid delays in reimbursement of contractor.

WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT

MEMORANDUM

TO : J. Henson
FROM : D. Higgins
DATE : 14 April 1983
SUBJ : Report on progress in implementing the Force Account
Activity Schedule of 29/11/82
REF.# DTH/I1131/83

You asked for an update on Force Account activities since last November when I suggested a schedule of project completion date targets and the level of support I'd need.

At that time I proposed February or April 1983 as completion dates for about 60% of the projects. Those dates were based on apparent urgency of need and also based on finishing as much as possible before Ramadan and the rainy season. I wrote that 60% completion was unrealistic but that we might make 25%.

In fact only 20% of the outstanding work on the November list has been finished. With no major changes in support since November I have continued the slow but steady progress that we are accustomed to, all of it in Kadugli.

Speaking positively I can point to the following progress since November:

- the new pump is operating
- experience with the plastic pipe system has been good
- the water pipeline from the seraf has reached the farm and is also providing water for seraf landscaping and bridge construction.
- the road r/w to the farm has been cleared, surveyed and staked
- the Irish bridge is virtually complete and is in service

14 April 1983 Force Account progress report

- about half of the road drainage facilities have been completed
- the approaches to the box culvert near the seraf are under construction
- a temporary radio antenna is in service in Kadugli (antennas in El Obeid and Khartoum were installed by others)
- airstrip approach guides are installed
- a windsock mast is ready
- the farm boundary fence is complete except for gates and some painting
- west side gully controls are finished
- we have established a new farm building site which will be more economical to develop
- the agronomy dirty lab is half finished
- ground has been broken for a new electricians' shop and store

I can report no progress at the other stations. This is not to say I haven't planned for progress at them as well. During November I designed a simple, manageable program to install much of the Project's fence by July 1983. The program was not accepted.

I proposed a simple method to improve the wet weather performance of the Ghazala Gawazet airstrip. The method was rejected. Alternative suggestions have been ignored.

Because of a critical need for Project construction water in El Fasher I made a preliminary water system design including pump, power, pipeline, distribution and storage. Efforts to move ahead with the system have come to naught.

When it became clear last year that arrangements with Roads and Bridges Public Corporation to build our Kadugli road were foundering I first sought permission to approach foreign contractors in El Obeid. Permission was denied. Then I asked for funds to begin construction by ourselves. The request was ignored. I did push ahead with bridge construction. It is now in service.

For reasons not clear to me the Project is not willing to spend the money to support a more aggressive Force Account construction program.

14 April 1983 Force Account progress report

All the following negative experiences or conditions can be explained by an unwillingness to spend money.

Technical assistance requests. For more than a year I have asked for a graduate Sudanese engineer to assist me. Until the last few months the request was denied. When I wrote out guidelines for advertisements for technical help the ads were not placed.

Labor. With the legal G.O.S. pay scale I cannot attract a quality labor force. Last summer when I took matters into my own hands and paid more I had a good team of willing workers. However I was not allowed to continue the practice.

Purchase of long lead time items. Import delays and bureaucratic government procedures make it desirable to place orders for large material purchases and imported items well in advance of need. With few exceptions the Project does not support this policy. Requests to stock fuel in the West have been ignored.

Purchasing on the Khartoum market. There are delays of several months sometimes in purchasing even simple items such as bolts, cable, and voltmeters.

IntraProject communications. Requests for information, supplies or instructions are often simply ignored.

The November report was a response to several stimuli including Mr. Gephart's evaluation of the Project's engineering and construction program. For efficient, Project-wide Force Account direction, I was to come out of the trenches of Kadugli; but I'm still in the trenches. The only noteworthy increase in Project support has been the dedication of two pickup trucks and a lorry, and the hiring of a building foreman - all happening in February. Now there is a possibility of employing an engineer who is presently with N.A.W.

I am appending copies of memos, et cetera, which show efforts to broaden and speed Force Account activity. They are:

23/11/82 Memo: Fencing program for Fasher, G.G., Obeid, KRT

14 April 1983 Force Account progress report

- 1/12/82 Memo: Ghazala Gawazat airstrip drainage
- 1/12/82 Memo: Draft of a letter to Eric Witt to speed the ordering of the filter if Dr. Dafalla approved
- 2/12/82 Memo: Purchase of materials-Force Account
- 2/12/82 Memo: Long leadtime purchases for Force Account
- 8/12/82 Memo: Recapitulation of memos sent to one or both of you since 16 October
- 8/12/82 Memo: Seraf-farm road - funds needed
- 11/12/82 Memo: G.G. airstrip improvements
- 11/12/82 Memo: Pumps for Kadugli and El Fasher
- 12/12/82 Memo: Electric service for El Fasher well

As I have said before, I think that within the severe constraints imposed on Force Account work we are doing well. To the extent you can relax some of the Project-imposed constraints we will do better.

Appendix VIII

Staffing patterns for WSARP senior scientist, technicians, and support staff. These patterns represent projected staffing as agreed on March 6, 1980. They are given by location, discipline, and year.

SENIOR SCIENTIFIC STAFF

by

LOCATION AND YEAR

FINAL AGREEMENT: 6/ 3/80 -- Osman Khalifa, World Bank, J. B. Henson, R. F. Harwood

<u>KHARTOUM</u>	1	2	3	4	5	6	TOTAL
PROJECT SUPPORT UNIT:							
Project Director	1	1	1	(El Obeid Yrs 4-6)			3
Deputy Project Director (U.S.)	1	(Kadugli Yrs. 2-3 and El Obeid Yrs. 4-6)					1
Construction Engineer (U.S.)		1	1	1	1	1	5
Advisor to Director General ARC (U.S.)	1/4	1	1	1	1	1	5 1/4
Chief Administrative Officer (U.S.)	1	1	1	1	1	1	6
Liaison Officer	1/2	1	1	1	1	1	5 1/2
KHARTOUM SUBTOTALS	3 3/4	5	5	4	4	4	25 3/4

KADUGLI

INTEGRATED LIVESTOCK/CROPS OR CRACKING CLAYS:

Production Agronomist (Sub-program leader) (US)	1	1	1	1	1	1	6
Farm Management Economist (U.S.)	1	1	1	1	1	1	5
Agricultural Engineer (Mechanical) (U.S.)		1	1	1	1	1	4
Agro-Breeder		1	1	1	1	1	4
Livestock Production Specialist			1	1	1	1	4
Economist			Tr	1	1	1	4
Research/Extension Liaison Officer				1	Tr	1	3
Water/Land Use Specialist					Tr	1	3

Training Designation (Tr) are speculative only at this time. All individuals so designated will undergo training, but the number of years and at what time such training will occur are not necessarily determined.

SENIOR SCIENTIFIC STAFF

	YEAR						TOTAL
	1	2	3	4	5	6	
Crop Protection Specialist		1	1	Tr	Tr	1	5
Agricultural Eng. (Trainee)		Tr	Tr	Tr	Tr	1	5
Deputy Project Director (U.S.) (Khartoum Yr 1)		1	1	(El Obeid Yrs. 4-6)			2
Agro-climatologist Consultant (U.S.)		1/4	1/4	(El Obeid Yrs. 4-6)			1/2
Sociologist (U.S.)		1	1	(El Obeid Yrs. 4-6)			2
Range Specialist (U.S.)		1	1	(S. Darfur Yrs. 4-6)*			2
Animal Production Specialist (U.S.)		1	1	(El Fasher Yrs. 4-6)*			2
	<u>1</u>	<u>8 1/4</u>	<u>12 1/4</u>	<u>10</u>	<u>10</u>	<u>10</u>	<u>51.5</u>
	(0 Tr)	(incl 1 Tr)	(incl 2 Tr)	(incl 2 Tr)	(4 Tr)	(0 Tr)	(5 Tr for 9 Tr yrs)

* See page 4 for note on locations of U.S. Range and Animal Production Specialists in Years 4-6.

SENIOR SCIENTIFIC STAFF

EL OBEID	YEAR						TOTAL
	1	2	3	4	5	6	
<u>ADMINISTRATIVE HEADQUARTERS:</u>							
Project Director	(Khartoum yrs 1-3)			1	1	1	3
Deputy Project Director	(Khartoum Yr 1 and Kadugli Yrs 2-3)			1	1	1	3
(Station Superintendent - See "Non-Scientific Support Staff)				(1)	(1)	(1)	(3)
(Sr. Accountant/Controller - See "Non-Scientific Support Staff)				(1)	(1)	(1)	(3)
<u>LAND AND WATER USE PROGRAM:</u>							
Water and Land Use Systems Analyst (Program Leader)				1	1	Tr	3
Deputy Program Leader (Systems)	Tr		Tr	1	1	1	5
Soil Physicist			Tr	Tr	1	1	4
Agricultural Chemist			Tr	Tr	1	1	4
Agro-Climatologist	Tr		Tr	Tr	1	1	5
*Agricultural Engineer - Water oriented			Tr	Tr	1	1	4
Agro-Climatologist Consultant (U.S.)			(Kadugli Yrs. 2-3)	1/3	1/3	1/3	1
<u>RESEARCH SUPPORT SERVICES:</u>							
Production Systems Agronomist (Program Leader) (U.S.) (Kadugli yrs. 2-3)				1	1	1	3
Sociologist (U.S.)			(Kadugli Yr 2-3)	1	1	1	3
Economist/Biometrician			Tr	Tr	1	1	4
<u>TRAINING AND EXTENSION UNIT:</u>							
Research/Training/Liaison Officer	Tr		Tr	Tr	Tr	1	5
(Asst. Training Officer - Mid-level)				(Tr)	(1)	(1)	(3)
<u>CROP/LIVESTOCK ON NON-CRACKING CLAYS PROGRAM:</u>							
Systems Agronomist			Tr	1	1	1	4
Gum Arabic Specialist #1	1		Tr	1	1	1	6
Gum Arabic Specialist #2	Tr		Tr	Tr	Tr	1	5
*open position							

SENIOR SCIENTIFIC STAFF

	1	2	3	4	5	6	TOTAL
Farm Management Economist		Tr	Tr	Tr	Tr	1	5
Agro-Breeder				1	Tr	1	3
Livestock Specialist		Tr	Tr	1	1	1	5
Forage/Range Specialist				Tr	1	1	3
Horticulturist				1	1	Tr	3
EL OBEID SUBTOTALS	<u>1</u> (0 Tr)	<u>7</u> (6 Tr)	<u>12</u> (12 Tr)	<u>20 1/3</u> (9 Tr)	<u>20 1/3</u> (4 Tr)	<u>20 1/3</u> (2 Tr)	<u>31</u> (16 Tr for 33 Tr yrs)

EL FASHER

LIVESTOCK PRODUCTION AT DESERT

FRINGE:

*Animal Production Specialist (U.S.) (Kadugli Yrs 2-3)				1	1	1	3
Animal Production/Nutrition Specialist			Tr	1	1	1	4
Sociologist		Tr	Tr	1	1	1	5
Range Management Specialist		Tr	Tr	1	1	1	5
Forage/Gum Arabic Specialist (Animal Health - Cooperative with Vet. Dept.)				1	Tr	1	3
	<u>0</u> (0 Tr)	<u>2</u> (2 Tr)	<u>3</u> (3 Tr)	<u>5</u> (0 Tr)	<u>5</u> (1 Tr)	<u>5</u> (0 Tr)	<u>20</u> (1 Tr for 6 Tr Yrs)

S. DARFUR - GHAZALA GAWAZAT

INTEGRATED CROP/LIVESTOCK ON STABILIZED SANDS:

Production Systems Agronomist				1	1	Tr	3
Ground Nut Breeder			Tr	1	1	1	4
Economist			Tr	1	1	1	4
Sociologist			Tr	1	1	1	4

SEMI-ARID LIVESTOCK PRODUCTION

SUDANIAN & SAHELIAN ZONES:

*Range Specialist (U.S.) (Kadugli Yrs 2-3)				1	1	1	3
Livestock/Range Specialist			Tr	1	1	1	4
Animal Health Specialist			Tr	1	1	1	4

Locations of Animal Production Specialist and Range Specialist (expatriates) not yet finalized. World Bank feels U.S. Range person should be at El Fasher and U.S. Animal Production Specialist at G.G.

SENIOR SCIENTIFIC STAFF

	1	2	3	4	5	6	TOTAL
Animal Production Specialist			1	1	Tr	1	4
(Liaison/Extension Specialist - Mid-level)			(Tr)	(1)	(1)	(1)	(4)
HAZALA GAWAZAT SUBTOTALS	0	0	6	8	8	8	30
	(0 Tr)	(0 Tr)	(5 Tr)	(0 Tr)	(1 Tr)	(1 Tr)	(7 Tr for 7 Tr Yrs.)
TOTALS ALL STATIONS	5 3/4	22 1/4	38 1/4	47 1/3	47 1/3	47 1/3	208 1/4
	(0 Tr)	(9 Tr)	(22 Tr)	(11 Tr)	(10 Tr)	(3 Tr)	(32 Tr for Total of 55 Tr Yrs)

NOTE: Positions in parentheses are either shown on additional staffing summaries (Controller, Station Superintendent, See "Non-Scientific Support Staff") or are now considered mid-level positions. These are not included in the total figures listed here.

WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT

April 1981

Staff Projections: Technicians (Sudanese)
by Location and Year

Based upon scientific positions by years, the technical positions are budgeted to coincide with the scientific staff m/y. One-half are senior and one-half are junior technicians.

EL OBEID	YEAR						TOTAL
	1	2	3	4	5	6	
1. Water/Land Use Res.							
Resource Analyst				2	2	2	6
Rep. Prog. Leader				2	2	2	6
Soil Physicist					2	2	4
Ag. Chemist					2	2	4
Ag. Climatologist						2	2
Water Engineer							
Ag. Climatologist (consultant)		1	1	1	1	1	5
2. Res. Support Services							
Prodn. Systems Sp.				2	2	2	6
Sociologist							
Economist/Biometrician					1	1	2
3. Training/Extension Unit							
Research/Training Liaison Office					2	2	4
4. Crop/Livestock Res. on Non-Cracking Clays							
Systems Agronomists				2	2	2	6
Gum Arabic Sp.	2	2	2	2	2	2	12
Gum Arabic Sp.	2	2	2	2	2	2	12
Farm Mgt. Economist						2	2
Agro-Breeder				2	2	2	6
Livestock Sp.				2	2	2	6
Forage/Range Sp.					2	2	4
Horticulturist				2	2	2	6
5. Maintenance							
Office and Scientific Equipment				2	2	2	6
	<u>4</u>	<u>5</u>	<u>5</u>	<u>21</u>	<u>30</u>	<u>34</u>	<u>99</u>

TECHNICIANS (SUDANESE)

<u>EL FASHER</u>	1	2	3	4	5	6	TOTAL
Animal Prodn. Sp.						2	2
Animal Prodn./Nutrition Sp.				2	2	2	6
Sociologist				2	2	2	6
Range Mgt. Sp.				2	2	2	6
Forage/Gum Arabic Sp.				2	2	2	6
	<u>0</u>	<u>0</u>	<u>0</u>	<u>8</u>	<u>8</u>	<u>10</u>	<u>26</u>
<u>S. DARFUR</u>							
1. Integrated Crops/Livestock							
Prodn. Systems Agronomist				2	2	2	6
Economist				2	2	2	6
Sociologist				2	2	2	6
2. Semi-Arid Livestock							
Range Sp.				2	2	2	6
Range/Livestock Sp.				2	2	2	6
Animal Prodn. Sp.							
Animal Health Sp.			2	2	2	2	8
Liaison/Extension Sp.				2	2	2	6
	<u>0</u>	<u>0</u>	<u>2</u>	<u>14</u>	<u>14</u>	<u>14</u>	<u>44</u>
<u>KADUGLI</u>							
Prodn. Agronomist	2	2	2	2	2	2	12
Prodn. Mgt. Economist		2	2	2	2	2	10
Ag. Engineer			2	2	2	2	8
Agro-Breeder			2	2	2	2	8
Livestock Prodn. Sp.		2	2	2	2	2	10
Range Sp.				2	2	2	6
Res. Liaison Officer				1	1	1	3
Water Land Use Sp. - Field Res.					2	2	4
Crop Protection		2	2	2	2	2	10
Ag. Engineer						2	2

TECHNICIANS (SUDANESE)

<u>KADUGI.I, cont.</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>TOTAL</u>
Range/Livestock Sp.		2	2				4
Range Mgt. Sp.		2	2				4
	<u>2</u>	<u>12</u>	<u>16</u>	<u>15</u>	<u>17</u>	<u>19</u>	<u>81</u>
<u>KHARTOUM</u>							
1. Maintenance							
Office and Scientific Equipment		2	2				4
<u>GRAND TOTALS</u>	<u>6</u>	<u>19</u>	<u>25</u>	<u>58</u>	<u>69</u>	<u>77</u>	<u>254</u>

prepared by Osman Khalifa, Robert Harwood, James Henson, Jan Hoel
4/71

NON-SCIENTIFIC SUPPORT STAFF

BY

LOCATION AND YEAR

Finalized by O. Khalifa, J. Ycel, J.B. Henson- March 1980

KHARTOUM	YEAR						TOTAL
	1	2	3	4	5	6	
Liaison Officer	(See Sr. Scientific Staff)						
Sr. Accountant/ Controller	1/2	1	1	(El Obeid Yrs. 4-6)			2 1/2
Sr. Clerk/ Communications	1/2	1	1	1	1	1	5 1/2
Sr. Secretary	1/2	1	1	1	1	1	5 1/2
*Secretaries	2 @ 1/2	2	2	2	2	2	11
Purchasing/Stores	1/2	1	1	1	1	1	5 1/2
Sr. Driver	1/2	1	1	1	1	1	5 1/2
**Drivers	3 @ 1/2	3	3	3	3	3	16 1/2
Office laborers	2 @ 1/2	4	4	4	4	4	21
Grounds Laborer	1/2	1	1	1	1	1	5 1/2
Guest House Cook	1/2	1	1	1	1	1	5 1/2
Guest Housekeeper	--	1	1	1	1	1	5
Guest House Cleaner/ Washer	2 @ 1/2	1	1	1	1	1	6
Guest House Guards	2 @ 1/2	2	2	2	2	2	11
Office Guards	3 @ 1/2	3	3	3	3	3	16 1/2
	10.5	23	23	**22	**22	**22	122.5

*The number of secretaries in years 4-6 may decrease with transfer of one or both to El Obeid.

**The number of drivers given is a maximum number; may be fewer drivers. Also, some of the positions may be transferred to El Obeid in years 4-6.

NON-SCIENTIFIC SUPPORT STAFF

KADUGLI	1	2	3	4	5	6	TOTAL
Executive (Admin) Office	2/3	1	1	1	1	1	5 2
(Sr.) Accountant	2/3	1	1	1	1	1	5 2
Asst. Accountant (Bookkeeper)	2/3	1	1	1	1	1	5 2
Sr. Clerk/ Communications	2/3	1	1	1	1	1	5 2
Cashier	2/3	1	1	1	1	1	5 2
Secretaries	2 @ 2/3	2	3	3	3	3	15 1
Purchasing/Stores	2/3	1	1	1	1	1	5 2
Asst. Storekeeper	2/3	1	1	1	1	1	5 2
Transp. Officer (Head Driver)	2/3	1	1	1	1	1	5 2
Drivers	9 @ 2/3	18	18	18	18	18	96
Office Labor	2 @ 2/3	4	4	4	4	4	21 1
<u>Skilled Workers:</u>							
Electrician		1	1	1	1	1	5
Plumber		1	1	1	1	1	5
Carpenter/Mason		1	1	1	1	1	5
Generator Operators		3	3	3	3	3	15
Mechanic		1	1	1	1	1	5
Assistant Mechanic		1	1	1	1	1	5
Farm Manager	2/3	1	1	1	1	1	5 2
Farm and Grounds Labor/ Cleaners	68 @ 2/3	66	66	66	66	66	375
Farm Supervisor (Head Laborer)	2/3	1	1	1	1	1	5 2
Grounds Supervisor (Head Laborer)	2/3	1	1	1	1	1	5 2
Head Guard	2/3	1	1	1	1	1	5 2
Guards	6 @ 2/3	6	10	10	10	10	50
Guesthouse Cook		1	1	1	1	1	5
Housekeeper		1	1	1	1	1	5
Guest House Washer/ Cleaners		2	2	2	2	2	10
	60	120	125	125	125	125	686

*Driver numbers are maximums--may be fewer

NON-SCIENTIFIC SUPPORT STAFF

<u>EL OBEID</u>	1	2	3	4	5	6	TOTAL
Station Superintendent	-	-	-	1	1	1	3
Executive (Admin) Officer	2/3	1	1	1	1	1	5 2/3
Sr. Accountant/ Controller	(Khartoum Yrs. 1-3)			1	1	1	3
(Sr.) Accountant	2/3	1	1	1	1	1	5 2/3
Asst. Accountant/ (Bookkeeper)	2/3	1	1	1	1	1	5 2/3
Sr. Clerk/ Communications	2/3	1	1	1	1	1	5 2/3
Cashier	2/3	1	1	1	1	1	5 2/3
Secretaries	2/3	1	1	8	8	8	26 2/3
Purchasing/Stores	2/3	1	1	1	1	1	5 2/3
Asst. Storekeeper	2/3	1	1	1	1	1	5 2/3
Transp. Officer (Head Driver)	2/3	1	1	1	1	1	5 2/3
*Drivers	4 @ 2/3	4	4	25	25	25	85 2/3
Office Labor	2 @ 2/3	2	2	6	6	6	23 1/3
<u>Skilled Workers:</u>							
Electrician	-	-	-	1	1	1	3
Plumber	-	-	-	1	1	1	3
Carpenter/Mason	-	-	-	1	1	1	3
Generator Operators	-	-	-	3	3	3	9
Mechanic	-	-	-	1	1	1	3
Assistant Mechanic	-	-	-	1	1	1	3
Farm Manager	2/3	1	1	1	1	1	5 2/3
Farm Labor (32)	} 23 @ 2/3						
Grounds Labor (6)							
Cleaners (8)							
Grounds Supervisor	2/3	1	1	1	1	1	5 2/3
Head Guard	-	-	1	1	1	1	4
Guards	6 @ 1/2	6	10	16	16	16	67
Guesthouse Cook	1/2	1	1	1	1	1	5 1/2
Housekeeper	-	1	1	1	1	1	5
Guest House Washers/ Cleaners	1/2	1	1	2	2	2	8 1/2
	<u>34</u>	<u>54</u>	<u>59</u>	<u>126</u>	<u>126</u>	<u>126</u>	<u>525</u>

* Maximum--May be fewer

NON-SCIENTIFIC SUPPORT STAFF

<u>SOUTHERN DARFUR/ GHAZALA, GAWAZAT</u>	1	2	3	4	5	6	TOTAL
Executive (Admin) Officer	-	-	-	1	1	1	3
(Sr.) Accountant	-	-	-	1	1	1	3
Sr. Clerk/Communications	-	-	-	1	1	1	3
Cashier	-	-	-	1	1	1	3
Secretaries	-	-	-	3	3	3	9
Purchasing/Stores	-	-	-	1	1	1	3
Asst. Storekeeper	-	-	-	1	1	1	3
Sr. Driver	-	-	-	1	1	1	3
*Drivers	-	-	-	10	10	10	30
Office Laborers	-	-	-	2	2	2	6
<u>Skilled Workmen:</u>							
Electrician	-	-	-	1	1	1	3
Carpenter/Mason	-	-	-	1	1	1	3
Generator Operators	-	-	-	2	2	2	6
Mechanic	-	-	-	1	1	1	3
Asst. Mechanic	-	-	-	1	1	1	3
Farm Manager	-	-	-	1	1	1	3
Farm Laborers/Herders	-	-	-	20	20	20	60
Grounds Superintendent (Head Laborer)	-	-	-	1	1	1	3
Grounds Labor/Cleaners	-	-	-	6	6	6	18
Head Guard	-	-	-	1	1	1	3
Guards	-	-	-	10	10	10	30
Guesthouse Cook	-	-	-	1	1	1	3
Housekeeper	-	-	-	1	1	1	3
Guesthouse Cleaner/ Washers	-	-	-	2	2	2	6
	0	0	0	71	71	71	213

*Maximums -- May be fewer

NON-SCIENTIFIC SUPPORT STAFF

<u>EL FASHER</u>	1	2	3	4	5	6	TOTAL
Executive (Admin.) Officer	-	-	-	1	1	1	3
(Sr.) Accountant	-	-	-	1	1	1	3
Sr. Clerk/Communications	-	-	-	1	1	1	3
Cashier	-	-	-	1	1	1	3
Secretaries	-	-	-	3	3	3	9
Purchasing/Stores	-	-	-	1	1	1	3
Head Driver	-	-	-	1	1	1	3
*Drivers	-	-	-	5	5	5	15
<u>Skilled Workmen:</u> (2-generator operators 1 all-around maint.)	-	-	-	3	3	3	9
Head Laborer	-	-	-	1	1	1	3
Grounds Labor/Cleaners	-	-	-	2	2	2	6
Farm Labor/Herders	-	-	-	11	11	11	33
Head Guard	-	-	-	1	1	1	3
Guards	-	-	-	4	4	4	12
Guest House Cook/ Houskeeper	-	-	-	1	1	1	3
Guest House Cleaner/ Washer	-	-	-	1	1	1	3
	0	0	0	39	39	39	117

*Maximums - May be fewer

Appendix IX

Staffing patterns for WSARP senior scientist, technicians, and support staff. These patterns represent projected staffing as agreed on November, 1982. They are given by location, discipline, and year.

**Sudanese Scientific Positions Identified by Location and
Discipline, and Sudanese Scientists Presently Conducting Research
in the Field**

Location of Position	Discipline	Sudanese Sci. Currently at Stations
<u>Kadugli</u>		
	Production Systems Agronomist Agro-Breeder	Mukhtar Kenani
	Soil/Water Use & Management Specialist Agricultural Engineer	
	Farm Management Economist	
	Livestock Production Specialist	Babo Fadlalla
	Range/Forage Specialist	Hashim Mukhtar
	Research/Extension Liaison Specialist	
	Crop Protection Specialist	
	Weed Specialist	
	Social Scientist	M. Azim Abu Sabah

El Obeid

Production Systems Agronomist	
Systems Agronomist	El Hag Abu El. Gasim
Agro-Breeder	Abdel Rahman, El Khidir
Horticulturist	Osman Adam Osman
Water/Land Use Systems Analyst	
Systems Deputy Program Leader	
Soil Physicist	
Agricultural Chemist	
Agricultural Engineer (Soil/Water)	
Agro-Climatologist	
Economist/Biometrician	
Farm Management Economist	
Social Scientist	
Livestock Production Specialist	
Forage/Range Specialist	
Research/Training/Liaison Officer	
Asst. Training Officer (Mid-level)	
Plant Pathologist	
Gum Arabic Specialist #1	Zakaria Saad
Gum Arabic Specialist #2	

El Fasher

Agricultural Economist
Social Scientist
Animal Production Specialist
Animal Production/Nutrition Specialist
Animal Health (Coop. with Vet. Dept.)
Range Management Specialist

Ghazala

Gawazat

Production Systems Agronomist
Groundnut Breeder
Agricultural Economist
Social Scientist
Animal Production Specialist
Animal Health Specialist
Range Scientist
Liaison/Extension (Mid-level)

Khartoum

(Later at
El Obeid)

Project Director

Dr. Dafalla

Various

Locations

Production Specialists - 12
(Extension/Liaison)

WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT

April 1981

Staff Projections: Technicians (Sudanese)*
by Location and Year

Based upon scientific positions by years, the technical positions are budgeted to coincide with the scientific staff m/y. One-half are senior and one-half are junior technicians.

EL OBEID	YEAR						TOTAL
	1	2	3	4	5	6	
1. Water/Land Use Res.							
Resource Analyst				2	2	2	6
Rep. Prog. Leader				2	2	2	6
Soil Physicist					2	2	4
Ag. Chemist					2	2	4
Ag. Climatologist						2	2
Water Engineer							
Ag. Climatologist (consultant)		1	1	1	1	1	5
2. Res. Support Services							
Prodn. Systems Sp.				2	2	2	6
Sociologist							
Economist/Biometrician					1	1	2
3. Training/Extension Unit							
Research/Training Liaison Office					2	2	4
4. Crop/Livestock Res. on Non-Cracking Clays							
Systems Agronomists				2	2	2	6
Gum Arabic Sp.	2	2	2	2	2	2	12
Gum Arabic Sp.	2	2	2	2	2	2	12
Farm Mgt. Economist						2	2
Agro-Breeder				2	2	2	6
Livestock Sp.				2	2	2	6
Forage/Range Sp.					2	2	4
Horticulturist				2	2	2	6
5. Maintenance							
Office and Scientific Equipment				2	2	2	6
	4	5	5	21	30	34	99

*This table not revised, see Summary

TECHNICIANS (SUDANESE)

<u>EL FASHER</u>	1	2	3	4	5	6	TOTAL
Animal Prodn. Sp.						2	2
Animal Prodn./Nutrition Sp.				2	2	2	6
Sociologist				2	2	2	6
Range Mgt. Sp.				2	2	2	6
Forage/Gum Arabic Sp.				2	2	2	6
	<u>0</u>	<u>0</u>	<u>0</u>	<u>8</u>	<u>8</u>	<u>10</u>	<u>26</u>

S. DARFUR

1. Integrated Crops/Livestock							
Prodn. Systems Agronomist				2	2	2	6
Economist				2	2	2	6
Sociologist				2	2	2	6
2. Semi-Arid Livestock							
Range Sp.				2	2	2	6
Range/Livestock Sp.				2	2	2	6
Animal Prodn. Sp.							
Animal Health Sp.			2	2	2	2	8
Liaison/Extension Sp.				2	2	2	6
	<u>0</u>	<u>0</u>	<u>2</u>	<u>14</u>	<u>14</u>	<u>14</u>	<u>44</u>

KADUGLI

Prodn. Agronomist	2	2	2	2	2	2	12
Prodn. Mgt. Economist		2	2	2	2	2	10
Ag. Engineer			2	2	2	2	8
Agro-Breeder			2	2	2	2	8
Livestock Prodn. Sp.		2	2	2	2	2	10
Range Sp.				2	2	2	6
Res. Liaison Officer				1	1	1	3
Water Land Use Sp.							
Field Res.					2	2	4
Crop Protection		2	2	2	2	2	10
Ag. Engineer						2	2

TECHNICIANS (SUDANESE)

<u>KADUGLI, cont.</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>TOTAL</u>
Range/Livestoc: Sp.		2	2				4
Range Mgt. Sp.		2	2				4
	<u>2</u>	<u>12</u>	<u>16</u>	<u>15</u>	<u>17</u>	<u>19</u>	<u>81</u>
 <u>KHARTOUM</u>							
1: Maintenance							
Office and Scientific Equipment		2	2				4
 <u>GRAND TOTALS</u>	<u>6</u>	<u>19</u>	<u>25</u>	<u>58</u>	<u>69</u>	<u>77</u>	<u>254</u>

prepared by Osman Khalifa, Robert Harwood, James Henson, Jan Hoel
4/71

NON-SCIENTIFIC SUPPORT STAFF

BY

LOCATION AND YEAR

	<u>Project Year</u>		
	4	5	6
<u>KHARTOUM</u>			
Sr. Accountant	1 M ¹	1 M ¹	1 M ¹
Sr. Clerk	1 M ¹	1 M ¹	1 M ¹
Secretaries ²	3	3	2
Store Keeper	1	1	1
Asst. Store Keeper	1	1	1
Sr. Driver	1	1	1
Drivers ³	3	3	3
Transport Officer	1 M ¹	1 M ¹	1 M ¹
Office Laborers	4	4	4
Carpenter/Painter	1	1	1
Grounds Laborer/Cleaners	4	4	4
Radio Operator	1 M ¹	1 M ¹	1 M ¹
Guest House Cook	1	1	1
Guest Housekeeper	1	1	1
Guest House Cleaner/Washer	1	1	1
Guest House Guards	2	2	2
Guards	3	3	3

¹ M indicates mid-level position.

² The number of secretaries in year 6 may decrease with transfer of one to El Obeid.

³ The number of drivers given is a maximum number; may be fewer drivers. Also, some of the positions may be transferred to El Obeid in year 6.

	<u>Project Year</u>		
	4	5	6
Asst. Dir. Finance	1	1	-
Asst. Director Admin.	1	1	1
Purchasing Officer	1	1	1
Inspector of Accounts	1	1	-
Accountant	2	2	1
Librarian	1 M ¹	1 M ¹	1 M ¹
<u>KADUGLI</u>			
Executive (Admin) Officer	1 M ¹	1 M ¹	1 M ¹
(Sr.) Accountant	1 M ¹	1 M ¹	1 M ¹
Asst. Accountant (Bookkeeper)	1	1	1
Sr. Clerk	1 M ¹	1 M ¹	1 M ¹
Communications Officer	1 M ¹	1 M ¹	1 M ¹
Cashier	1	1	1
Secretaries	3	4	4
Purchasing/Stores	1 M ¹	1 M ¹	1 M ¹
Asst. Storekeeper	3	3	3
Pump Operator (Fuel)	1	1	1
Transp. Officer	1	1	1
Drivers	18	18	18
Office Labor	4	4	4
Maintenance Engineer	1 M ¹	1 M ¹	1 M ¹
<u>Skilled Workers:</u>			
Electrician (Head)	1 M ¹	1 M ¹	1 M ¹
Electrician	1	1	1
Plumber	1	1	1

	4	<u>Project Year</u> 5	6
Carpenter	2	2	2
Painter	1	1	1
Mason	1	1	1
Generator Operators	3	3	3
Mechanic (Head)	1	1	1
Assistant Mechanic	4	4	4
Farm Manager	1 M ¹	1 M ¹	1 M ¹
Farm and Grounds Labor/Cleaner	66	66	66
Farm Supervisor	1	1	1
Grounds Supervisor	1	1	1
Head Guard	1	1	1
Guards	10	10	10
Guesthouse Cook	1	1	1
Assistant Cooks	2	2	2
Housekeeper	1	1	1
Guest House Washer/Cleaners	4	4	4
Librarian Information Officer	1 M ¹	1 M ¹	1 M ¹
Asst. Librarian	1	1	1
<u>EL OBEID</u>			
Executive (Admin) Officer	1 M ¹	1 M ¹	1 M ¹
Sr. Accountant	1 M ¹	1 M ¹	1 M ¹
Asst. Accountants (Bookkeepers)	-	1	3
Sr. Clerk	-	1 M ¹	1 M ¹
Communications Officer	1 M ¹	1 M ¹	1 M ¹
Cashier	1	1	1

	<u>Project Year</u>		
	4	5	6
Secretaries	3	4	8
Purchasing/Stores	1	1	1
Asst. Storekeeper	1	1	4
Transp. Officer	1 M ¹	1 M ¹	1 M ¹
Drivers ⁴	8	12	43
Office Labor	3	3	6
Maintenance Engineer	-	1 M ¹	1 M ¹
<u>Skilled Workers:</u>			
Electrician (Head)	1	1	1
Electrician	-	-	1
Plumber	1	1	2
Painter	-	1	2
Carpenter/Mason	1	1	3
Generator Operators	3	3	3
Head Mechanic	-	-	1
Assistant Mechanic	1	1	6
Farm Manager	1 M ¹	1 M ¹	1 M ¹
Farm Labor (32)	}-----	50	56
Grounds Labor (6)			
Cleaners (8)			
Grounds Supervisor	-	1	1
Head Guard	1	1	1
Guards	6	10	16
Guesthouse Cook	1	1	2

⁴ Maximum -- May be fewer

	<u>Project Year</u>		
	4	5	6
Assistant Cooks	2	3	4
Housekeeper	1	1	1
Guest House Washer/Cleaners	2	2	6
Librarian	-	1 M ¹	1 M ¹
Asst. Librarian	-	-	3
<u>SOUTHERN DARFUR/GHAZALA GAWAZAT</u>			
Executive (Admin) Officer	1 M ¹	1 M ¹	1 M ¹
Sr. Accountant	-	-	1 M ¹
Sr. Clerk	1 M ¹	1 M ¹	1 M ¹
Communications Officer	1 M ¹	1 M ¹	1 M ¹
Cashier	1	1	1
Secretaries		1	3
Purchasing Officer	-	1	1
Store Keeper	-	1	1
Asst. Storekeeper	-	-	1
Sr. Driver	1	1	1
Drivers ⁵	2	3	10
Office Laborers	1	1	2
Maintenance Engineer	-	1	1
<u>Skilled Workmen:</u>			
Head Electrician	1	1	1
Carpenter/Mason	-	1	2
Generator Operators	2	3	3
Plumber	-	1	1

⁵ Maximum -- May be fewer

		<u>Project Year</u>	
	4	5	6
Head Mechanic	1	1	1
Assistant Mechanic	1	1	3
Farm Manager	-	1 M	1 M
Farm Laborer/Herders	20	20	30
Grounds Superintendent	-	1	1
Grounds Labor/Cleaners	1	3	6
Head Guard	-	1	1
Guards	5	5	10
Guesthouse Cook	1	1	1
Housekeeper	1	1	1
Guest House Cleaner/Washers	-	2	2
Asst. Librarian		1	1
<u>EL FASHER</u>			
Executive (Admin.) Officer	-	1 M ¹	1 M ¹
(Sr.) Accountant	-	-	1 M ¹
Sr. Clerk	-	-	1 M ¹
Cashier	-	-	1
Secretaries	-	-	3
Communications Officer	-	-	1 M ¹
Purchasing/Stores	-	-	1 M ¹
Asst. Storkeepers	-	-	1 M ¹
Head Driver	1	1	1
Drivers ⁶	2	2	5
Maintenance Engineer	-	-	1 M ¹

⁶ Maximum -- May be fewer

	4	<u>Project Year</u> 5	6
<u>Skilled Workmen:</u>			
Maintenance/Operations	-	2	2
Generator Operators	-	-	1 M ¹
Head Mechanics	-	-	1
Asst. Mechanic	-	-	2
Mason/Carpenter	-	-	1
Plumber	-	-	1
Head Electrician	-	1	1
Head Laborer	-	1	1
Grounds Superintendent	-	1	1
Grounds Labor/Cleaners	-	4	4
Farm Labor/Herders	4	11	11
Head Guard	-	1	1
Guards	-	4	4
Guesthouse Cook	1	1	1
Housekeeper	1	1	1
Asst. Cooks	-	2	2
Guest House Cleaner/Washer	-	3	3
Assistant Librarian	-	-	1

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Summary of
Revised Staff Projections as Person Years for Years 4, 5, 6 (1982-1985)

November, 1982

	<u>Khartoum</u>				<u>Kadugli</u>				<u>El Obeid</u>				<u>El Fasher</u>				<u>GG</u>				<u>Totals by Years</u>			
	4	5	6	T ¹	4	5	6	T	4	5	6	T	4	5	6	T	4	5	6	T	4	5	6	T
A. Senior Staff																								
1. Administration	7	7	3	17	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	7	7	7	21
2. Scientists	0	0	0	0	6	6	10	22	4	4	16	24	0	0	5	5	0	2	8	10	10	12	39	61
B. Middle Staff																								
1. Technicians																								
a. Senior																								
	2	2	1	5	10	10	10	30	6	7	18	31	3	3	5	11	3	4	8	15	24	26	42	92
b. Junior																								
	1	1	1	3	10	10	10	30	5	6	18	29	3	3	5	11	3	4	8	15	22	24	42	88
2. Assistant Scientists (See totals)																								
																					13	13	9	35
3. Administration/Support																								
	3	4	2	9	11	11	11	33	5	7	8	20	2	8	8	18	0	4	5	9	21	34	34	89
4. Liaison Officers																								
	0	0	1	1	1	3	3	7	1	2	3	6	0	0	3	3	0	0	3	3	2	5	13	20
C. Laborers (Includes administrative and support staff)																								
	23	25	20	68	115	115	115	345	81	99	150	330	7	47	47	101	40	59	83	182	266	345	415	1026

Expressed as Person Years

DRAFT OPERATIONAL GUIDELINES FOR WSARP RESEARCH

The following outline presents a general operating procedure for the planning, implementation and conduct of all Western Sudan Agricultural Research Project (WSARP) research activities.

I. General Administration and Functional Approaches

Overall administration of research activities are to be guided by the following:

- A. Goals of WSARP research are set by project administration with a view to the individual farmer and pastoralist in the West and the national interest and goals of Sudan.
- B. Responsibilities for achieving overall project goals will be defined and delegated to the appropriate project scientists and/or administrators.
- C. Adequate support of sufficient scope and duration to achieve the approved research project objectives will be required and made available within the existing constraints.
- D. Overall project modification will be implemented in a timely fashion resulting from constant monitoring and periodic evaluation.
- E. Effective integration into ARC will be a requirement.

II. Goals of the Western Sudan Agricultural Research Project

- A. Improve the quality of life of the inhabitants of Western Sudan as determined by their own standards.
- B. Increase agricultural productivity on farms and in herds of producers in the rain-fed sector in Western Sudan consistent with optimal utilization, maintenance or improvement of natural resources.
- C. Provide economic advantages or other measurable benefits to the individual producers.
- D. Improve the environment and/or decrease environmental degradation while achieving A, B and C above.
- E. Gather information relevant and useful to decision makers influencing regional and national policies that will assist in the realization of A, B, C and D above.

III. General Research Approach

- A. Agricultural production will be viewed in a systems context with short-term benefits being emphasized while giving due consideration to mid- and long-term benefits.
- B. Products for which the Western Sudan has a comparative advantage within the framework of national policy such as dura, millet, gum arabic, sesame, groundnuts, certain horticultural crops, livestock and livestock products will be emphasized.

C. A Production (Farming) Systems Research approach which requires interdisciplinary interactions among scientists will be used with the following sequence of activities and strategies related to the research being stressed:

1. The production systems will be identified with definition of generally homogenous environmental settings within attendant farming and livestock systems.
2. The environmental context in which these systems exist will be broadly described.
3. Methods by which the farmer or pastoralist lives, works and utilizes resources will be determined.
4. The priorities the farmer and/or pastoralist has set for the operation and management of agricultural enterprises, use of resources and production of agricultural commodities in the existing agricultural systems will be defined.
5. The major constraints to fulfilling those priorities will be identified.

Items 2 through 5 above will be accomplished through diagnostic surveys and researcher observations using the concepts of the "Downstream FSR Approach."

6. The constraints will be determined and prioritized in terms of farmer/pastoralist perceptions and technical considerations.

7. Apparently feasible solutions to the constraints will be defined, prioritized and those that show the most promise for short-term and long-term benefits will be examined further. A limited number of high priority interventions will be examined.
8. The proposed solutions (interventions) will be prescreened.
 - a. for the short-term potential impact on the well being, incomes and productivity of the farmers and herders
 - b. for the long-term potential impact on the environment
 - c. for feasibility within the resource base of the farmer/herders
 - d. for feasibility in the policy and infrastructural context in which farmers and herders must operate
9. Accepted interventions will be tested in the context of the farmer or pastoralist environment (on the farmers' fields or in the pastoralist herds) where they will have to operate to be useful to farmers and herders.
10. Results of the on-farm and in-herd experiments will be interpreted using the criteria the farmer or pastoralist would use.

The above represent the "central thrusts" of the research activities. In those circumstances in which additional technical information is required and cannot be provided by others, supportive research carried out on the research stations and/or in the fields and herds will be conducted.

In all instances, a balance between central and support thrusts will be maintained. Within this context, a central thrust is considered a research activity that has potential, short-term benefit to the farmer/pastoralist and can be immediately tested for acceptability and appropriateness on fields or in herds. A support thrust is research that is designed to obtain additional technical information and is not appropriate and/or ready for testing as an intervention on farms and/or herds for potential benefits in the short-term, or to provide needed information for policy decisions.

11. Extension activities will be established to implement the general solutions identified and evaluated for wide-scale application. Close coordination with regional and national extension services will be carried out.

D. Research activities of WSARP will be integrated into and coordinated with those of other scientists, stations and activities of the Agricultural Research Corporation. In addition, cooperation and coordination with regional and national governmental and other relevant organizations will be fostered for optimal effectiveness of WSARP activities.

E. Research activities of the scientists will be structured so as to provide professionally challenging and rewarding career opportunities.

IV. Monitoring of Research Activities

All research projects will be monitored by peer scientists and project administration to ensure that the activities continue to follow a course that addresses WSARP goals. This monitoring process will feedback to the responsible scientists for improving

methodologies or approaches. Progress toward achieving project objectives will be measured against the time-frame provided by the project administration.

V. Research Administrative Structure

The research administrative structure will be as described in Volume II, WSARP Work Plan (October 1982) with incorporation of recommendations of the Evaluation Team Midterm Report (pages 15-16).

A. Administration and Responsibilities

1. The Director General of ARC has overall responsibility for all ARC activities, including WSARP.
2. The WSARP Director is responsible for all WSARP activities, including the administration and research.
3. The Systems Research Committee (SRC) is a project-wide committee appointed by the Project Director and chaired by him; composed of a Sedentary Production System Coordinator, a Transhumant Production System Coordinator, a Nomadic Production System Coordinator, the Deputy Project Director, and an ARC representative as may be determined by the Project Director and Director General/ARC. A secretary will be designated with responsibilities as indicated below. The functions of the SRC are as follows:
 - a. Receives and evaluates research proposals submitted by the station scientists through the Station Research Committee/Station Director and the appropriate Production System Coordinator.

- b. Prioritizes the proposals in terms of optimal utilization of project resources to realize project goals.
 - c. Suggests changes and/or other activities not covered in proposals submitted.
 - d. Coordinates the research activities among the production systems and research stations.
 - e. Makes recommendations regarding programmatic and support matters relating to the research program.
 - f. Meets with the ARC Technical Committee for discussions and recommendations concerning proposed activities.
 - g. The Systems Research Committee secretary calls meetings, ensures that information and recommendations and decisions of the committee are forwarded to the Station Research Committee, the submitting scientists and the Project Director
4. Station Research Committee. Each station will have a Station Research Committee composed of all senior scientists and chaired by the Station Director. The functions of the committee are as follows:
- a. Meets on a regular schedule to discuss ongoing research, potential research, specific research proposals and other station activities. This committee also serves to generally relate the specific requirements and inputs of the station to project-wide and inter-station research programs.

- b. Coordinates the research and support needs among the station scientists.
- c. Is responsible for interacting with ARC scientists and scientists from other institutions and organizations to ensure cooperation, coordination and optimal access to information from past and ongoing research activities being conducted outside the WSARP.
- d. Provides a mechanism for input to the Station Director concerning research support needs and activities.
- e. Makes recommendations through the Station Director to the Systems Research Committee concerning specific research proposals.
- f. The Systems Coordinators will visit each station on a regular basis for general discussion of all research, including that proposed and ongoing. Such visits by the Systems Coordinators must occur at least quarterly, but more frequent visits are encouraged.

B. Research Definition and Approval Flow

Specific research activities are planned and approved by the Project as follows:

1. The definition of research activities will be guided by the overall WSARP Work Plan and associated project documents which provide the orientation for the research.

2. Specific research proposals will originate from one or more scientists and will be presented for consideration only after thorough discussions with all senior scientists to obtain interdisciplinary input. This will occur at the Station Research Committee level.
3. The Station Research Committee will discuss each proposal as indicated in A. 4 above. Input from ARC and other appropriate scientists will be obtained, and the appropriate Systems Leader or Leaders will participate as indicated above. Recommendations of the Station Research Committee will be forwarded by the committee's chair (Station Director) to the Systems Coordinator.
4. Each Systems Coordinator is responsible for assisting in the planning of research activities at the Station level; coordinating systems activities among stations; and submitting proposals and recommendations received from Station Research Committees along with his/her own recommendations to the Systems Research Committee for action. The Systems Coordinators are responsible for ensuring that project research activities are conducted in a timely and efficient manner. Each Systems Coordinator is also responsible for calling meetings, transmitting information, and otherwise ensuring that systems planning, research and coordination are carried out with scientist participation.

C. Summary of Research Activities and Scientific Effort

1. WSARP Program Summary Sheet

A project wide summary sheet will be prepared and periodically updated as given in Table 1. This sheet will provide an overview of all project research activities by system, by project, by scientists, by activities within projects, by thrust and gives the hypothetical impact and project goals being addressed against time.

2. Project Summary Sheet

As with the WSARP Program Summary Sheet, this sheet will be attached to each project and provides information relating to the individual project as given in Table 2.

3. Project Senior Scientific and Administrative Staff Effort

A summary of annual effort by all senior administrative and research staff will be summarized to give the indication of effort required.

4. These tables will be updated every six months

Table 1

WSARP RESEARCH PROGRAM SUMMARY

Date: _____

	1983	1984	1985	Hypo- thetical Impact	Goals Addressed
I. <u>Sedentary System</u>					
A. Constraints and Interventions					
Identification and Prioritization					
1. Target Group Identification					
2. Survey of Available Information/ Interaction with Others					
3. Diagnostic Survey					
Staff					
(1) _____					
(2) _____					
(3) _____					
4. Formal Survey					
Staff					
(1) _____					
(2) _____					
(3) _____					

		1983	1984	1985	Hypo- thetical Impact	Goals Addressed
b.	_____	.....	.....	.....
	Staff: _____	.....	.....	.....
	_____		
c.	_____	.....	.....	.....
	Staff: _____	.....	.....	.....
	_____		
d.	_____	.....	.....	.....
	Staff: _____	.....	.....	.....
	_____		
C. Support Thrusts						
Project Name, No. and Principal Investigator						
a.	_____	.....	.....	.....
	Staff: _____	.....	.....	.....
	_____		
b.	_____	.....	.....	.....
	Staff: _____	.....	.....	.....
	_____		

1983

1984

1985

Hypo-
thetical
Impact

Goals
Addressed

c. _____
Staff: _____

D. Policy Thrust
Project Name, No. and Principal
Investigator

a. _____
Staff: _____

b. _____
Staff: _____

c. _____
Staff: _____

	1983	1984	1985	Hypo- thetical Impact	Goals Addressed
c.		
Staff:		
		
a.		
Staff:		
		
b.		
Staff:		
		
c.		
Staff:		
		

	1983	1984	1985	Hypo- thetical Impact	Goals Addressed
II. Transhumant System					
A. Constraints and Intervention		
Identification and Prioritization					
1. Target Group Identification		
2. Survey of Available Information/ Interaction with Others		
3. Diagnostic Survey		
Staff					
(1) _____		
(2) _____		
(3) _____		
4. Formal Survey		
Staff					
(1) _____		
(2) _____		
(3) _____		

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>Hypo- thetical Impact</u>	<u>Goals Addressed</u>
5. Collation and Interpretation of Data					
Staff					
(1) _____					
(2) _____					
(3) _____					
6. Identification of Interventions (in order of priority)					
a. _____					
b. _____					
c. _____					
d. _____					
B. Central Thrusts					
Project Name, No. and Principal Investigator					
a. _____					
Staff: _____					

	1983	1984	1985	Hypo- thetical Impact	Goals Addressed
b.					
Staff:					
c.					
Staff:					
d.					
Staff:					
C. Support Thrusts					
Project Name, No. and Principal Investigator					
a.					
Staff:					
b.					
Staff:					

		1983	1984	1985	Hypo- thetical Impact	Goals Addressed
c.	_____	.....	.....	.....
	Staff: _____	.....	.....	.....
	_____		
D. Policy Thrust						
Project Name, No. and Principal Investigator						
a.	_____	.....	.....	.....
	Staff: _____	.....	.....	.....
	_____		
b.	_____	.....	.....	.....
	Staff: _____	.....	.....	.....
	_____		
c.	_____	.....	.....	.....
	Staff: _____	.....	.....	.....
	_____		

	1983	1984	1985	Hypo- thetical Impact	Goals Addressed
III. Nomadic System					
A. Constraints and Interventions					
Identification and Prioritization					
1. Target Group Identification					
2. Survey of Available Information/ Interaction with Others					
3. Diagnostic Survey					
Staff					
(1) _____					
(2) _____					
(3) _____					
4. Formal Survey					
Staff					
(1) _____					
(2) _____					
(3) _____					

	1983	1984	1985	Hypo- thetical Impact	Goals Addressed
5. Collation and Interpretation of Data					
Staff					
(1) _____					
(2) _____					
(3) _____					
6. Identification of Interventions (in order of priority)					
a. _____					
b. _____					
c. _____					
d. _____					
B. Central Thrusts					
Project Name, No. and Principal Investigator					
a. _____					
Staff: _____					

		1983	1984	1985	Hypo- thetical Impact	Goals Addressed		
b.	_____				
	Staff: _____	.....	.....	.....	
	_____				
c.	_____	.....	.....	.....	
	Staff: _____	.....	.....	.....	
	_____				
d.	_____	.....	.....	.....	
	Staff: _____	.....	.....	.....	
	_____				
	_____				
C. Support Thrusts								
Project Name, No. and Principal Investigator								
a.	_____				
	Staff: _____				
	_____				

		1983	1984	1985	Hypo- thetical Impact	Goals Addressed
b.	_____	.....	.....	.....
	Staff: _____	.....	.....	.....
	_____		
c.	_____	.....	.....	.....
	Staff: _____	.....	.....	.....
	_____		
d.	_____	.....	.....	.....
	Staff: _____	.....	.....	.....
	_____		
D. Policy Thrusts						
Project Name, No. and Principal Investigator						
a.	_____	.....	.....	.....
	Staff: _____	.....	.....	.....
	_____		

		<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>Hypo- thetical Impact</u>	<u>Goals Addressed</u>
b.	_____	|||||	|||||	|||||		
	Staff: _____	|||||	|||||	|||||		

c.	_____	|||||	|||||	|||||		
	Staff: _____	|||||	|||||	|||||		

Table 2
PROJECT SUMMARY SHEET

Project No.: _____

		1983	1984	1985
A.	Name of Project: _____ _____			
B.	Date Submitted to Systems Committee: _____			
C.	Location of Research: _____ _____			
D.	Date Approved/Rejected by Project Director: _____			
E.	Project Activities			
	Constraint and Intervention Identification and Prioritization			
	a. Diagnostic Survey			
	Staff:			

b. Formal Survey (if any)

Staff:

c. Other Data Collection:

Staff:

d. Analysis of Data:

Staff:

e. Identification of Intervention(s)

Staff:

1983	1984	1985

F. Central/Support/Baseline/Policy (Circle one)

1. Description: _____

2. Hypothesis being tested: _____

3. Project Goal(s) Addressed: _____

4. Project Implementation Time-Frame: _____

5. Staffing (Including Time Involved):
a. Principal Investigator: _____
b. Co-Worker: _____
c. Co-Worker: _____
d. Co-Worker: _____
e. Co-Worker: _____

1983	1984	1985

6. Approvals/Signatures:

- 1. Principal Investigator: _____ Date: _____
- 2. Co-Investigators: _____ Date: _____
- 3. Station Director: _____ Date: _____
- 4. System Leader: _____ Date: _____
- 5. System Committee Chair: _____ Date: _____
- 6. Project Director: _____ Date: _____

Scientists

Name	Name	Name	etc.
%	%	%	

B. Sedentary System

1. Kadugli

a. Project

(1) Title: _____

(2) Number of Project: _____

(3) Scientist Participation

(a) Principal Investigator

(b) Co-Investigator

2. El Obeid

a. Project

(1) Title: _____

(2) Number of Project: _____

Scientists

	N a m e	N a m e	N a m e	etc.
<p>(3) Scientist Participation</p> <p>(a) Principal Investigator</p> <p>(b) Co-Investigator</p>				
<p>3. El Fasher</p> <p>a. Project</p> <p>(1) Title: _____</p> <p>(2) Number of Project: _____</p> <p>(3) Scientist Participation</p> <p>(a) Principal Investigator</p> <p>(b) Co-Investigator</p>				
<p>4. GG</p> <p>a. Project</p> <p>(1) Title: _____</p>				

Scientists

	N a m e	N a m e	N a m e	etc.
	%	%	%	
(2) Number of Project: _____				
(3) Scientist Participation				
(a) Principal Investigator				
(b) Co-Investigator				
C. Transhumant System				
1. Kadugli				
a. Project				
(1) Title: _____				
(2) Number of Project: _____				
(3) Scientist Participation				
(a) Principal Investigator				
(b) Co-Investigator				
2. El Obeid				
a. Project				
(1) Title: _____				
(2) Number of Project: _____				

(01.1)

Scientists

Name	Name	Name	etc.
%	%	%	

- (3) Scientist Participation
 - (a) Principal Investigator
 - (b) Co-Investigator

3. El Fasher

a. Project

(1) Title: _____

(2) Number of Project: _____

(3) Scientist Participation

(a) Principal Investigator

(b) Co-Investigator

4. GG

a. Project

(1) Title: _____

Scientists

	N a m e	N a m e	N a m e	etc.
(2) Number of Project: _____	%	%	%	
(3) Scientist Participation				
(a) Principal Investigator				
(b) Co-Investigator				
D. Nomadic System				
1. Kadugli				
a. Project				
(1) Title: _____				
(2) Number of Project: _____				
(3) Scientist Participation				
(a) Principal Investigator				
(b) Co-Investigator				

Scientists

	N a m e	N a m e	N a m e	etc.
2. El Obeid	%	%	%	
a. Project				
(1) Title: _____				

(2) Number of Project: _____				
(3) Scientist Participation				
(a) Principal Investigator				
(b) Co-Investigator				
3. El Fasher				
a. Project				
(1) Title: _____				

(2) Number of Project: _____				

Scientists

				Scientists			
				N a m e	N a m e	N a m e	etc.
				%	%	%	
(3) Scientist Participation							
(a) Principal Investigator							
(b) Co-Investigator							
4.	GG						
	a.	Project					
		(1) Title: _____					
		(2) Number of Project: _____					
		(3) Scientist Participation					
		(a) Principal Investigator					
		(b) Co-Investigator					
E.	Other Activities						
	List						
				100%	100%	100%	

D. Proposal Preparation

1. Proposals for specific research should adhere to the goals, approaches, and guidelines given in the previous sections.
2. All proposals must be discussed at the station level as well as involving other scientists both within and without WSARP. The Systems Leader will insure that such discussions have occurred before transmittal of a proposal to the Systems Committee.
3. The format for a proposal will be:
 - a. Name of the Proposal
 - b. Name of Principal Investigator
 - c. Name(s) of Co-Investigator(s)
 - d. Purposes of the Proposed Research
 - (1) Purposes
 - (2) Project Goals being addressed
 - (3) Intervention/Activity to be carried out
 - (4) Hypothesis being tested
 - (5) Expected benefits from research
 - e. Proposed Methods/Procedures

f. Anticipated Results

g. Duration of Research

h. Resources Required

(1) Scientists

(2) Technicians

(3) Support Staff

(4) Vehicles (including distances to be driven)

(5) Laboratory equipment and supplies

(6) Other supplies

i. Signatures

j. Summary Project Sheet

E. Evaluation Criteria

Evaluation criteria applied to each research proposal will include among others:

1. Probability of assisting in realization of project goals.
2. Probability of success in realizing proposed purposes.
3. Whether proposed activity can result in improvement for the target group within the short-term.

4. Whether adequate planning and preparation are evident including participation of other scientists and disciplines.
5. In regard to 4 above, have adequate diagnostic and/or other surveys provided the basis for the proposal.
6. Relation and importance of the proposal to others proposed or ongoing for the system and project as a whole.
7. Prioritization of the proposal compared to others within the system and within the project.
8. Resource availability for conduct of the proposed activities.
9. Will the proposed results maintain or improve environmental resources?

F. Reporting Procedures

Certain reports are required by the donors, ARC, CID and WSU. In addition to these formal reports, it is imperative that the observations and experiences of the scientists be recorded. Therefore, all activities will be incorporated in a proposal, or if a minor activity and time commitment, should have a "Project Summary Sheet" prepared to describe the activity.

1. Annual Reports -- Required in a different format by ARC and donors.
 - a. ARC -- Prepared by each ARC scientist as per ARC regulations.

b. US Staff -- Detailed description of activities to be submitted to WSU through the Deputy Project Director (Chief of Party) by 1 September of each year. These will be incorporated into the Annual Report required by AID and WB. Such reports will include the following:

(1) Title

(2) Principal Investigator

(3) Co-Investigators

(4) Time Period covered

(5) Project Summary Sheet

(6) Brief Summary of Project (Activity), Purposes and Hypothesis being Tested and Anticipated Benefits from the Activity.

(7) Procedures (Activities) carried out.

(8) Results

(9) Conclusions Regarding Hypothesis and Benefits.

(10) Projected Activities for the Forthcoming Year.

2. Quarterly Reports

a. Required by WB and AID.

b. Summarized all activities for quarter.

- c. Includes budgetary expenditures from all sources of funds.
- d. Prepared by Deputy Project Director (COP) except that SE expenditures are the responsibility of Assistant Director, Finance.
- e. Each scientist is required to prepare a quarterly report containing the following information for inclusion.
 - (1) Name of Scientist
 - (2) Projects in which he/she is the Principal Investigator and Co-Investigator.
 - (3) Description of activities and results (general)
 - (4) Time utilization for various activities.
 - (5) Projected activities for next quarter.
 - (6) Problems encountered/needs for next quarter.
- f. Copied by COP to ISU, USAID, WB and ARC.
- g. Project Director circulate as appropriate.

3. Monthly Activity Reports

- a. Each scientist is required to provide a list of activities carried out during the preceeding month.

- b. Each list is sent to the COP, who forwards them to USAID and WSU.

VI. Publication Policy and Procedure for Scientists Working with WSARP.

A. Research Publication in WSARP Research Report Series.

1. The author(s) will prepare and submit copies of the manuscript proposed for publication in WSARP Report Series to the Station Research Committee for review. In the event that the manuscript involves inter-station research, the SRC of such involved station will review.
2. The SRC will refer the manuscript to appropriate scientists on the project or others as may be necessary for review. The purpose of this review should be to obtain critique and suggestions for use by the author(s).
3. The author(s) will incorporate the suggestions of the reviewers, as appropriate, into the manuscript and resubmit the manuscript for approval.
4. Following station approval, the manuscript will be submitted to the Project Director of WSARP for review and approval.
5. After approval by the Project Director, the manuscript is submitted to WSU/CID for additional review and publication as a WSARP Research Report.

B. Research Publication in Professional Peer-reviewed Journals.

Publications in professional journals of research results obtained from the WSARP shall follow the procedures of the ARC and by the journal. In addition, the following WSARP policies shall apply.

1. A copy of the manuscript to be submitted to a professional journal shall be sent simultaneously to the Station Director(s), Project Director of WSARP and Project Coordinator, WSU for review.
2. If the author(s) does not receive specific written response from any of the three administrators within two months, the author(s) may follow the publication procedures of the professional journal.
3. All manuscripts submitted to professional journals shall recognize WSARP and the donors supporting WSARP in a footnote on page one.
4. The senior author will take primary responsibility for following the publication policies and procedures.
5. ARC publication policy will be followed.

(D1.1) 10/24/83

Appendix XI

Budget Summaries prepared in October/November, 1982 (Revised April 1983) and summary estimates prepared October, 1983 are included. These budgets reflect the summaries of expenditures and estimates by category, currency, source and years. As presented here, this appendix should be considered a draft and NOT FINAL. At present we do not have current SE expenditures from the field for incorporation into the expenditures and estimates.

Also details of the estimated yearly expenditures for 1983-84 and 1984-85 will be provided under separate cover.

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SUMMARY OF WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT BUDGET*
 BY AMOUNT, SOURCE AND CURRENCY
 Expressed as (000)

	Expended Thru August, 1982				Total Projected (LOP)			
	USAID		HB	GOS	USAID		HB	GOS
	\$	£ ¹	\$	£ ¹	\$	£ ¹	\$	£ ¹
I. Capital and Technical Assistance Costs								
A. Construction								
1. Kadugli								
a. Contract ²	0	} 262.7	} 2,717.2	} 673.0	0	} 0	2,949.0	983.0
b. Variations	0				614.8	} 262.7	122.0	245.6
Subtotal A,1	0	262.7	2,717.2	673.0	614.8	262.7	3,071.0	1,228.6
2. Other Sites								
a. Basic Tender ³		} 605.8	} 450.2	} 859.2	1,985.5	} 6,150.3	} 8,650.8	} 2,814.5
b. Variation Order #1					321.4			
c. Contingency					576.7			
Subtotal A, 2	605.8	450.2	859.2	250.5	2,883.6	6,150.3	8,650.8	2,814.5
Subtotal A, 1,2	605.8	712.9	3,576.4	923.5	3,498.4	6,413.0	11,721.8	4,043.1
3. Force Account	<u>5.0</u>	<u>498.2</u>	<u>0</u>	<u>0</u>	<u>418.0</u>	<u>1,477.0</u>	<u>0</u>	<u>0</u>
Subtotal A	610.8	1,211.1	3,576.4	923.5	3,916.4	7,890.0	11,721.8	4,043.1

¹ Also given under Local Currency Costs (II below)

² Tender in £ to be paid 60% \$ and 40% £ (Source - Contract documents)

³ Tender £ to be paid 50% \$ and 50% £ (Source - Contract documents)

*Revised October/November, 1982, and partially revised April, 1983.

	Expended Thru August, 1982			Projected (Sept. 82 - Aug. 85)			Totals by Source of Funds			GOS	
	USAID		WB	USAID		WB	USAID		WB		
	\$	L ¹	\$	L ¹	\$	L ¹	\$	L ¹	\$		L ¹
B. Architectural and Engineering											
1. Kerplan (Kadugli)											
a. Design, etc.	299.1	0	0	0	145.9	0	0	0	445.0	0	0
b. Supervision	0	0	0	0	0	0	0	0	0	0	0
Subtotal B, 1	299.1	0	0	0	145.9	0	0	0	445.0	0	0
2. Grube-Zimmer (all Sites except Kadugli)											
a. Design, etc.	1,280.3	0	0	0	1,087.0 ⁴	0	0	0	0	0	0
b. Supervision	0	0	0	0	0	0	0	0	2,367.3 ⁴	0	0
c. Bergman Support	0	0	0	0	45.0 ⁴	0	0	0	0	45.0 ⁴	0
Subtotal B, 2	1,280.3	0	0	0	1,087.0 ⁴	45.0 ⁴	0	0	2,367.3 ⁴	45.0 ⁴	0
Subtotal B	1,579.4	0	0	0	1,232.9	45.0 ⁴	0	0	2,812.3 ⁴	45.0 ⁴	0
C. Technical Assistance											
1. Salaries and Wages (US)	789.2	0	0	0	2,196.7	0	0	0	2,985.9	0	0
2. Consultants	22.7	0	0	0	240.5	0	0	0	263.2	0	0
3. Fringe Benefits (24%)	138.4	0	0	0	584.9	0	0	0	723.3	0	0

⁴ Construction completion projected for August, 1984 (one year extension) so supervision projected August, 1984

	Expended Thru August, 1982				Projected (Sept. 82 - Aug. 85)				Totals by Source of Funds			
	USAID		WB	GOS	USAID		WB	GOS	USAID		WB	GOS
	\$	<u>L¹</u>	\$	<u>L¹</u>	\$	<u>L¹</u>	\$	<u>L¹</u>	\$	<u>L¹</u>	\$	<u>L¹</u>
4. Indirect Costs												
a. WSU and Other	666.1	0	0	0	2,410.3	0	0	0	3,076.4	0	0	0
b. CID	399.6	0	0	0	1,177.8	0	0	0	1,577.4	0	0	0
5. Travel/Transportation	311.3	0	0	0	1,691.7	0	0	0	2,003.0	0	0	0
6. Allowances	346.5	0	0	0	1,429.3	0	0	0	1,775.8	0	0	0
7. Other Direct Costs												
a. T Asst.	216.6	0	0	0	522.1	0	0	0	738.7	0	0	0
b. Fuel Contingency	0	0	0	0	250.0	0	0	0	250.0	0	0	0
8. Equipment Materials and Supplies (Purchased in US)	1,379.2	0	0	0	2,918.0	0	0	0	4,297.2	0	0	0
9. Training/Workshops/etc.	77.5	0	0	0	911.3	0	0	0	988.8	0	0	0
10. Other By Mission	159.4	0	0	0	0	0	0	0	159.4	0	0	0
11. Trust Account (See under II, F below) ⁵	0	73.4	0	0	0	1,270.1	0	0	0	1,343.5	0	0
Subtotal C	4,506.5	73.4	0	0	14,332.6	1,270.1	0	0	18,839.1	1,343.5	0	0
Subtotal B & C	6,085.9	73.4	0	0	15,565.5	1,315.1	0	0	21,651.4	1,388.5	0	0
D. Aircraft												
1. Purchase and Spares	0	0	1,766.9	0	0	0	220.0	0	0	0	1,986.9	0
2. Operations ⁶	0	0	673.1 = 56.2	48.8	0	0	1355.2 = 273.2	236.8	0	0	56428.3 = 329.4	285.6
3. Salaries and Other \$ Costs	0	0	57.1	0	0	0	368.0	0	0	0	425.1	0
Subtotal D	0	0	1,880.2	48.8 ⁶	0	0	861.2	236.8	0	0	2,741.4	285.6

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⁵ Technical assistance costs paid locally in SL from PL-480 funds

⁶ SL operational costs for aircraft to be funded 60% by WB and 40% by GOS

	Expended Thru August, 1982				Projected (Sept. 82 - Aug. 85)				Totals by Source of Funds			
	USAID		WB	GOS	USAID		WB	GOS	USAID		WB	GOS
	\$	£	£	£	\$	£	£	£	\$	£	£	£
II. Local Currency Costs ⁹												
A. Construction - See under Construction (Includes Force Account, See I, A above)												
B. Architectural and Engineering	-	721.9	0	923.5	-	7,168.1	0	4,043.1	-	7,890.3	0	4,043.1
		0	0	0		45.0	0	0		45.7	0	0
C. Salaries												
1. 70% Sudanese Salaries	0	487.4	0	0	0	2,424.0	0	0	0	2,911.4	0	0
2. 30% Sudanese Salaries	0	0	0	208.0	0	0	0	1,039.0	0	0	0	1,247.0
D. Operations												
1. El Ubeid	0		0		0	613.2	0	0			0	
2. Karkigili	0		0		0	566.8	0	0			0	
3. Ghazala Gawazat	0	1,010.7	0	23.8	0	547.2	0	0		3,842.5	0	29.8
4. El Fasher	0		0		0	354.7	0	0			0	
5. Khartoum	0		0		0	739.9	0	0			0	
Subtotal D	0	1,010.7	0	29.8	0	2,831.8	0	0		3,842.5	0	29.8
E. Aircraft Operations	0	0	73.1	48.8	0	0	355.2	236.8	0	0	428.3	285.6
F. Fuel (Vehicles, tractors, lorries, generators, -- excludes aircraft)	0	7	0	- 7	0	610.0	0	0	0	610.0 ⁸	0	0
G. Trust Account (Technical Assistance - See I, B above)	0	73.4	0	0	0	1,270.1	0	0	0	1,343.5	0	0
H. Furniture and Equipment (Lab, Office, Farm, etc. -- Purchased in Sudan)	0	95.6	0	0	0	425.0	0	0	0	520.6	0	0
Subtotal II	0	2,389.0	73.1	1,210.1	0	13,385.2	355.2	5,318.9	0	15,774.2	428.3	5,605.4

⁷ Included in D above

⁸ Part included in D above

⁹ Note that items in II herein in A, B, E, and G are repeated from I above to provide an overall view of SL expenditures for all categories. Therefore, only items C, D, F, and H are new costs not previously presented under I above.

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III. Summary	Expended Thru August, 1962			GOS-	Projected (Sept 62 - Aug. 65)				Totals by Source of Funds				GRAND TOTALS	
	USAID		WB		USAID	WB		GOS	USAID	WB		GOS		
	\$	L	\$	L	\$	L	\$	L	\$	L	\$	L	\$	L
A. Construction	610.0	1,211.1	3,576.4	923.8	3,305.6	6,678.0	8,148.4	3,119.6	3,916.4	7,890.0	11,721.0	4,043.1	15,638.2	11,933.1
B. Technical Assistance														
1. Architectural and Engineering	1,579.4	0	0	0	1,232.9	45.0	0	0	2,812.3	45.0	0	0	2,812.3	45.0
2. Technical Assistance	4,506.5	73.4	0	0	14,332.6	1,270.1	0	0	18,839.1	1,343.5	0	0	18,839.1	1,343.5
Subtotal B	6,085.9	73.4	0	0	15,565.5	1,315.1	0	0	21,651.4	1,348.5	0	0	21,651.4	1,343.5
C. Aircraft														
1. Purchase and Spares	0	0	1,766.9	0	0	0	220.0	0	0	0	1,986.9	0	1,986.9	0
2. Salaries (\$)	0	0	57.1	0	0	0	368.0	0	0	0	425.1	0	425.1	0
Subtotal C	0	0	1,824.0	0	0	0	588.0	0	0	0	2,412.0	0	2,412.0	0
D. Local Currency Costs														
1. Furniture and Equipment (Local Purchase)	0	95.6	0	0	0	425.0	0	0	0	520.6	0	0	0	520.6
2. Salaries and Operations (Except Aircraft)	0	1,498.1	0	237.8	0	8,865.8	0	1,039.0	0	7,363.9	0	1,276.8	0	8,641.7
3. Aircraft Operations (60% WB and 40% GOS)	0	0	56.2	48.8	0	0	273.2	236.8	0	0	329.4	285.6	329.4	255.6
Subtotal D	0	1,593.7	56.2	286.6	0	6,290.8	273.2	1,275.8	0	7,884.5	329.4	1,562.4	329.4	9,445.9
GRAND TOTALS	6,696.7	2,878.2	5,456.6	1,210.1	10,871.1	14,284.8	8,868.6	4,395.4	25,647.8	17,163.0	14,463.2	5,605.5	40,031.0	22,768.5

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Summary of
Revised Staff Projections as Person Years for Years 4, 5, 6 (1982-1985)

November, 1982

	<u>Khartoum</u>				<u>Kadugli</u>				<u>El Obeid</u>				<u>El Fasher</u>				<u>GG</u>				<u>Totals by Years</u>			
	4	5	6	T ¹	4	5	6	T	4	5	6	T	4	5	6	T	4	5	6	T	4	5	6	T
Senior Staff																								
1. Administration	7	7	3	17	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	7	7	7	21
2. Scientists	0	0	0	0	6	6	10	22	4	4	16	24	0	0	5	5	0	2	8	10	10	12	39	61
Middle Staff																								
1. Technicians																								
a. Senior	2	2	1	5	10	10	10	30	6	7	18	31	3	3	5	11	3	4	8	15	24	26	42	92
b. Junior	1	1	1	3	10	10	10	30	5	6	18	29	3	3	5	11	3	4	8	15	22	24	42	88
2. Assistant Scientists	(See totals)																				13	13	9	35
3. Administration/Support	3	4	2	9	11	11	11	33	5	7	8	20	2	8	8	18	0	4	5	9	21	34	34	89
4. Liaison Officers	0	0	1	1	1	3	3	7	1	2	3	6	0	0	3	3	0	0	3	3	2	5	13	20
Laborers (Includes administrative and support staff)	23	25	20	68	115	115	115	345	81	99	150	330	7	47	47	101	40	59	83	182	266	345	415	1026

Expressed as Person Years

	1982-83 ²			1983-84			1984-85			Total
	P/Y	Rate	Amount	P/Y	Rate	Amount	P/Y	Rate	Amount	
D. Summary										
1. Senior Staff										
a. Administration	7	6,000	42,000	7	6,900	48,300	7	7,935	55,545	145,845
b. Scientists	10	6,000	60,000	12	6,900	82,800	33	7,935	261,855	404,655
2. Middle Staff										
a. Assistant Scientists	13	2,000	26,000	13	2,300	29,900	9	2,645	23,805	79,705
b. Technicians										
(1) Senior	21	3,000	63,000	26	3,450	89,700	42	3,968	166,656	319,356
(2) Junior	22	1,500	33,000	24	1,725	41,400	42	1,984	83,328	157,728
c. Administration/Support	22	1,500	33,000	34	1,725	58,650	34	1,984	67,456	159,106
d. Liaison Specialists	2	2,000	4,000	5	2,300	11,500	13	2,645	34,385	49,885
3. Laborers	266	1,200	319,200	345	1,380	476,100	415	1,587	658,605	<u>1,453,905</u>
4. Daily Paid			Figured in Station Operating Budgets							
5. Totals			580,200			838,350			1,351,635	2,770,185
6. Incentive (25%)			145,050			209,588			337,909	692,547
7. Grand Total			725,250			1,047,938			1,689,544	3,462,732

² 82-83 at current levels; 83-84 and 84-85 figured at 15% increase per annum

**SUMMARY OF WESTERN SUDAN AGRICULTURAL RESEARCH PROJECT BUDGET
BY AMOUNT, SOURCE AND CURRENCY (Revised October, 1983)
Expressed in (000)**

	Expended Thru August, 1983				Total Projected (LOP - August, 1985)			
	\$	USAID £1	WB \$	GOS £1	\$	USAID £1	WB \$	GOS £1
I. Capital and Technical Assistance Costs								
A. Construction								
1. Kadugli								
a. Contract ²	0				0	0	2,949.0	983.0
b. Variations	0	} 262.7	} 2,717.2	} 732.6	614.8	262.7	122.0	245.6
Subtotal A,1	0	262.7	2,717.2	732.6	614.8	262.7	3,071.0	1,228.6
2. Other Sites								
a. Basic Tender ³					1,365.5		5,956.5	
b. Variation Order #1	} 605.8	} 450.2	} 859.2	} 407.6	321.4	} 6,150.3	964.1	} 2,814.5 ⁵
c. Contingency					576.7		1,730.2	
d. Devaluation ⁴						} 4,000.4 ⁴		
Subtotal A,2	605.8	450.2	859.2	407.6	2,883.6 ⁶	10,150.3	8,650.8 ⁶	2,814.5 ⁵
Subtotal A,1, 2	605.8	712.9	3,576.4	1,140.2	3,498.4	10,413.0	11,721.8	4,043.1 ⁵
3. Force Account								
a. Estimates	5.0	580.0 [*]	0	0	418.0	1,477.0	0	0
b. Devaluation	0	0	0	0	0	1,000.0	0	0
Subtotal 3	5.0	580.0	0	0	418.0	2,477.0 ⁵	0	0.0 ⁵
Subtotal A	610.8	1,292.2	3,576.4	1,140.2	3,916.4	12,890.0 ⁵	11,721.8	4,043.1 ⁵

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	Expended Thru August, 1983				Projected (Sept. 83 - Aug. 85)				Totals by Source of Funds				
	USAID		WB	GOS	USAID		WB	GOS	USAID		WB	GOS	
	\$	£ ¹	\$	£ ¹	\$	£ ¹	\$	£ ¹	\$	£ ¹	\$	£ ¹	
B. Architectural and Engineering													
1. Karpfen (Kadugli)													
a. Design, Etc.	} 299.1	0	0	0	} 0	0	0	0	0	445.0	0	0	
b. Supervision		0	0	0		0	0	0	0	0	0	0	
Subtotal B,1	299.1	0	0	0	0	0	0	0	445.0	0	0	0	
2. Grube-Zimmer (all sites except Kadugli)													
a. Design, etc.	} 2306.6	0	0	0	} 639.4	0	0	0	0	0	0	0	
b. Supervision		0	0	0		0	0	0	0	2946.0	0	0	0
c. Bergman Support		0	0	0		80.0 ⁷	0	0	0	2946.0	80.0 ⁷	0	0
Subtotal B, 2	2306.6	0	0	0	639.4	80.0 ⁷	0	0	2946.0	80.0 ⁷	0	0	
Subtotal B	2605.7	0	0	0	639.4	80.0 ⁷	0	0	3391.0	80.0 ⁷	0	0	
C. Technical Assistance													
1. Salaries and Wages (US)	1283.8	0	0	0	1413.2	0	0	0	2697.0	0	0	0	
2. Consultants	29.4	0	0	0	196.0	0	0	0	225.4	0	0	0	
3. Fringe Benefits (24%)	225.9	0	0	0	339.2	0	0	0	565.1	0	0	0	
4. Indirect Costs													
a. WSU and Other	980.8	0	0	0	1698.6	0	0	0	2679.4	0	0	0	
b. CID	553.3	0	0	0	577.0	0	0	0	1130.3	0	0	0	
5. Travel/Transportation	383.8	0	0	0	1118.7	0	0	0	1502.5	0	0	0	
6. Allowances	481.9	0	0	0	1031.8	0	0	0	1513.7	0	0	0	
7. Other Direct Costs													
a. T. Asst.	290.2	0	0	0	315.5	0	0	0	605.7	0	0	0	
b. Fuel Contingency	0	0	0	0	200.0	0	0	0	200.0	0	0	0	
8. Equipment Materials and Supplies (Purchased in US)	1632.7	0	0	0	3225.4 ⁸	0	0	0	4858.1	0	0	0	

	Expended Thru August, 1983				Projected (Sept. 83 - Aug. 85)				Totals by Source of Funds			
	USAID		WB	GOS	USAID		WB	GOS	USAID		WB	GOS
	\$	£ ¹	\$	£ ¹	\$	£ ¹	\$	£ ¹	\$	£ ¹	\$	£ ¹
9. Training/Workshops/etc.	135.7	0	0	0	700.0 ⁹	0	0	0	835.7	0	0	0
10. Other By Mission	159.4	0	0	0	0	0	0	0	159.4	0	0	0
11. Trust Account (See under II, F, below) ¹⁰	0	273.7 ¹¹	0	0	0	1085.6	0	0	0	1359.3	0	0
Subtotals C	5997.5	273.7 ¹¹	0	0	10815.4	1085.6	0	0	16812.9	1359.3	0	0
Subtotals B & C	8603.2	273.7	0	0	11454.8	1165.6	0	0	20203.9	1442.9	0	0
D. Aircraft												
1. Purchase and Spares	0	0	2083.0	0	0	0	150.0 ⁹	0	0	0	2233.0	0
2. Operations ¹²	0	0	90.0	58.8	0	0	250.0 ⁹	226.8	0	0	340.0	285.6
3. Salaries and Other \$ Costs	0	0	125.0 ⁹	0	0	0	300.0 ⁹	0	0	0	425.0	0
Subtotal D	0	0	2298.0	58.8 ¹²	0	0	700.0	226.8	0	0	2998.0	285.6
II. Local Currency Costs¹¹												
A. Construction - See under Construction (Includes Force Account, See I, A above)												
	-	1292.2	0	1140.2	-	11597.8	0	2902.9	-	12890.0 ¹⁴	0	4043.1
B. Architectural and Engineering												
	-	45.0	0	0	-	80.0	0	0	-	125.0	0	0
C. Salaries												
1. 70% Sudanese Salaries	0	578.1 ¹⁵	0	0	0	1916.2	0	0	0	2494.3	0	0
2. 30% Sudanese Salaries	0	0	0	246.7 ¹⁵	0	0	0	821.2	0	0	0	1067.9
D. Operations												
	-	1364.1 ¹⁵	0	48.0 ¹⁵	-	2326.8 ¹⁵	0	0	-	3690.9	0	48.0
E. Aircraft Operations												
	0	0	180.0	58.8	0	0	345.2	226.8	0	0	525.2	285.6
F. Fuel (Vehicles, tractors, lorries, generators, -- excludes aircraft)												
	0	13	0	13	0	450.0 ⁹	0	0	0	450.0 ⁹	0	0
G. Trust Account (Technical Assistance - See I, B above)												
	0	273.7	0	0	0	1085.6	0	0	0	1359.3	0	0

	Expended Thru August, 1983				Projected (Sept. 83 - Aug. 85)				Totals by Source of Funds				GRAND TOTALS	
	USAID		WB	GOS	USAID		WB	GOS	USAID		WB	GOS	\$	£
	\$	£ ¹	\$	£ ¹	\$	£ ¹	\$	£ ¹	\$	£ ¹	\$	£ ¹		
H. Furniture and Equipment (Lab, Office, Farm, etc. -- Purchased in Sudan)	0	95.6	0	0	0	425.0	0	0	0	520.6	0	0		
Subtotal II	0	3648.7	180.0	1493.7	0	17881.4	345.2	3950.9	0	25372.6	525.2	5444.6		
III. Summary														
A. Construction	610.8	1298.2	3576.4	923.5	3305.6	6678.9	8145.4	3119.6	3916.4	12890.0	11721.8	4043.1	15638.2	16933.1
B. Technical Assistance														
1. Architectural and Engineering	2306.6	49.0	0	0	639.4	80.0	0	0	2946.0	125.0	0	0	2946.0	125.0
2. Technical Assistance	5997.5	300.0 ⁹	0	0	10815.4	1085.6	0	0	16812.9	1385.6	0	0	16812.9	1385.6
Subtotal B	8304.1	349.0	0	0	11454.8	1165.6	0	0	19758.9	1514.6	0	0	19758.9	1510.6
C. Aircraft														
1. Purchase and Spares	0	0	2083.0	0	0	0	150.0	0	0	0	2233.0	0	2233.0	0
2. Salaries (\$)	0	0	125.0	0	0	0	360.0	0	0	0	425.0	0	425.0	0
Subtotal C	0	0	2208.0	0	0	0	450.0	0	0	0	2658.0	0	2658.0	0
D. Local Currency Costs														
1. Furniture and Equipment (Local Purchase)	0	95.6	0	0	0	425.0	0	0	0	520.6	0	0	0	520.5
2. Salaries and Operations (Except Aircraft)	0	1942.2	0	294.7	0	4693.3	0	821.2	0	6635.5	0	1115.9	0	7751.4
3. Aircraft Operations (60% WB and 40% GOS)	0	0	90.0	58.8	0	0	250.0	226.8	0	0	340.0	285.6	340.0	285.6
Subtotal D	0	2037.8	90.0	353.5	0	5118.3	250.0	1048.0	0	7156.1	340.0	1461.5	340.0	8271.9
GRAND TOTALS	8914.9	3685.0	5874.4	1277.0	14760.4	12962.8	8845.4	4167.6	23675.3	21560.7	14719.8	5504.6	38395.0	26715.6

- 1 Also given under Local Currency Costs (II below)
- 2 Tender in £ to be paid 60% \$ and 40% £ (Source - Contract documents)
- 3 Tender £ to be paid 50% \$ and 50% £ (Source - Contract documents)
- 4 Devaluation estimates prepared by J. Grube and G. Owens - May 1983
- 5 Amount of S£ impact and whether specific matching formula unknown, based upon World Bank - GDS agreement
- 6 Based upon distribution of costs prepared by J. Grube, May, 1981
- 7 Construction completed projected for August, 1984 (one year extension so supervision projected August, 1984)
- 8 Includes research, shop maintenance, operations equipment, vehicles, spares, shipping, etc. Also included, but not previously included are 15 additional pickups with spares and shipping
- 9 Estimates, only, at this time. More complete figures being developed
- 10 Technical Assistance costs paid locally in S£ from PL-480 funds
- 11 Note that items in II herein A, B, E, and G are repeated from I above to provide an overall view of S£ expenditures for all categories. Therefore, only items C, D, F, and H are new costs not previously presented under I above
- 12 S£ operational costs for aircraft to be funded 60% by WB and 40% by GDS
- 13 Included in D above
- 14 Based upon devaluation of S£
- 15 Figures current through March 1983, only