

University of Arizona  
Consortium for International Development  
Agronomic Research II (628-0605)  
625  
OMVS/USAID Senegal River Basin Agronomic Research Project

Phase I Project Design

Final Report  
Period Covered  
1 May 1979 to 31 May 1981

TABLE OF CONTENTS

	Page
1. Introduction . . . . .	1
1.1 The Senegal River Basin . . . . .	1
1.2 Agricultural Research in the SRB . . . . .	2
1.3 Agronomic Research I . . . . .	3
1.4 Agronomic Research II (AR II) . . . . .	4
2. The Project Paper . . . . .	5
2.1 Project Description . . . . .	6
2.2 Project Specific Analysis . . . . .	9
2.2.1 Technical Analysis . . . . .	9
2.2.2 Economic Analysis . . . . .	11
2.2.3 Social Soundness . . . . .	12
2.2.4 Environmental Analysis . . . . .	13
2.2.5 Administrative Analysis . . . . .	14
2.2.6 Financial Analysis . . . . .	15
3. Project Activities . . . . .	16
4. Leader Study Tour . . . . .	20
5. Documents . . . . .	22
5.1 Status Report . . . . .	22
5.2 Project Paper Amendment, Agronomic Research II (625-0605) for the Senegal River Basin . . . . .	22
5.3 Report of C1D/OMVS Study Tour of Western United States . .	22
5.4 Nine Quarterly Reports on OMVS/USAID Senegal River Basin Agronomic Research Project by Consortium for International Development, University of Arizona . . . . .	22
5.5 Trip Reports . . . . .	23
5.6 A Final Report on Phase I, AR II will be Submitted Before July 31, 1981 as Required . . . . .	23
6. Comparison of Contract Requirements and Accomplishments . . . .	24
6.1 Aspects of Contract that were Fulfilled . . . . .	24
6.1.1 A Work Plan . . . . .	24
6.1.2 The Primary Objective . . . . .	24
6.1.3 Expenditures . . . . .	24

TABLE OF CONTENTS--Continued

	Page
6.2 Differences Between Contract Guidelines and Actual	
Activities . . . . .	25
6.2.1 Personnel . . . . .	25
6.2.2 Schedule . . . . .	26
7. Problems Encountered . . . . .	27
7.1 Personnel . . . . .	27
7.2 Scheduling . . . . .	28
7.3 Administration . . . . .	29
7.4 General Problems . . . . .	30
8. Recommendations . . . . .	31
9. Appendices . . . . .	32
9.1 Project Paper Table of Contents . . . . .	32
9.2 CID AR II Phase I Team . . . . .	38
9.3 Proposed Phase II Budget . . . . .	39
9.3.1 Personnel (CID Team) . . . . .	39
9.3.2 Rental Housing . . . . .	39
9.3.3 Training . . . . .	40
9.3.4 Local Operating Costs . . . . .	40
9.3.5 Construction and Facilities Development Costs . .	40
9.3.6 Equipment Costs . . . . .	41
9.3.7 Summary of Estimated Costs (1000's of \$) . . . . .	41

## 1. Introduction

This final report summarizes the activities and accomplishments of the first phase of Agronomic Research II (625-0605). The primary goal of this phase has been the design of a regional agronomic research program for the Senegal River Basin. This phase has been completed by the Consortium for International Development (CID) under contract to the United States Agency for International Development (AID).

### 1.1 The Senegal River Basin

The Senegal River Basin includes parts of Mali, Mauritania, Senegal, and Guinea. Several efforts have been made since independence to coordinate research and development of the region. In 1972 the Senegal River Development Organization (OMVS) was formed by Mali, Mauritania, and Senegal.

As used in this report, the term Senegal River Basin (SRB) means the area close to the Senegal River in Mali, Mauritania, and Senegal. Despite the aridity of much of the area, the river basin has been identified as a major area for agricultural development in all three countries with the increased use of irrigation. Ongoing irrigation projects, as well as the planned construction of two dams by OMVS, point to the potential for increasing the productivity of the region.

A majority of the inhabitants of the SRB are subsistence farmers whose agricultural production is limited by environmental constraints such as poor soils and uncertain water supplies. Drought conditions in the last twenty years have contributed significantly to the problem of inadequate food production. This deficit must be overcome at the national level by imports. Many farm families in the SRB supplement annual production by purchasing food on the market using income from migratory wage labor. Plans for agricultural development must contend with present conditions of declining production per capita and rapidly increasing populations.

## 1.2 Agricultural Research in the SRB

Agricultural research in the river basin began in the early 1800s with the establishment of an experimental garden at Richard Toll, Senegal. Three stations, one each in Mali (Sanié), Mauritania (Kaédi), and Senegal (Guedi) became the focus of regional cooperation in agricultural research. This cooperation is presently coordinated by OMVS. A station at Fanaye is being developed to replace Guedi as the major location of OMVS research in Senegal. From 1970 to 1976 the Food and Agriculture Organization and the United Nations Development Program (FAO/UNDP) were responsible for research at the three stations under the direction of a previous regional organization. While much useful data were collected, very little was accomplished toward applying research findings to regional development.

### 1.3 Agronomic Research I

At the request of OMVS and FAO/UNDP, funds were granted in 1975 by USAID to sustain the three research centers. This three-year project, entitled Agronomic Research I (625-0616), while allowing the continuation of the research stations, did not result in a comprehensive plan either for research or for development.

#### 1.4 Agronomic Research II (AR II)

As a result, the OMVS member states requested the assistance of AID in designing a large-scale research plan for the improvement of the region's agriculture. AID prepared a Project Paper (PP) in 1978 using input from a design team that included three CID representatives. AID/Washington (AID/W) judged the proposed project to be worthwhile but felt that the PP needed improvement and more detail. CID was selected to write a PP amendment as part of Phase I of Agronomic Research II (625-0605). Phase I was originally to have included construction of facilities at the three stations, with research beginning in Phase II. Construction was subsequently moved to Phase II. The activities of Phase I, which emphasized research for and preparation of the Project Paper, are summarized in Section 3.

The Project Paper amendment provides a comprehensive plan for agricultural research focused on small-scale farming systems in community settings. Phase II, as outlined in the PP, would entail about \$13 million in AID grant assistance and about \$3 million in Title III funds over six years (FY 82 through FY 87). These funds would provide support in five categories: 1) technical assistance in the form of a team of agricultural scientists, project administrators, and staff as well as short-term scientists (\$5,740,000); 2) construction and facilities development, including field site preparation and construction of laboratories, office space, and staff housing (\$6,722,000); 3) equipment (\$743,000); 4) training (\$622,000); 5) local operating costs (\$1,700,000); and 6) temporary housing rental (\$500,000). A summary version of the budget plan is included in Section 9.3.

## 2. The Project Paper

The purpose of a Project Paper is to provide the USAID mission and AID/W with a detailed description of the project that can serve as the basis for implementation.

The PP amendment proposes a comprehensive program of research and development over a six year period. The CID design team has taken a unique approach aimed at integrating different forms of expertise, research, and applied programs. Basic research on crops and irrigation is not enough. It must be augmented by research on the social and economic system of the region. Developing new agricultural techniques and technologies is not enough. Research and administrative personnel must be trained, and the farmers themselves involved, to ensure long term benefits.

The PP is organized into three sections. Part I is a description of the project. Previous research in the SRB and its limitations are contrasted to the proposed approach of this project. The goal and purpose of AR II are presented in terms of specific outputs (research, human, physical, and institutional resources). The proposed research plan, including necessary research, training, construction, equipment, and the nature of the management of the project are outlined. The costs of these activities as well as an implementation schedule are described.

In Part II, specific analyses carried out to develop the design are described in detail. A technical analysis reviews the basic methodology of the project. It also outlines construction and facilities development. Details of the training program are provided.

The economic analysis provides background material on the agricultural problems of SRB. Previous development projects are reviewed and contrasted to the anticipated economic returns to this project. An analysis of the feasibility and economic effects of each form of research planned in AR II is provided.

An analysis of the social soundness of this project is based on a detailed description of the existing social structure and organization of the SRB. The relevance of these data to development plans is demonstrated.

An administrative analysis outlines the role of various agencies in the project. A financial analysis examines the effects of financial inputs and outlines planned modes of disbursement. Finally, an environmental

analysis describes the SRB, including the nature of soils and the availability of water.

Part III of the Project Paper is a series of appendices. Included are job descriptions, lists of relevant agencies, official documents, and Phase I personnel.

The detailed Table of Contents from the amended PP is in Section 9.1.

## 2.1 Project Description

The primary goal of Phase II will be to contribute to regional economic development through increased agricultural production. In social terms, the goal is to improve the quality of life for the farmers of the SRB. The purpose of the research and development of Phase II is, more specifically, to increase the efficiency of land utilization, labor, and other inputs. Working within a regional plan for increasing the use of irrigated agriculture, this project emphasizes the development of small-scale irrigation projects grounded in existing agricultural systems.

The Project Paper thus places primary emphasis on small-scale, locally managed development programs. Many agricultural projects have suffered from a lack of awareness and thus inclusion of farmers' existing knowledge and technology. The development of appropriate technology and the use of existing organization of labor and production starting at the level of the average small farm family hold better promise for the achievement of real, sustained development. The use of a multi-disciplinary research team will help integrate agricultural, social, and economic factors influencing productivity into development and research plans. The involvement and training of producers themselves will not only increase the chances of success, but will also establish the base from which to evaluate such plans.

The proposed research builds on the results of previous work done in the SRB, including the efforts of Agronomic Research I, FAO/UNDP projects as well as other national and international research projects. It also builds on the farmers' changing needs and capabilities. The continual involvement of farmers in research in their own fields will help maintain the focus of this project on appropriate, small-scale technology and minor modifications in farming strategies. Six types of research are planned, each directed at different parts of the physical and social environment.

On-Farm Research will begin as soon as possible. The purpose of On-Farm Research is to learn more about local farming systems and farmers' needs, and to find ways of assisting farmers to increase yields with only minor modifications in current farming systems. Three or four farmers in communities near the research stations will be chosen. Selection criteria will include not only soil and water characteristics but also social and cultural representativeness. Testing of crops and small-scale irrigation systems will be integrated into the farmers' existing agricultural cycle and strategies. Research will emphasize the social and economic context of agricultural production since this is considered crucial for the successful development of technological innovations.

The next level of research, termed Applied Research, will be initiated soon afterwards (30% of resources). The purpose of Applied Research will be to test promising results from On-Farm projects and previous research under the controlled setting of the three research stations. Field sites will simulate as closely as possible the conditions of local farms. Testing of crop varieties and rotation will not only provide data which can be disseminated to the farmer through field days and seminars but will train project technicians and field personnel in research methods.

Community and Regional Research will be initiated immediately and will continue throughout the duration of the project (15% of resources). Its general purpose is to gather baseline information on social, demographic, political and environmental conditions of the local communities and the SRB as a whole. This information will not only be relevant to the other types of research proposed for AR II, but will contribute to future project evaluation. Community and Regional Research will be conducted primarily in communities neighboring the research stations. Committees of farm families will be developed from the existing sociopolitical structure in each community selected for On-Farm research to serve as the main point of contact with the CID team.

The importance of communication between research and development agencies and projects is acknowledged as Supporting Research (15% of

resources). The primary focus will be to assist other agencies in assessing and solving the problems of establishing small-scale irrigation projects in the SRB. It is anticipated that this form of research will be initiated one year after the CID team is in place.

Fundamental Research (5% of resources) will aim at accumulating basic information on plants and environmental conditions. Innovative Research (10% of resources) will evaluate such technologies as new forms of equipment and construction methods, some of which have been developed elsewhere, which would involve too high a risk if evaluated in the On-Farm program. Both of these forms of research will be conducted at the research stations and will be initiated in the third year of the project.

An eight-person research team is proposed. Recommendations for the type of scientists and administrative personnel needed at project headquarters and in the U. S. during Phase II are in the PP amendment. Included in long-term research are three agronomists, an agricultural economist, an agricultural engineer, and a social scientist. Short-term specialists ranging from agricultural education specialists to veterinarians will be incorporated as needed. Working with and training of counterpart personnel are emphasized throughout the project. Close interaction of CID and OMVS officials is planned. The establishment of on-going research capabilities within OMVS will be developed through the training of both scientist and administrative counterpart personnel.

The implementation of the research and training outlined above will depend on the physical development of the three research stations. Some existing facilities will be remodeled and additional living, laboratory and office space will be constructed. Preparation of field research areas including irrigation and drainage facilities is planned. The purchase of farming equipment will emphasize low cost and maintenance and local availability. Existing equipment will be used when appropriate.

## 2.2 Project Specific Analysis

In keeping with the basic orientation of this project, the existing social and economic conditions and the projected impacts of technical, administrative and financial inputs are evaluated in terms of the farmers themselves. For although the primary impact of this project is institutional, the ultimate beneficiaries are the farmers of the SRB. A focus on research where results will be technically, economically and socially amenable to combining with existing farming systems, requires detailed knowledge of these systems. Responsiveness to local conditions is planned from the outset, and will be incorporated into frequent evaluations. Cooperation with other development activities to avoid duplication of effort and to share research information on crops will also enhance the responsiveness of this project.

2.2.1 Technical Analysis. The existing farming system incorporates three basic types of agriculture: rainfed, flood recession, and irrigation. Individual families commonly use more than one strategy depending on the availability of different types of land, the labor supply, and rainfall and flooding conditions. Soil types, crops and peak labor demands differ for the three systems.

The SRB is typically subdivided into three regions: the Delta, the Middle Valley and the Upper Valley. Although alluvial deposits occur along the entire basin, the proportions of flood plain and upland areas as well as the slope of fields differ significantly along the 1800 kilometers of the river. The design of irrigation systems, especially small-scale projects, therefore must be finely tuned to local conditions.

Irrigation in the SRB exists at several different levels, from small-scale village to large-scale commercial projects. Small-scale projects are carried out on lands of 10-25 ha. which are close to the village and a surface water source. They are worked by the farmers themselves and require little machinery. In the past, land preparation commonly has been done by development agencies. These projects have been thought by developers to be a means of transition for the farmers between traditional agriculture and larger-scale irrigation. The AR II research will emphasize the productive potential of improved small-scale projects. Problems with augmenting the some 1,100 ha. now under small systems

operation include the increased involvement of farmers in design, construction and operation of the projects, as well as further research on crops, soils and water management.

A significant amount of basic research on crops has been undertaken in the SRB. The productivity estimates of various existing and experimental varieties of cultivars can be a starting point in the On-Farm and field station projects. Small scale irrigation equipment developed by other projects will also be introduced and tested under local conditions. The provision of adequate laboratory, shop, storage and field facilities at the three research stations is essential to the implementation and maintenance of the research objectives.

Plans for the development of the research stations also include adequate housing for the project personnel. The proposed research program calls for an 8-person CID team with 14 counterpart trainees, 63 person-months of technical backstopping, and other administrative and support personnel. The design of residential and other structures has been made with careful consideration of climate, local building materials, and low cost maintenance. The use of passive cooling, including proper orientation to the winds, the creation of shade, evaporative cooling, and wind towers, make an energy efficient system of low cost and minimal maintenance. A detailed description of the three research stations (Fanaye, Kaedi, Samé) is included in the PP, with designs for necessary renovations and construction. Estimated costs for these projects and the purchase of agricultural equipment are outlined.

Included in the plans for Phase II is a comprehensive plan for the recruitment and training of necessary personnel. The lack of trained administrative and research personnel in the member states is a serious handicap to sustained development. In response to this scarcity of qualified personnel, AR II plans include on-the-job and classroom training for counterparts.

Training for administrators and accountants will continue throughout the project. The recruitment and training of research staff will operate at three levels. Counterpart trainees at the BS level will be recruited and will work for one to two years directly with a CID team member. They will then spend two years at a CID institution studying for advanced degrees.

Research for these degrees will be undertaken at the research stations under the supervision of project scientists.

A total of 12 research assistants will be recruited in the SRB and trained on-the-job and at an institute in a Francophone third country. Nine field assistants also will be chosen and trained for one year at a local school.

Seminars and workshops, visits to the other research stations, and extension materials will provide additional training for the recruits.

2.2.2 Economic Analysis. Existing agricultural production falls below the desired levels in all three countries. With the construction of two dams to control river flow and decrease salinization, the OMVS has charted a long-term program for agricultural development. Their comprehensive plan aims eventually at large-scale irrigation projects along with the improvement of transportation facilities, reforestation, and development of hydro-electric power. The OMVS emphasizes that although the larger irrigation projects have not been as successful as the small projects, they hold better promise to meet long-term agricultural production goals. But large-scale irrigation projects require, as a minimum, a pool of farmers experienced in the techniques and organizational skills of irrigated agriculture. The AR II research thus places primary emphasis on the development of small locally-managed projects in which the farm family itself is directly involved.

A combination of factors have conspired to keep productivity low in the SRB. Environmental constraints, the scarcity of good lands, labor shortages, and timing demands of a mixed cropping system are all problems that can be addressed at the local level. For example, research into increasing the productivity of marginal upland fields may alleviate the problems of land shortage. Outreach programs designed to involve women in development schemes and labor-saving techniques may alleviate labor shortage problems. Only through a combination of research strategies and inputs, not limited to actual production, can long-term solutions be developed.

The expansion of irrigated agriculture brings its own problems. Ideally with an assured water supply, farmers can maintain larger, less variable harvests of a greater variety of crops. Nonetheless, such

necessities as greater labor requirements and more external inputs including fertilizers and pesticides as well as the risks of a breakdown in water supply may limit the success of augmenting irrigation. Smaller projects, adapted to farmers' existing land, labor and capital constraints can minimize the risk and maximize farmers' participation. The farming systems approach, which combines technical and human elements, is aimed at making agricultural development feasible and profitable to the individual farmer.

Results of the research will reach a large population by building on the traditional agricultural system. The use of wells as sources of irrigation in the uplands, presently neglected in farming research, will allow easy extension of irrigated farming to these areas. The use of animal-powered water lifting devices and animal traction will allow further extension of irrigated plots. Such research and its application can be demonstrated to the farmers themselves, allowing their involvement, training and inputs.

The AR II research program thus is based on available knowledge of the SRB, as well as OMVS and national development goals. The long run effect of numerous productive small projects will be greater total production than a smaller number of inefficient larger units. This bottom-up approach thus places the hope for development in an outgrowth of the existing system.

2.2.3 Social Soundness. Only with an understanding of the social context of agricultural production in the SRB, can the social impact of research be positive. Three assumptions derive from this systemic approach: 1) that existing farming systems should be considered a resource to build upon, 2) that innovations should be directed at the household and community level, and 3) that benefits should accrue to all segments of society equitably. Each assumption requires a good understanding of population distribution, ethnic group differences, caste and household structures, population dynamics and political organization. Too often development programs have favored a small group of large land holders, whereas AR II research focuses on improvements that can be adopted by the majority of small-scale farmers.

The major demographic forces in the SRB today are rapid population growth and emigration. When coupled with the high rates of mortality and malnutrition, all these factors contribute to labor shortages and act to

lower productivity. Remittances from migrant laborers are a significant part of the local economy although the capacity of local urban areas to absorb the increasing flow of migrant labor may be limited. The enhancement of agricultural profits in the SRB may help to stem the out-migration.

The six major ethnic groups of the basin are all involved to some degree in agriculture. The majority of the people are sedentary farmers, and those who were traditionally transhumant herders are increasingly shifting to crop cultivation. These ethnic groups are cross-cut by a strong caste system. Although colonialism and subsequent independence have modified the traditional castes, significant economic inequality along caste lines has increased. The approach of AR II is to aim for research results that will service all ethnic and caste groups equitably. The location of the three research stations will ensure the contact with all ethnic groups; the emphasis on low cost innovations will increase the access of all caste groups. A complex system of land tenure further complicates the adoption of agricultural innovations. Research will aim at keeping land ownership in the hands of families, while augmenting the access to productive lands by poorer or landless farmers.

Since the household or the extended family remains the basic unit of production and consumption in the SRB, development will be geared to this level. Women and children contribute significant inputs of labor into the present agricultural system. Other projects have found women eager to participate in agricultural development, and AR II will attempt to involve them at the individual and community level.

In order to reach this diversity of social groups, AR II plans to tap existing organizational structures. Community organizations will be used to establish village farmers' committees where On-Farm research is being carried out. Such an approach will not only ensure the compatibility of development schemes to existing social structures, but will delegate responsibility and allow flexibility to the farmers themselves.

2.2.4 Environmental Analysis. Known environmental constraints of weather, soil and uncertain annual flood flow affect plans for even minor adjustments in the indigenous farming system. The approach of AR II is to introduce simple technologies such as crop rotation and improved crop varieties and to develop small-scale irrigation and drainage techniques which

do not require major modifications of existing conditions. Much detailed information on climate, vegetation, and soil varieties is already available for representative areas of the SRB. The seasonal rainfall and variable supplies of surface and ground water are crucial climatic limitations to increased production. At the small-scale of projected programs, no negative environmental impacts are anticipated.

2.2.5 Administrative Analysis. AR II will involve many national and international agencies. Coordination of interagency communications and internal operations will be essential to the success of a regional development plan.

The organizations expected to be most directly involved in the project include: USAID (source of funds); CID (management of project in cooperation with OMVS; University of Arizona lead university); OMVS (indigenous counterpart agency). The three national agricultural research agencies which currently manage the research stations will also be closely involved. Also related to AR II are the agricultural development agencies of the member states of OMVS who will contribute guidance in research and diffusion of results.

The research design of AR II administration operates at four levels. A general policy committee (CIERDA) is made up of OMVS directors and representatives of the national research organizations. For this project it is proposed that the committee be joined by representatives of AID, CID, national development organizations and farmers of the river basin. This committee will have the responsibility of formulating the basic policy of the project.

At the second level of AR II are the CID Chief of Party and the OMVS Coordinator for Agricultural Research. They are to establish programmatic content by determining the timing of activities outlined by the general policy committee. The third level consists of the station directors. The final administrative level is made up of the local and CID team researchers themselves. Their involvement will include the proposal and implementation of projects and activities. The involvement of local farmers will be emphasized at this level.

2.2.6 Financial Analysis. This section of the PP amendment provides an analysis of the projected costs of Phase II. Estimated costs are summarized below. A more detailed budget is presented in Section 9.4.

Financial inputs from other agencies besides AID are also planned. OMVS and its member states will provide the equivalent of about \$500,000 toward construction and improvements including the value of new land.

They will also provide approximately \$400,000 in support personnel at various levels for the three stations and the OMVS secretariat. Included will be office staff, research and field assistants, mechanics, carpenters, grounds maintenance personnel, agricultural labor and guards. Other donor assistance received by OMVS from national and international agencies will contribute an estimated \$200,000 annually to this project. A summary of current bilateral and multilateral donor activity in the SRB is provided in Section 9 of the PP.

Provisions for the maintenance of research costs at the three stations beyond Phase II are discussed. The increasing participation of OMVS is projected. The problem of maintaining agricultural equipment beyond the life of this project is addressed by emphasizing the use of locally-procured machinery. \$200,000 of the \$743,000 projected costs is budgeted for foreign (non-U.S.) or local machinery.

The financial management of this project will be vested primarily in the institutional contract with CID under the Collaborative Assistance mode. Costs for technical personnel, U.S. and third country training, U.S. origin machinery and equipment, and administrative and support expenses in the U.S. will be disbursed from AID/W to the CID Executive Office in Tucson on a cost reimbursement basis. Most local costs will be disbursed in local currency to the CID Chief of Party by AID/OMVS. Procedures for disbursement of local construction costs, and the purchase of farm equipment, as well as more general local costs are outlined in the PP.

### 3. Project Activities

The project began on May 1, 1979 when the CID contract with AID/Washington became effective. This section contains a brief description of project activities. A final report of project financial activity will be submitted separately.

On May 11, CID negotiated an agreement with The University of Arizona (UA), naming it as lead university. W. Gerald Matlock, Director of International Agriculture Programs, was appointed CID Project Director. Bernie Henrie, CID Deputy Director, was named contract representative.

During the next month, candidates for the three field positions were chosen. Simon Ince (UA) was assigned as civil engineer. Eugene Foerster, Texas Tech University, was named as irrigation engineer. Planning sessions were held throughout June in Tucson by Matlock and Ince, as well as other UA faculty and staff.

In July of 1979, the candidate for agricultural research administrator who had been recommended by USAID/OMVS was brought to Tucson for orientation during which time conditions of his employment were agreed on with Matlock and Henrie. Because he would not be able to start work immediately, plans were made for a preliminary site visit by Matlock and Ince.

Ince was in the project area from July 14 to August 16, visiting Dakar, the three research stations and other sites in the SRB. Matlock arrived on July 14 and spent a week visiting research stations and meeting with development and agricultural officials in Dakar. Foerster was in the project area from August 10-24 visiting two of the research stations and making preliminary assessments of the irrigation systems.

Without informing CID, the candidate for agricultural research administrator took another job, after having been hired by the UA. When the team became aware of this, an alternative administrative plan was prepared in August and September to avoid further delay. Under the new plan, there would be no long term agricultural administrator in Dakar. Matlock as Project Director would be the chief administrator with an administrative representative in Dakar. There would also be additional team members (social scientist, agricultural economist, and extension specialist) but no increase in total person-months. Job descriptions for

these personnel were developed. Matlock was in Dakar from September 17-19 to discuss the alternative staffing and other project details with USAID, OMVS, World Bank and other officials. Final approval of this plan was not received until January 1980.

During October-December 1979, personnel in Tucson continued collecting background information, wrote a preliminary schedule of activities for the Design Team, and prepared an outline of a Status Report. The Status Report was meant to provide background briefing for project implementation personnel and provide information useful in preparing the PP.

In February 1980, two members were added to the design team. James Harkin of the Department of Public Administration (UA), with four years experience in Senegal, was named as social scientist. Ratiba Saad was appointed as soil scientist and in-country representative.

Matlock was in Dakar on February 25 and 26 to discuss with USAID/OMVS personnel the progress and problems with the project, the revised work plan, and a schedule and budget for a U.S. observation study tour for OMVS officials.

During March, a formal orientation for Harkin, Saad, Ince and Foerster was held in Tucson. Other UA participants included Nancy Ferguson and David Cleveland (Research Associates, International Agriculture Programs, UA) and Helen Henderson (Coordinator of Women in Development, UA). This orientation acquainted new members with the project and updated others on progress made.

Ince, Saad and Harkin all left for the project area during March. Saad arrived in Dakar on March 10 and began gathering background information on the research stations and existing irrigation systems. Ince was in Dakar from March 11-28 making logistic arrangements, including renting an apartment as the CID project office and to serve as Saad's residence. Harkin visited the area between March 15-23 meeting with various officials and visiting St. Louis, Guede and Kaedi.

During the period January-June 1980, the Tucson members of the team continued gathering information on the SRB. A more detailed revision of the Status Report outline was sent to Dakar in March to serve as a guide for the collection of additional data by the field team.

Some delay resulted from difficulties in locating qualified team members. Two new members were added to the Design Team during this period of April-June 1980. Ken Ribyat was hired as Agricultural Economist. Harold Young was hired as Agronomist and Team Leader.

Background research in the project area continued throughout May and June. All members concentrated on completion of the PP amendment. Saad remained in the area, visiting the stations at Samé and Kaedi. Ribyat, Young, Foerster and Ince all arrived in mid-May/early-June and remained throughout June. Harkin and Matlock made shorter visits.

A workshop to obtain input from representatives of the three countries and OMVS was organized by the UA/CID team and was held in Dakar on May 27-28. USAID/OMVS personnel also attended.

In June, technical writing assistance in the preparation of the PP was received from Michael Mau, an AID program specialist. Mau arrived in Dakar on June 9.

Between July 7-August 6 a leader study tour was conducted for five officials of OMVS and national research organizations of Mali, Mauritania and Senegal. Ferguson served as co-leader and interpreter. Young was the technical co-leader. The purpose of the study tour which included stops in Arizona, California, Colorado and Utah was to familiarize the visiting officials with U.S. agricultural research programs, with particular emphasis on irrigation. A report of this study tour was prepared. By mutual agreement Young's employment was terminated at the end of the tour.

In August, another agronomist, M. A. Yacoubi, joined the team to help with completion of the amended PP. His role was to obtain specific information on the status of agricultural research at the three OMVS research stations. Yacoubi and Mau came to Tucson on September 6 to discuss Yacoubi's role in the SRB during the period of September-December. Yacoubi arrived in Dakar on September 17 and began gathering information for the PP amendment. This included visiting the OMVS documentation center in Dakar and St. Louis and contacting various officials in the three countries.

In Tucson, Cleveland prepared technical information on agricultural research in the SRB, including the use of appropriate technology. Ince and Cleveland began coordinating the preparation of site plans for each of the three stations.

The schedule for completion of the PP amendment was revised initially to December 31, 1980 and finally to March 31, 1981 (without additional funding). During the period of October-December, the project team was active in Tucson. Ken Clark (architecture, UA) worked on the design of buildings for the research stations. Ince designed the layout of station facilities. Ribyat, who visited Tucson from December 12-14, drafted the Economic Analysis section. Harkin and Cleveland worked on the Social Soundness section with contributions from Henderson. Yacoubi returned to Tucson on December 10 and worked on the research design and technical analysis with Matlock and Cleveland. Mau was in Tucson for 2 weeks in mid-December to help with preparation of the PP.

The PP was completed in the first week of March. Preliminary copies of the design section were sent to Mau and David Shear (Mission Director, USAID/Senegal) in Washington. Matlock delivered completed copies to Dakar while there from March 23-29. Through discussions with Mau and Shear, changes were made, mainly involving a major budget reduction. Agreement was reached with World Bank and ISRA officials concerning construction at Fanaye. A two-month extension until May 31, 1981 with additional funds was issued to cover the expenses of the final PP revision and negotiations with AID/W. AID/OMVS notified CID in March that approval of the PP by USAID Missions in the OMVS countries had been delayed and that the contract would not be extended. However, CID may still be asked to participate in the PP review by AID/W at a later date.

#### 4. Leader Study Tour

In the summer of 1980, the CID team organized a leader study tour of agricultural research stations and irrigation projects in the Southwestern U.S.

Participants in the month-long tour were officials who have active roles in the improvement of agricultural research in the SRB. Six of the participants were from the national research organizations, two each from Mali, Mauritania and Senegal. Three of them were the directors of the three research stations toward which planning efforts are being directed. One participant represented OMVS directly. The group was accompanied by the project's Chief of Party from Dakar and a guide/translator.

The purpose of the study was to allow this group to meet U.S. research administrators and to visit their laboratories and field plots. Since the plans for developing the SRB revolve around improved water management and increasing areas of irrigation, administration of irrigation projects was included.

Government research laboratories and experimental farms in Arizona, California, Utah and Colorado were visited. General orientation was held at The University of Arizona and included presentations by agricultural administrators and visits to the UA experimental stations near Tucson and in Phoenix and Yuma, as well as the Salt River Project and other irrigation projects in Arizona.

In California, the group visited El Centro and Riverside including the Imperial Valley Field Stations and the Soil Conservation Service and the Salinity Laboratory of the U.S. Department of Agriculture. In the Logan area of Utah, several water and crop research laboratories operated by Utah State University and the U.S. Department of Agriculture were toured. In Denver the group visited the Engineering Research Center, Water and Power Resources Service of the U.S. Department of Interior. Finally, before returning to Tucson, the group visited the Colorado-Big Thompson Irrigation Project in the Loveland, Colorado area. A debriefing session was held in Tucson before the group departed.

The study tour succeeded in exposing the participants to a significant number of agricultural research organizations and irrigation projects. The group not only learned of the organizational structure of each institution,

but also of administrative aspects such as procedures for initiating research, sources of funding, relations between researchers and administrators, and administrative philosophies.

The participants agreed the study tour was a success and offered a number of suggestions, including that they should have been involved more directly in the planning of the tour so they might know in advance of the organizations to be visited. They would also have preferred to learn more about specifics of research and less about its administration. However, the CID team believed that as administrators in the development of the SRB, it was important that they be exposed to methods and philosophies of U.S. research administration.

## 5. Documents

A description of project documents is given in this section.

### 5.1 Status Report

This is a compilation of background material on the SRB prepared in draft form only.

### 5.2 Project Paper Amendment, Agronomic Research II (625-0605) for the Senegal River Basin

Submitted to U.S. Agency for International Development by the Consortium for International Development, March 1981 (see Section 2 for summary).

### 5.3 Report of CID/OMVS Study Tour of Western United States

July 7-August 6, 1980. (See Section 4 for summary.)

### 5.4 Nine Quarterly Reports on OMVS/USAID Senegal River Basin Agronomic Research Project by Consortium for International Development, University of Arizona

First Quarterly Progress Report

Period Covered: May 1, 1979-July 15, 1979

Second Quarterly Progress Report

Period Covered: July 16, 1979-September 30, 1979

Third Quarterly Progress Report

Period Covered: October 1, 1979-December 31, 1979

Fourth Quarterly Progress Report

Period Covered: January 1, 1980-March 31, 1980

Fifth Quarterly Progress Report

Period Covered: April 1, 1980-June 30, 1980

Sixth Quarterly Progress Report

Period Covered: July 1, 1980-September 30, 1980

Seventh Quarterly Progress Report

Period Covered: October 1, 1980-December 31, 1980

Eighth Quarterly Progress Report

Period Covered: January 1, 1981-March 31, 1981

Ninth Quarterly Progress Report

Period Covered: April 1, 1981-June 30, 1981

## 5.5 Trip Reports

1. W. G. Matlock (Project Director, University of Arizona)  
Five trip reports:  
July 1979, September 1979, May 1979, June-July 1980, March 1981
2. Harold W. Young (Chief of Party, University of Arizona)  
Three trip reports:  
May 4-11, 1980; May 12-29, 1980; May 30-June 27, 1980
3. James M. Harkin (Social Scientist, University of Arizona)  
Two trip reports:  
March 1980, May-June 1980
4. Simon Ince (Civil Engineer, University of Arizona)  
Two trip reports:  
July-August 1979, June-August 1980
5. Eugene P. Foerster (Agricultural Engineer, Texas Tech University)  
One trip report:  
August 1979

## 5.6 A Final Report on Phase I, AR II will be Submitted Before July 31, 1981 as Required

## 6. Comparison of Contract Requirements and Accomplishments

The requirements of the original contract (AID/afr-C-1520) of May 2, 1979 were fulfilled in all substantive aspects. There were divergences from the project plan outlined in the contract in three basic areas: 1) personnel, 2) scheduling and 3) construction. The details of these changes and reasons for them will be discussed below.

### 6.1 Aspects of Contract that were Fulfilled

6.1.1 A Work Plan was submitted on schedule in July 1979 outlining Phase I efforts. It had five parts: 1) evaluate present agricultural situation and current research efforts; 2) design research and training programs for the three research stations and administrative structure; 3) provide design for, initiate and supervise construction of facilities; 4) design and carry out a study tour; and 5) prepare an amended PP. The only aspect not accomplished was construction, which was eliminated by mutual agreement (see Section 6.2.2).

6.1.2 The Primary Objective for CID personnel, to define an agricultural research program for the SRB, was met in the form of the completed PP amendment.

6.1.3 Expenditures conformed to the original budget of \$420,085.

## 6.2 Differences Between Contract Guidelines and Actual Activities

6.2.1 Personnel. It proved difficult to find a qualified person to lead the effort and there were difficulties in getting approval for alternative staffing.

6.2.1.1: The original contract called for an agricultural research administrator with primary responsibility for the design of Phase II. The administrator was to be assisted by a civil engineer and an agricultural (irrigation) engineer. As designed, the administrator was to have spent up to 18 months in OMVS countries, procuring equipment, and initiating necessary construction for irrigation and water supply systems. Field preparation, design and supervision of lab, office, and housing construction was to be done by the Civil Engineer. Irrigation works were to be designed by the Agricultural/Irrigation Engineer.

6.2.1.2: We were unable to find an agricultural research administrator who was both qualified and available for a project of this length (see problems section). We did have civil and agricultural/irrigation engineers. An alternative personnel list was outlined in July, 1979 which would eliminate the position of agricultural research administrator and replace it with a representative working with the Project Director. Total person months would be the same (37 months) but it would allow the addition of an agronomist, an agricultural economist and other specialists.

6.2.1.3: Delayed approval of this Alternative B: Following revision of the work plan in February, 1980 to include a team leader, Extension Specialist, and a Social Scientist in addition to other specialists, approval was obtained.

6.2.1.4: The leader who was hired in late Spring, 1980 proved unsuited (see Problems) and his assignment was terminated by mutual agreement in August, 1980. Other team members were added in Spring and Summer 1980. The Project Director saw to completion of contract requirements.

6.2.2 Schedule. Although all required research, design and reports were completed as in the contract (see Reports Section), we did not conform to the original schedule. Although personnel problems contributed, the evolution of a research design as complex as that given in the amended PP was a sizeable undertaking requiring efforts of a large team over a considerable period.

1. The original three-member team was to have arrived in the SRB in June and July 1979. Although site visits were made by the Project Director, the Civil Engineer, and the Agricultural/Irrigation Engineer during this period, other team members did not arrive until the following Spring and Summer of 1980.
2. Completion of the PP was delayed from the original estimate of June 1980 to March, 1981. However, the final PP amendment contained all original contract requirements, including research designs, budgets, construction and equipment requirements for the other phases, including an evaluation plan and environmental assessment.
3. There was no construction, equipment purchased or field preparation, although the original contract called for significant activity in these areas. The CID Design Team concurred with the USAID/OMVS decision to delay these activities until Phase II.

We believed that it was inadvisable to plunge into expensive renovations and new construction at the three research centers until an integrated and comprehensive plan was developed. This would insure the construction of facilities that would be tailored to specific objectives and that would be maintained.

## 7. Problems Encountered

Some of the problems discussed herein are specific to this project, others result from more general problems in communication between agencies and the restrictiveness of contract expectations.

### 7.1 Personnel

Difficulties in finding highly qualified experts willing to commit themselves to an 18-month project.

- a. We did not learn until late summer that the candidate recruited at the start of AR II as Agricultural Administrator had taken another job.
- b. The person hired as Team Leader and Agronomist during the April-June quarter of 1980 proved unsuited for the project. His assignment was terminated in August by mutual agreement.
- c. The Agricultural Economist was not found until April-June 1980.

## 7.2 Scheduling

Personnel problems contributed to delays in keeping to the schedule. There also were delays in getting approval for revised plans.

- a. An Alternative Work Plan was drafted in July of 1979. It eliminated the position of Agricultural Administrator. The Project Director, Matlock, would be chief administrator with an administrative representative stationed in Dakar. The alternative was drafted to 1) expedite completion of Phase I, 2) avoid delay in finding a new full-time administrator, 3) provide more comprehensive research design. There was a long delay in getting approval for this plan.
- b. Completion of PP amendment: Although originally scheduled for completion by June 30, 1980 the PP was not done until March 1981. Problems discussed above contributed as well as: 1) late assistance from USAID in technical writing, 2) USAID not being able to supply an expert in finance and accounting as promised, and 3) the CID team not being assembled in the field until June, although some had arrived as early as March 5.

### 7.3 Administration

- a. It is difficult for both parties, AID and universities, to abandon past attitudes and behaviors based on an adversary relationship and begin to build a new working format. Problems were discussed in a November 1979 letter to AID/W, USAID/OMVS, and USAID/Senegal.
- b. A major problem is lack of interim funding to provide continuity between phases. We made a formal request for funding but were told informally such procedure was unusual and complicated, and that it would be necessary to wait for Phase II funding.
- c. Once the PP was completed, we were uncertain as to what CID's role in moving it through required reviews and recommendations would be. We need to work with USAID/OMVS to clarify this role.
- d. Obtaining approval of PP by USAID missions in Mali, Mauritania and Senegal, OMVS, and others by AID/OMVS was delayed.

#### 7.4 General Problems

It is difficult to make a completely detailed research plan for a project which is to remain responsive to local conditions and to the needs of small-scale farmers. The desire for such detailed plans is understandable, but they would tend to follow the more traditional lines of development research which have not proved successful in the past.

## 8. Recommendations

- a. Maintain flexibility in expectations for research projects. Gear design to overall project and its orientation.
- b. Develop a more open, positive attitude between AID and CID universities. Communicate clearly about expectations of all involved parties.

## 9. Appendices

### 9.1 Project Paper Table of Contents

#### TABLE OF CONTENTS

	Page
SUMMARY OF MAJOR FEATURES . . . . .	S-1
PART I: PROJECT DESCRIPTION . . . . .	I-1
Section	
1. Previous Agricultural Research . . . . .	1-1
1.1 Agronomic Research I (Project 625-0616) . . . . .	1-2
1.2 Limitations of Previous Research . . . . .	1-2
1.2.1 Lack of Administrative Structure . . . . .	1-2
1.2.2 Lack of Long-Term Commitment . . . . .	1-2
1.2.3 Wrong Program Emphasis . . . . .	1-2
1.2.4 Inadequate Infrastructure . . . . .	1-3
1.2.5 Lack of Counterparts and Support Personnel . . . . .	1-3
2. Agronomic Research II (625-0605), Phase I and II . . . . .	2-1
2.1 Goal . . . . .	2-1
2.2 Purpose . . . . .	2-2
2.3 Outputs . . . . .	2-2
2.3.1 Research Outputs . . . . .	2-2
2.3.2 Human Resources Outputs . . . . .	2-2
2.3.3 Physical Resources Outputs . . . . .	2-3
2.3.4 Institutional Resources Outputs . . . . .	2-3
2.3.5 Social Resources Outputs . . . . .	2-3
2.4 Inputs . . . . .	2-4
2.4.1 Phase I Inputs . . . . .	2-4
2.4.2 Phase II Inputs . . . . .	2-5
3. Project Activities . . . . .	3-1
3.1 Problems to be Addressed . . . . .	3-1
3.1.1 Technical Problems . . . . .	3-1
3.1.2 Research Management Problems . . . . .	3-1
3.2 The CID Approach . . . . .	3-2
3.3 Proposed Research Program . . . . .	3-2
3.3.1 On-Farm Research . . . . .	3-6
3.3.2 Applied Research . . . . .	3-9

TABLE OF CONTENTS--Continued

	Page
3.3.3 Community and Regional Research . . . . .	3-11
3.3.4 Supporting Research . . . . .	3-12
3.3.5 Innovative Research . . . . .	3-13
3.3.6 Fundamental Research . . . . .	3-13
3.4 Technical Assistance and Counterpart Needs . . . . .	3-14
3.4.1 CID Team Scientists . . . . .	3-15
3.4.2 Counterpart Scientists . . . . .	3-15
3.5 Training . . . . .	3-15
3.5.1 Management Training . . . . .	3-20
3.5.2 Research Training . . . . .	3-22
3.5.3 Other Training . . . . .	3-22
3.6 Construction and Facilities Development . . . . .	3-25
3.7 Equipment . . . . .	3-27
3.8 Administration/Management . . . . .	3-29
3.8.1 Individual Projects . . . . .	3-32
3.8.2 Reports . . . . .	3-33
3.8.3 Disbursement of Funds . . . . .	3-33
3.8.4 Maintenance . . . . .	3-33
3.8.5 Integration of Activities . . . . .	3-33
3.9 Costs . . . . .	3-34
3.9.1 Personnel (CID Team) . . . . .	3-34
3.9.2 Rental Housing . . . . .	3-34
3.9.3 Training . . . . .	3-35
3.9.4 Local Operating Costs . . . . .	3-35
3.9.5 Construction and Facilities Development Costs . . . . .	3-35
3.9.6 Equipment Costs . . . . .	3-36
3.9.7 Summary of Estimated Costs (1000's of \$) . . . . .	3-36
4. Beneficiaries . . . . .	4-1
5. Evaluations . . . . .	5-1
6. Implementation Schedule . . . . .	6-1
6.1 General Activities . . . . .	6-1
6.2 Details of Construction Implementation Schedule . . . . .	6-2

TABLE OF CONTENTS--Continued

	Page
7. Relationship to Other Donor Research . . . . .	7-1
7.1 Donor-Funded Development Activities . . . . .	7-1
7.2 Administrative Relationships . . . . .	7-1
7.3 Scientific Relationships . . . . .	7-3
7.4 Role of CIERDA in Coordination . . . . .	7-3
 PART II: PROJECT SPECIFIC ANALYSES . . . . .	 II-1
Section	
8. Technical Analysis . . . . .	8-1
8.1 Agricultural Analysis . . . . .	8-1
8.1.1 Farming Systems . . . . .	8-1
8.1.2 Assumptions . . . . .	8-6
8.1.3 Feasibility . . . . .	8-7
8.2 Technical Assistance and Counterparts . . . . .	8-16
8.2.1 Assumptions . . . . .	8-16
8.2.2 Justification . . . . .	8-16
8.2.3 Feasibility . . . . .	8-17
8.3 Construction and Facilities Development . . . . .	8-17
8.3.1 Research Stations . . . . .	8-18
8.3.2 Buildings . . . . .	8-19
8.3.3 Agricultural Lands . . . . .	8-37
8.3.4 Cost Estimating Procedures . . . . .	8-40
8.3.5 Construction Contracts . . . . .	8-41
8.3.6 Construction at Research Stations . . . . .	8-42
8.3.7 Estimated Construction Costs . . . . .	8-54
8.3.8 Assumptions . . . . .	8-54
8.3.9 Justification . . . . .	8-54
8.3.10 Feasibility . . . . .	8-62
8.3.11 Impact . . . . .	8-62
8.4 Equipment . . . . .	8-62
8.4.1 Agricultural Equipment for Use by Farmers . . . . .	8-63
8.4.2 Equipment for Use on the Research Stations . . . . .	8-65
8.5 Training . . . . .	8-66
8.5.1 Training Program Details . . . . .	8-66

TABLE OF CONTENTS--Continued

	Page
8.5.2 Assumptions . . . . .	8-67
8.5.3 Justification . . . . .	8-70
8.5.4 Feasibility . . . . .	8-70
9. Economic Analysis . . . . .	9-1
9.1 Economic Background of the Agricultural Problem in the SRB . . . . .	9-1
9.1.1 Senegal . . . . .	9-3
9.1.2 Mauritania . . . . .	9-3
9.1.3 Mali . . . . .	9-5
9.2 Development Strategy for the SRB . . . . .	9-5
9.3 Economics of Subsistence Farming and AR II . . . . .	9-8
9.4 Irrigated Agriculture . . . . .	9-11
9.4.1 Incentives and Constraints to Irrigation . . . . .	9-12
9.4.2 Large Irrigation Projects . . . . .	9-14
9.4.3 Small Irrigation Projects . . . . .	9-15
9.5 The Role of Applied Research in Development . . . . .	9-21
9.5.1 Returns to Agricultural Research . . . . .	9-21
9.5.2 The Farming Systems Approach . . . . .	9-24
9.5.3 Returns to Farming Systems Research . . . . .	9-25
9.6 Analysis of AR II Applied Research Program . . . . .	9-26
9.6.1 Cost Effectiveness . . . . .	9-26
9.6.2 Farm-Level Analysis . . . . .	9-33
9.6.3 ON-FARM Research System . . . . .	9-33
9.6.4 Animal Traction . . . . .	9-34
9.6.5 Multiplication Effects . . . . .	9-35
10. Social Soundness . . . . .	10-1
10.1 Assumptions . . . . .	10-1
10.2 Social Structure: Assuring Equal Access . . . . .	10-2
10.2.1 Population Structure and Dynamics . . . . .	10-3
10.2.2 Ethnic Groups . . . . .	10-9
10.2.3 Castes . . . . .	10-11
10.2.4 Land Tenure . . . . .	10-12
10.2.5 Lineage and Household Organization: The Roles of Men, Women, and Children . . . . .	10-16

TABLE OF CONTENTS--Continued

	Page
10.3 Farming Systems . . . . .	10-21
10.3.1 Farmers . . . . .	10-21
10.3.2 Herders . . . . .	10-22
10.3.3 Fishers . . . . .	10-23
10.4 Community Organization: Vehicle for Development . . . . .	10-24
10.4.1 Religious Organization . . . . .	10-24
10.4.2 Irrigation Development . . . . .	10-25
11. Administrative Analysis . . . . .	11-1
11.1 Functional Character of Agencies Involved with Agronomic Research II . . . . .	11-3
11.2 Structural Character of Agencies Involved with Agronomic Research II . . . . .	11-9
11.3 Final Comments on the Role of Small-Holding Farm Families . . . . .	11-13
12. Financial Analysis . . . . .	12-1
12.1 Financial Plan . . . . .	12-1
12.2 Recurrent Costs . . . . .	12-3
12.3 Effect of Additional Resources on OMVS . . . . .	12-6
12.4 Foreign Source Procurement . . . . .	12-6
12.5 Institutional Contract: Collaborative Assistance Mode . . . . .	12-6
12.5.1 Disbursement of U. S. Dollars . . . . .	12-8
12.5.2 Disbursement of Local Currencies . . . . .	12-8
12.5.3 Purchase of Local or Third Country Farm Equipment and Tools . . . . .	12-11
12.5.4 Disbursement for Local Construction Costs . . . . .	12-11
13. Environmental Analysis . . . . .	13-1
13.1 Basin Geomorphology . . . . .	13-1
13.2 Vegetation . . . . .	13-3
13.3 The Climate and its Impacts on Agriculture . . . . .	13-3
13.4 Surface Water . . . . .	13-10
13.5 Ground Water . . . . .	13-11
13.6 Soils . . . . .	13-14
13.7 Environmental Impacts . . . . .	13-19

TABLE OF CONTENTS--Continued

	Page
PART III: APPENDICES . . . . .	III-1
Section	
14. Official Documents . . . . .	14-1
15. Project Design Summary Logical Framework . . . . .	15-1
16. Other Donor Programs in the SRB . . . . .	16-1
16.1 Bilateral Assistance . . . . .	16-1
16.2 Multilateral Assistance . . . . .	16-12
17. Organizations Relevant to Research and Development in the SRB . . . . .	17-1
18. People Contacted by CID Team Members . . . . .	18-1
19. Job Descriptions . . . . .	19-1
19.1 General Responsibilities and Qualifications . . . . .	19-1
19.2 Chief of Party/Research Administrator (Dakar) . . . . .	19-2
19.3 Administrative Officer (Dakar) . . . . .	19-3
19.4 Plant Scientist (Fanaye) . . . . .	19-3
19.5 Social Scientist (Same) . . . . .	19-4
19.6 Plant Scientist (Kaedi) . . . . .	19-5
19.7 Agricultural Engineer (Kaedi) . . . . .	19-6
19.8 Plant Scientist (Same) . . . . .	19-7
19.9 Agricultural Economist (Fanaye) . . . . .	19-7
19.10 Project Director (US) . . . . .	19-8
19.11 Agricultural Scientist (US) . . . . .	19-9
19.12 Short-Term Personnel . . . . .	19-9
20. Initial Environmental Examination . . . . .	20-1
21. Glossary . . . . .	21-1
22. CID AR II Phase I Team . . . . .	22-1
23. The Collaborative Assistance Method of Contracting . . . . .	23-1
Part IV . . . . .	24-1
Section	
24. References . . . . .	24-1

## 9.2 CID AR II Phase I Team

<u>Name</u>	<u>Discipline</u>	<u>Activities</u>
Clark, Kenneth	Architecture	Construction design
Cleveland, David	Anthropology	Overall coordination, Social soundness analysis
Ferguson, Nancy	Ecology	Leader study-tour, Status Report
Foster, Eugene	Agricultural Engineering	Construction design, equipment selection
Fox, Roger	Agricultural Economics	Economic analysis
Grant, Paige	Hydrology	Environmental analysis
Harkin, James	Public Administration	Administrative analysis, Social soundness analysis
Henderson, Helen	Anthropology	Input on women's role, farming systems approach
Henrie, Bernie	Administration	CID administrative office for this project
Ince, Simon	Civil Engineering	Construction design, equipment selection, financial analysis
Lichtenberger, Keith	Architecture	Construction Design
Matlock, W. Gerald	Agricultural Engineering	Project Director, Research design
*Mau, Michael	International Relations	Acting Program Officer for USAID/OMVS
Netting, Robert	Anthropology	Review PP
Ribyat, Kennet	Agricultural Economics	Economic analysis
Saad, Ratiba	Soil Science	Environmental analysis, research design
Thielo, Oumar	Soil Science	Review PP
Volger, Kenneth	Hydrology	Construction design
Yacoubi, Abdou M.	Agronomy	Research design
Young, Harold	Agronomy	Research design, leader study-tour

---

\*Consultant

### 9.3 Proposed Phase II Budget

Estimated costs are given below for the various components of the overall agricultural research program for the six-year period. All of the local currency operating costs and construction costs for the Fanaye and Kaedi stations for years FY 83-FY 87 will be paid from Title III (PL 480) funds in Senegal and Mauritania as indicated below.

#### 9.3.1 Personnel (CID Team)

Chief of Party	72 months	
Administrative Assistant	72 months	
Research scientists		
long term (6)	432 months	
short term	63 months	
Project Director (U. S.)	72 months	
Technical backstopping (U. S.)	36 months	
Sub total (includes salaries, fringe benefits, allowances, international travel, support personnel, language training, and indirect costs)		\$5,740,000

#### 9.3.2 Rental Housing

Temporary (pending construction at sites)		
7 hours for 24 months		\$ 200,000
Permanent (Dakar)		
2 houses for 72 months		<u>300,000</u>
Sub total		\$ 500,000

### 9.3.3 Training

Counterpart trainees (MS or PH.D. in U.S., does not include salaries)	
14 trainees for 2 years	308,000
Research assistants (francophone country)	
14 trainees for 2 years	154,000
Local training	
Field assistants	
14 trainees for 1 year	60,000
Other	<u>100,000</u>
Sub total	622,000

### 9.3.4 Local Operating Costs

General administrative support (granted directly to OMVS, but accountable to CID COP and USAID/OMVS, Dakar)	265,000	Title III Funds 335,000
Research support		
labor	177,000	223,000
equipment maintenance and repair, office, laboratory, and infirmary (Samé) supplies	177,000	223,000
Local travel	90,000	110,000
Temporary lodging for counterparts, 14-24 months	<u>100,000</u>	<u>          </u>
Sub total	809,000	891,000

### 9.3.5 Construction and Facilities Development Costs

Fanaye	300,000	534,000
Kaedi (includes Rindiao and Belinabe)	300,000	1,750,000
Samé	<u>3,838,000</u>	<u>          </u>
Sub total	4,438,000	2,284,000

### 9.3.6 Equipment Costs

#### U. S. procured

vehicles	125,000
agricultural machinery	250,000
field and laboratory equipment	150,000
supplies	18,000

#### Foreign exchange procured

agricultural machinery	100,000
------------------------	---------

#### Locally procured

building supplies	
maintenance supplies, service	100,000
research supplies	
motor bikes	
Sub total	<u>743,000</u>

### 9.3.7 Summary of Estimated Costs (1000's of \$)

Category	FY 82	83	84	85	86	87	Subtotal
Personnel	860	860	960	960	1,050	1,050	\$ 5,740
Rental housing	150	150	50	50	50	50	500
Training	22	125	125	125	125	100	622
Local operating	200	176	100	100	100	133	809
	--	(24)	(200)	(200)	(200)	(267)	(891)
Construction and							
facilities	1,000	1,500	1,500	200	138	100	4,438
development	--	(500)	(1,500)	(222)	(62)	--	(2,284)
Equipment	200	143	100	100	100	100	743
Total							
(USAID/OMVA)	2,432	2,954	2,835	1,535	1,563	1,533	12,852
Total							
(Title III)		(524)	(1,700)	(422)	(262)	(267)	<u>(3,175)</u>
Grand Total							\$16,027

( ) indicates Title III (PL 480) funds from USAID missions in Senegal (\$980) and Mauritania (\$2,195).