AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE: A (A = Add, C = Change, D = Delete) — Amendment Number — DOCUMENT CODE: 3

COUNTRY/ENTITY: Kenya PDBBD467

2. PROJECT NUMBER: 615-0229

Official File Copy

BUREAU/OFFICE: AFR / 06

5. PROJECT TITLE (maximum 40 characters): National Agricultural Research

6. PROJECT ASSISTANCE COMPLETION DATE (PACD): MM 06 DD 30 YY 93

7. ESTIMATED DATE OF OBLIGATION (Under "B" below, enter 1, 2, 3, or 4)
A. Initial FY 86 B. Quarter 4 C. Final FY 89

8. COSTS ($000 OR EQUIVALENT $1 =)

A. FUNDING SOURCE	FIRST FY 86 B. FX	C. L/C	D. Total	LIFE OF PROJECT E. FX	F. L/C	G. Total
AID Appropriated Total	5,057	2,364	7,421	11,065	4,185	15,250
(Grant)	(5,057)	(2,364)	(7,421)	(11,065)	(4,185)	(15,250)
(Loan)	(-)	(-)	(-)	(-)	(-)	(-)
Other 1.						
U.S. 2.						
Host Country		7,024	7,024	-	13,940	13,940
Other Donor(s)						
TOTALS	5,057	9,388	14,445	11,065	18,125	29,190

9. SCHEDULE OF AID FUNDING ($000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE 1. Grant	2. Loan	D. OBLIGATIONS TO DATE 1. Grant	2. Loan	E. AMOUNT APPROVED THIS ACTION 1. Grant	2. Loan	F. LIFE OF PROJECT 1. Grant	2. Loan
1) ARDN	111	080	-	-	-	7,421	-	15,250	-
2)									
3)									
4)									
TOTALS				-	-	7,421	-	15,250	-

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each): 968 700 054 072

11. SECONDARY PURPOSE CO: 121

12. SPECIAL CONCERNS CODES (maximum 7 codes of 4 positions each)

A. Code	ESW					
B. Amount	15,250					

13. PROJECT PURPOSE (maximum 480 characters)

Develop a well-managed national agricultural research system capable of providing the farm sector with appropriate technologies which will increase productivity on a continuing basis.

14. SCHEDULED EVALUATIONS
Interim MM YY MM YY — Final MM 01 YY 89

15. SOURCE/ORIGIN OF GOODS AND SERVICES
[X] 000 [ ] 941 [ ] Local [X] Other (Specify): 935

16. AMENDMENTS/NATURE OF CHANGE PROPOSED (This is page 1 of a ____ page PP Amendment)

17. APPROVED BY
Signature:
Title: Charles L. Gladson, Director, USAID/Kenya
Date Signed: MM 07 DD 07 YY 86

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION: MM DD YY

AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON D.C. 20523

ACTION MEMORANDUM FOR THE ASSISTANT ADMINISTRATOR FOR AFRICA

FROM: AFR/PD, Carol Peasley

SUBJECT: Kenya National Agricultural Research Project (615-0229)

Problem: Your approval is required to authorize a grant of $15.25 million from the FAA Section 103 appropriation to fund the Kenya National Agricultural Research Project (No. 615-0229). Of this amount, $7,421,000 will be obligated in FY 86.

Discussion: This project* is a four-year effort which represents the initial phase of a ten-year program to strengthen Kenyan agricultural research. The purpose of the project is to assist the Government of Kenya in developing a well-managed national agricultural research system capable of providing the agricultural sector with appropriate technologies which will increase productivity on a continuing basis. The project is designed as a part of a ten-year effort; however, at this time, authorization is sought for the initial four-year phase due to Agency budgetary constraints. Although originally designed as a ten-year program, the project as proposed here will cover a self-contained four-year effort which will focus on the planning, management, and establishment of appropriate research methodologies. Implementation of the longer-term commodity research programs will be the focus of the second phase. Subsequent authorization will be required for the second six-year phase of the program, which is also described in the project paper. The project paper has not been revised to present only the first phase because presentation of the entire ten-year program is necessary to understand the long-term conceptual framework which will guide our agricultural research assistance efforts over the next decade.

The project is an institution-building effort. During the project the Government of Kenya will appoint a Board of Management, Executive Officers, and managerial and technical staff to assure that the Kenyan Agricultural Research Institute (KARI) is an effective and efficient research entity. The

*For purposes of this action memorandum and the authorization, the "project" means only the first phase of the larger program described in the project paper. No approval is being sought at this time for activities designed to occur after that first phase. Your approval of this first phase will not imply any approval for later activities.

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project will assist KARI to develop appropriate management and planning systems in the areas of: (1) resource allocation across commodity programs; (2) resource allocation within the maize and sorghum/millet programs; (3) financial accountability; (4) personnel and manpower development; (5) station maintenance; and (6) development of information systems. The project will also contribute to human resource development through the technical assistance, as well as on-the-job and academic training. Finally, the project will establish a research fund which will link public sector research to the talent and expertise found in the Kenyan private sector and academic community.

The project is in conformity with the strategy of USAID/Kenya and with the Africa Bureau's Plan for Supporting Agricultural Research and Faculties of Agriculture in Africa . Beneficiaries of the project will include the farming population of Kenya, particularly the vast majority who produce maize, sorghum and millet; those individuals who are employed in the supply of inputs and marketing of outputs associated with these crops; the researchers and technicians trained under the auspices of the project; and the private sector and academic recipients of research grants.

The total cost of the project is estimated to be $29.19 million, of which the AID contribution will be $15.25 million and the Kenyan contribution $13.94 million.

A summary of AID-financed inputs by category is as follows:

Input	$000
Technical Assistance	5,029.5
Training	5,197.2
Commodities	2,338.8
Operations/Maintenance	682.9
Construction	448.3
Research Fund	642.4
Administration	700.6
Evaluation	150.0
Total	15,250.0

Social, technical and economic analyses have shown the project concept to be sound. However, the Government of Kenya's commitment of resources to the agricultural research system in the form of financing of recurrent expenditures must be carefully monitored and is the subject of conditionality associated with the project. The implementation plan developed

for the project has been carefully prepared to establish a reasonable timeframe for the execution of the project and to take account of the need for careful coordination of inputs for all components of the project. Engineering plans and detailed budgets have been developed which satisfy the requirements of Section 611(a) of the Foreign Assistance Act of 1961, as amended.

Conditions precedent established for the project are designed to ensure: (1) that the GOK has begun to implement the task of reorganizing the Kenyan research system; (2) that participants do not begin academic training until a scheme of service is in place which will assist in retaining qualified researchers in the research system; (3) that funding for subsequent training is not begun until the Office of Planning and Manpower Development has been established and has implemented improvements in the KARI personnel system; (4) that financing is not made available to the Research Fund until the necessary management structure to operate the Fund is in place; and (5) that financing is not made available for operation and maintenance activities until detailed administrative and financial procedures have been developed regarding station maintenance. The covenants are designed to: (1) encourage the institutionalization of budgeting and other management systems which will ensure the effective use of scarce Kenyan resources exclusively for research problems of the highest priority; (2) maintain the market-oriented pricing and marketing of sorghum and millet; and (3) ensure that GOK funding of agricultural research is increased to a level adequate to cover all operating expenses by the end of the project.

The Kenya National Agricultural Research Project was approved at an ECPR chaired by DAA/AFR Saiers on July 28, 1986. There were four major decisions made at that meeting. First, total AID financing was reduced by $1.25 million by requiring selected local costs to be funded from counterpart generations rather than with local currency purchased with U.S. dollars. Second, the ECPR called for an early project evaluation (sometime within the first eighteen months) to assess GOK performance in making management and institutional reforms and to determine our response to that performance. Third, the ECPR decided that the major implementation contract for this project will be openly competed. Finally, the invitation for bids for this project will specifically encourage subcontracting arrangements with Gray Amendment entities.

A blanket waiver for Code 935 procurement of light weight right-hand drive vehicles and certain motorcycles was approved March 7, 1986 by the Administrator, but because the continuance

of this waiver is not assured, a separate waiver is requested for the purchase of all project vehicles. Additional source and origin waivers are required for field and irrigation equipment miscellaneous office equipment.

A Congressional Notification for the project was sent to th Congress on July 31, 1986 and expired without objection on August 15, 1986.

Recommendation: That you sign the attached Project Authorization.

Clearances:

DAA/AFR/ESA:ELSaiers	Date:	8/21/86
AFR/DP:JPatterson	Date:	
AFR/PD/EAP:TLofgren	Date:	8/21/86
AFR/EA:SMintz	Date:	8/21/86
AFR/TR:KSherper	Date:	8/21/86
GC/AFR:BBryant (draft)	Date:	
M/SER/PO:SDean (draft)	Date:	
AFR/CONT:TRattan (draft)	Date:	

Typed: AFR/PD/EAP:8/21/86
Doc. 5178Q

Project Authorization

Name of Country: Kenya

Name of Project: National Agricultural Research

Number of Project: 615-0229

1. Pursuant to Section 103 of the Foreign Assistance Act of 1961, as amended, I hereby authorize the first phase of the National Agricultural Research Project for Kenya (the "Cooperating Country") involving planned obligations of not to exceed $15,250,000 in grant funds over a four-year period from date of authorization, subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing the foreign exchange costs and local currency costs for the project. The planned life of the project is seven years from the date of initial obligation.

2. The project consists of support for the institutional development of the Kenyan agricultural research system, including the design and installation of improved planning and management systems, the expansion of technical capacity to produce improved technologies for Kenyan farmers, particularly for maize and sorghum and millet, and the improvement of research linkages between the public sector and the academic and private sectors. A.I.D will supply funds for technical assistance, training, logistical support, commodities, evaluation, and a research fund to support work by academicians and private-sector researchers.

3. The Project Agreement, which may be negotiated and executed by the officer(s) to whom such authority has been delegated in accordance with A.I.D. regulations and Delegations of Authority, shall be subject to the following essential terms and covenants and major conditions, together with such other terms and conditions as A.I.D. may deem appropriate.

a. Source and Origin of Commodities, Nationality of Services. Except as A.I.D. may otherwise agree in writing:

(1) Commodities financed by A.I.D. under the project shall have their source and, except for motor vehicles, their origin in the United States or in the Cooperating Country.

(2) Motor vehicles financed by A.I.D. under the project shall have their origin in the United States.

(3) Except for ocean shipping, the suppliers of commodities or services financed by A.I.D. under the project shall have the United States or the Cooperating Country as their place of nationality.

(4) Ocean shipping financed by A.I.D. under the project shall be financed only on flag vessels of the United States.

b. Conditions Precedent

(1) Prior to the first disbursement under the Grant, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, the Cooperating Country will, except as the parties may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D.:

(a) A statement of the names and titles of the persons who will act as the representatives of the Cooperating Country, together with a specimen signature of each person specified in such statement; and

(b) Evidence that the Government of Kenya ("GOK") has appointed (i) the Board of Management of the reorganized Kenya Agricultural Research Institute ("KARI"), (ii) the Director of KARI, and (iii) the three Deputy Directors of KARI; and

(2) Disbursement for Training.

(a) Prior to the first disbursement under the Grant, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, for training at the masters of science ("M.Sc.") and doctor of philosophy ("Ph.D.") levels, the Cooperating Country will, except as the parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D. evidence that the scheme of service for reserach institutes, as approved by the GOK, is operative for KARI personnel. This scheme should include precise guidelines on the regrading of staff and other transitional arrangements.

(b) Prior to the first disbursement under the Grant, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, for training at the MSc. and Ph.D. levels in United States fiscal year (FY) 1988, the

Cooperating Country will, except as the parties may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D. evidence that KARI has a staffed and operational Office of Planning and Manpower Development that is actively involved in planning for the improvement of KARI's human resource base.

(c) Prior to the first disbursement under the Grant, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, for training at the M.Sc. and Ph.D. levels in FY 1990, the Cooperating Country will, except as the parties may otherwise agree in writing, furnish to A.I.D., in form and substance satisfactory to A.I.D. evidence that KARI has instituted personnel policies which include a merit-based promotion system and the development of distinct career tracks for scientific and managerial staff.

3. Disbursement for the Research Fund. Prior to the first disbursement under the Grant, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, for the Research Fund, the Cooperating Country will, except as the parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D. evidence of the appointment by the KARI Board of Management of a Project Selection Committee and institution of detailed administrative and financial procedures for the operation of the Research Fund.

4. Disbursement for Operations and Maintenance Activities. Prior to the first disbursement under the Grant, or to the issuance of documentation pursuant to which disbursement will be made, for operations and maintenance activities, the Cooperating Country will, except as the parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D., detailed administrative and financial procedures with respect to station maintenance.

5. Disbursement after August 1, 1989. Prior to any disbursement under the Grant, or to the issuance by A.I.D. of documentation pursuant to which disbursement will be made, after August 1, 1989, the Cooperating Country will, except as the parties may otherwise agree in writing, furnish to A.I.D. in form and substance satisfactory to A.I.D. evidence that the Government of Kenya has established a commodity-based budget for agricultural research.

6. Disbursement for Local Costs. Prior to first disbursement under the grant, or to the issuance of by A.I.D. of document action pursuant to which disbursement will be made, for local costs, the responsible A.I.D. officer shall have made

the programming determinations required under chapter 18A1c of A.I.D. Handbook 1, Supplement B.

c. Covenants. The Project Agreement shall contain covenants providing in substance as follows:

(1) That the Cooperating Country will raise total funding for agricultural research in the Recurrent Estimates from the 1984-85 level of 6.9 million Kenyan pounds to a minimum of 10.0 million Kenya pounds in 1984-85 constant prices in the Kenyan budget year 1989-90;

(2) That the Cooperating Country will implement the anticipated recommendation in the National Agricultural Research Proposal that the system of research stations be required to include 24 national and regional stations and ensure that all other sites under control of the system are used as testing sites only;

(3) That the Cooperating Country will determine priorities for research activities in Kenya on the basis of the relative economic benefits of the planned outputs from various lines of research in Kenya;

(4) That the Cooperating Country will undertake the following with regard to the development and execution of research programs:

(a) Implement the anticipated recommendation of the Task Force Report that a process be established of determining long-term research strategies and detailed workplans through the Commodity Specialist Committees and KARI Programming Committees;

(b) Ensure that research programs developed through this procedure reflect adequate consideration of farm-based production concerns; and

(c) Transmit relevant research results to farmers through the public and private extension network.

(5) That the Cooperating Country will undertake the following with regard to the marketing of sorghum and millet:

(a) Ensure that the prices received by producers continue to be market-determined; and

(b) Encourage the continued private sector marketing and distribution of sorghum and millet products.

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NATIONAL AGRICULTURAL RESEARCH
PROJECT PAPER

4. Waivers

a. Based on the justification set forth in the Project Paper and the A.I.D. Handbook criteria cited therein and notwithstanding paragraph 3a above, I hereby approve the following waivers:

(1) A source and origin waiver permitting the procurement of photocopiers, typewriters, calculators and other office equipment with spare parts and consumables at a cost not to exceed $225,000 from countries included in A.I.D. Geographic Code 935.

(2) A source and origin waiver permitting the procurement of six tractors, tractor implements, irrigation equipment and related spare parts at a cost not to exceed $250,000 from countries included in A.I.D. Geographic Code 935.

(3) A source and origin waiver permitting the procurement of 23 right-hand drive vehicles, 15 motorcycles and spare parts at a cost not to exceed $340,000 from countries included in A.I.D. Geographic Code 935.

b. I hereby certify that exclusion of procurement from Free World countries other than the Cooperating Country and countries included in Code 941 would seriously impede attainment of United States foreign policy objectives and objectives of the foreign assistance program.

c. I hereby determine that special circumstances exist to waive, and I do hereby waive, the requirements of Section 636(i) of the Foreign Assistance Act of 1961, as amended.

Date: May 21, 1986

Mark L. Edelman
Assistant Administrator
for Africa

Clearances: As shown on the action memorandum

1796H

H. Unattached Annexes

1. National Agricultural Research Project Proposal; MOALD, April 1, 1986 (draft).
2. Project Financial Analysis; Coopers & Lybrand, June, 1986.
3. Project Institutional Analysis; Coopers & Lybrand, June, 1986.
4. Pre-Appraisal Mission Aide Memoire; IBRD, June, 1986.
5. Supplementary Budgetary Data; USAID/Kenya, May, 1986.
6. Supplementary Economic Data; USAID/Kenya, May, 1986.
7. Environmental Considerations; REDSO/ESA, May, 1986.
8. Project Equipment Procurement List.

Acronyms

AGDP	Agricultural Gross Domestic Product
AID	Agency for International Development
CIMMYT	International Center for Maize and Wheat Research
GOK	Government of Kenya
IARC	International Agricultural Research Center
IBRD	International Bank for Reconstruction
ICRISAT	International Crop Research Institute for Semi-Arid and Tropic Regions
INSORMIL	International Sorghum and Millet CRSP
ISNAR	International Service for National Agricultural Research
KARI	Kenya Agricultural Research Institute
MOALD	Ministry of Agriculture and Livestock Development
NCPB	National Cereals and Produce Board
PARAEC	Provincial Agricultural Research and Extension Committee
SAFGRAD	Semi-Arid Food Grain Research and Development
SRD	Scientific Research Division
USAID/Kenya	United States Agency for International Development Missior to Kenya

I. SUMMARY PROJECT DESCRIPTION

A. Grantee

The Grantee is the Government of Kenya. The Project Agreement will be executed on behalf of the Government of Kenya by the Ministry of Finance and Planning.

B. Implementing Agency

The project will be implemented through the Ministry of Agriculture and Livestock Development (MOALD) and the Kenya Agricultural Research Institute (KARI). The project will assist with the consolidation of all government agricultural research activities under a restructured and revitalized KARI which was originally established by the Science and Technology Act of 1979 as a semi-autonomous reserch institute under the authority of the MOALD. The project will be implemented through a host-country contract for technical services, training and procurement services. KARI will act as the contracting entity on behalf of the GOK.

C. Financial Plan and Term of Project

The cost of all resources required to implement the project over ten years is estimated at $95.1 million Of this amount, AID will contribute $40.4 million and Kenya the equivalent of $54.7 million. Authorization of AID funds will be made in two tranches; $15.25 million in FY 86 and $25.13 million in FY 90. This two-phased authorization is due solely to AID/Washington budgetary considerations and does not affect the character, design or timing of the project. Authorization for the initial four-year phase of the project is sought at this time. The Project Assistance Completion Data (PACD) for the first phase is 1993 to allow for completion of training for candidates entering academic training through Fiscal Year 1989. Obligation of AID funds will begin in the fourth quarter of FY 86 with $7,421 million in ARDN funds. The obligation plan for Phase I is as follows: FY 87, zero; FY 88, $4.0 million; FY89, $3.829 million. Government of Kenya contribution to the first phase of the project will be the equivalent of $ 13.94 million, including $1.31 million in counterpart funds.

The Life of Project has been designated as ten years given the long-term nature of the agricultural research process and the need for a thorough institutional strengthening of the Kenyan agricultural research system. It is recognized however, that even ten years will not be sufficient time to complete this effort. At least 15 and possibly 20 years will be required to see the ultimate objectives of this project fully realized.

D. Background of the Project

Agriculture has been and will remain in the foreseeable future the main stay of the Kenyan economy. In the face of a population growth rate which will nearly double the number of Kenyans from 21 million to at least 35 million by the year 2000 and a shortage of available arable land which can be put into production, this key sector has several critical problems; improving productivity and output of food crops, increasing foreign-exchange earnings, absorbing more labor and generating greater farm income from higher value crops. Despite this agenda of problems, the rate of growth in the agricultural sector has been declining since the late 1970's.

Numerous factors have contributed to this decline of the agricultural sector. The specific focus of the project is problems caused by the lack of a well-coordinated, efficient research system capable of producing effective new technologies which can boost the productivity of Kenyan agriculture.

The research system has been hampered by a lack of coordination and overall direction. Various organizational centers have been allowed to spring up without a thorough regard for the establishment of priorities and managerial efficiency. Research stations have been allowed to proliferate until, at the present time, there are 43 stations and sub-stations which absorb resources with little systematic approach to programming on the basis of the priority needs of Kenyan agriculture. There are too many stations and too many research foci in the system, given the available resources. International donors have contributed to the problem by financing individual research projects without proper regard for prioritization. GOK financing for the system has been stagnant while the recurrent costs of the system, particularly for personnel, have continued to rise. At some stations, personnel costs now reach 80 percent of the recurrent cost budget, inhibiting the ability of the stations to execute research tasks for lack of funds for equipment maintenance, transport and other costs.

The GOK recognizes these shortcomings and over the past two years has addressed these problems and their potential solutions in a series of studies, many of them undertaken in association with the International Service for National Agricultural Research (ISNAR). The culmination of these studies has been the publication this year of a plan by the MOALD to reorganize the research system. The plan, called the National Agricultural Research Proposal (April, 1986), also known as the "Task Force Report," calls for the consolidation of research activities under a completely restructured KARI, the strengthening of management and planning capacity in the system, a rationalization of the workload and gradual reduction of the number of research stations, and a

prioritization of research problems to be addressed by the system. The report constitutes the beginnings of a blueprint for institutional reform. What is now required is a long-term concerted effort by the GOK and participating donors to refine and implement this blueprint.

E. Project Description

The AID financed project is an institution-building effort designed to strengthen the managerial and technical capacity of the Kenyan research system so that it can produce quality results which will enhance the productivity and output of Kenyan agriculture.

The AID project is part of a multi-donor effort to help the GOK implement the reorganization of its agricultural research system. The GOK and several donor agencies, including AID, have recently concluded a Pre-Appraisal Mission to review the proposed research program and the donors will now be preparing individual projects based on the Mission's findings.

The AID project consists of the following four components:

1. Planning and Management: The purpose of this component is to improve the efficiency and effectiveness of Kenya's Agricultural Research System through instituting new management and administrative procedures in KARI. Management systems within the present National Agricultural Research System are virtually non-existent, with the Scientific Research Division and the Veterinary Research Division of the MOALD and the present KARI operating under separate management systems which function with limited success. Under the restructured KARI all previously dispersed research functions will be integrated within one management organization. The project will provide two long-term specialists in Research Management and Planning to advise the Director of Research and KARI management units on the means and techniques of implementing the Government's program of a prioritized research system. Short-term technical support will be provided to assist KARI with the design, installation and on-the-job training in the use of critical management systems.

2. Commodity Research: This component will focus on technical and material assistance to the KARI National Maize and Sorghum/Millet commodity research programs. Technical Assistance personnel will be based at Kitale, Kakamega, and Embu (Maize Program) and Kakamega (Sorghum/Millet Program) and will assist their Kenyan scientific counterparts in the design, execution and monitoring of the national coarse grain research activities. Technical assistance personnel will have a major and continuing role in the development of Kenyan technical expertise through on-the-job training and guidance of local

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technicians. Project personnel will also assist KARI technical and managerial staff to develop a system of adaptive testing , including on-farm work, able to produce up-to-date recommendations for varied agro-ecological zones, thereby maximizing the potential from improved maize and sorghum/millet varieties.

3. Human Resource Development: A serious deficiency in Kenya's Agricultural Research system is the dearth of adequately trained scientists and managers. This component addresses that need by providing on-the-job training and targeted study tours for managers and scientists as well as Masters and Ph.D. training for Kenyan scientists. The latter will initially be in support of manpower development for the maize and sorghum/millet programs for selected scientific disciplines such as breeding, agronomy, and plant pathology. Additional degree training will be available to assist with the development of sufficient scientific manpower to support research in other priority commodities. A portion of the Kenyan Masters trainees will study at the University of Nairobi with the balance at selected U.S. and possibly third country institutions. In-service training and periodic seminars and workshops will be conducted for station support and technical staff in Kenya.

4. Agricultural Research Fund: The final component of the National Agricultural Project is an agricultural research fund to be managed by a specialized staff within the restructured KARI. . The fund will have two "windows"; the first for contracting with private or university researchers to conduct research needed to supplement KARI programs; the second to provide grants for innovative, problem-oriented research proposals generated by private sector agricultural organizations and Kenyan university researchers. The objective of the fund is twofold; 1) to foster collaborative scientific linkages between the three elements of the research community - KARI, local universities and the agricultural private sector and, 2) to expand the opportunities for the private sector research on high value commodities with potential for increased foreign exchange earnings and labor absorption. Limited opportunities will be available to the private sector for specialized, short-term training relevant to research needs. Matching funding will be sought from Rotary International for these training slots.

F. Consideration of Provisions of the Gray Amendment

Given the size and complexity of the Project, it is not an appropriate project for set aside for small and disadvantaged businesses or those targetted for special consideration under the Gray Amendment. The Project, instead, will solicit the widest possible interest from all potential bidders. However, the

invitation for bids will specifically encourage sub-contracting arrangements with minority and disadvantaged businesses.

G. Waivers Required

The Africa Bureau blanket waiver for vehicles will be used for the purchase of all project vehicles. Additional waivers are required for field and irrigation equipment (source/origin and proprietary); vehicle spare parts (source/origin and proprietary) and miscellaneous office equipment (source/origin).

H. Major Conditions Precedent and Covenants

There will be one major condition precedent to initial disbursement which will call for evidence of the appointment of the Board of Management and the Director of the restructured KARI and the appointment of the three Deputy Directors for Crops, Soil and Water; Livestock; and Planning, Finance and Administration. This condition ensures that the GOK has taken critical first steps in implementing the reorganization of the research system under KARI management. Other conditions precedent to disbursement of funds required that; 1.) academic training at the MSc. and Ph.D. level not begin until the scheme of service for Kenyan research institutes has been formally applied to KARI personnel. 2.) KARI will be precluded from expending grant funds from the Research Fund until it has furnished to AID and AID has approved detailed administrative and financial procedures for operations of the Research Fund. 3.) KARI will be precluded from expending grant funds for operation and maintenance activities until it has furnished to AID and AID has approved detailed administration and financial procedures with respect to station maintenance. Disbursement subsequent to August 1, 1989 is conditional on the installation of a commodity-based public budget for agricultural research. Future disbursements for continued Ph.D training require, by Fiscal Year 1988, the establishment in KARI of a functioning Office of Planning and Manpower Development and, by Fiscal Year 1990 improvement in KARI's personnel policies consistent with recommendations of the GOK/donor Pre-Appraisal Mission.

Project covenants are designed to promote the establishment of a system for determining research project priorities and the rational distribution of stations called for in the GOK reorganization plan. These covenants include; execution of the plan to include no more than 24 stations involved in crops, soil and water research with all other sites serving as testing sites only; and the determination of research priorities on the basis of sound economic analysis of expected results; and an increase in the recurrent budget for the national research system to a minimum of ten million Kenyan pounds by the 1991/92 Kenyan fiscal year; implementation of the commodity programming and budgeting process

as detailed by the Pre-Appraisal Mission. A final covenant addresses the need to maintain the market-determined pricing of sorghum and millet and the private sector marketing of those commodities.

The covenants included in the first phase of the project represent important benchmarks in development of KARI's research system management. At the time of the phase two authorization the progress made in reaching these milestones will be determined. The conditionality included the second phase of the project may then reflect the degree to which these benchmarks have not been achieved.

I. USAID/GOK Project Design Team members were:

USAID/Kenya

David Lundberg	Chief, Office of Agriculture
D. A. Smith	Office of Agriculture
James Goggin	Office of Agriculture
Curtis Nissly	Office of Agriculture
Barry MacDonald	Office of Projects
Leonora Shiluli)	
Everlyne Ayoti)	Secretaries, Office of Agriculture
Farzana Hudda)	
John Gaudet	REDSO, Analysis Division
Ann Stroud	REDSO, Analysis Division
Carolyn Barnes	REDSO, Analysis Division
Lyn Dunn	REDSO, Supply Management Division

Government of Kenya:

W. Wapakala	MOALD/SRD
J.B.W. Matata	MOALD/SRD
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Dr. S. Chema	MOALD Veterinary Research Services
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II. PROJECT RATIONALE AND STRATEGY

A. Background

JDS

Maintaining current levels of per capita food output is and will remain an enormous problem for the burgeoning population of Kenya. Increasing incomes through diversification to higher value crops and increased exports will be even more difficult. A limited supply of productive land in the face of rapid population growth is a key constraint on Kenyan agricultural development. Only some 9% of Kenya's area is considered of high potential and another 9% considered to be of medium to marginal potential. Agricultural land availability in Kenya in 1981 was estimated to be 1.14 hectare per capita, while availability of medium to high potential land was limited to 0.39 hectares per capita.

Complicating the land constraint is Kenya's population growth. The annual growth rate has risen steadily from about 2.2% in 1950 to approximately 4.1% in 1985 and the processes fueling Kenya's explosive population growth are still underway with continued growth absolutely inevitable over the next five or six decades, even under the most optimistic forecasts. In the fifteen years remaining in this century, the population and labor force of Kenya will double. Even with rapid fertility reduction beginning in the mid-1980s the momentum of growth based on today's youthful age structure (50% of population age 14 and below) will eventually triple the current population of 20 million. This expanded population will demand food and jobs. Kenya's agricultural sector must be able to respond with greater food crop production, foreign exchange earnings and employment opportunities.

Regarding the productivity of Kenyan agriculture, between 1955 and 1977 gross agricultural production in Kenya more than doubled, growing at an average annual rate of 3.6%. This substantial growth rate was fueled by such key factors as the rapid expansion of coffee, tea and other cash crop production, the availability and diffusion of high-yielding maize varieties, and the expansion of crop production on high potential land. However, in the period 1977 to 1983, the average annual rate of agricultural growth has been estimated at 2.7%. If coffee is excluded from the analysis, the rate of growth was only 1.8%. Policy disincentives, the increasing lack of available high or medium potential land, and the lack of improved farmer-ready technologies which permit the intensification of production have all contributed to the downward trend in the agricultural growth rate.

The policy environment as it impacts on agriculture has presented a mixed picture in recent years. Agriculture remains overwhelmingly in private hands with practically all output accounted for by the private sector. However, government pricing policies and structures which govern the supply of inputs and the marketing of outputs, have in the past produced disincentives to improved efficiency, productivity and diversification in the agricultural sector. Progress has been witnessed recently in the areas of pricing policies and marketing mechanisms, specifically

with respect to maize pricing and moves toward expanded fertilizer, maize and wheat marketing by the private sector. These issues remain of great significance to the Kenyan economy and will be closely monitored.

Given the land constraint and historic policy difficulties, and assuming the current trends in agricultural productivity and no change in the population growth rate, by the year 2011 Kenya could be faced with a population of 56.5 million, available agricultural land of 0.26 ha/capita (medium to high potential of 0.11 ha/capita) and an annual maize import requirement of 2.75 million metric tons - 40% of total needs based on 1979-83 mean per capita consumption levels.

To avert this scenario, key objectives which must be achieved by Kenya in the remaining years of the twentieth century include the deceleration of the current trend in population growth, the expansion of gross output and productivity for existing crops, the development of new high value labor intensive crops and markets, and the restructuring of Kenyan institutions and policies in support of the aforementioned objectives. AID is assisting Kenya on all these fronts.

It is appropriate that AID begin now to work with Kenya to build a research system that will contribute the essential technical advances to the country's agricultural sector. The environment for moving ahead with a dramatic plan to reshape Kenya's agricultural research system is better now than it has been for several years. A series of events have prepared the way:

- In September 1983 two separate ministries, Ministry of Agriculture and Ministry of Livestock were merged and the Ministry of Science and Technology was dismantled. For the first time all agricultural research activities became the responsibility of one government organization, the Ministry of Agriculture and Livestock Development.

- Since that merger three key positions in the new Ministry - the Permanent Secretary, the Director of Agriculture and the Director of Research - have been filled with highly qualified and motivated individuals fully conscious of the pivotal development role to be played by agricultural research.

- Under this new leadership ISNAR (International Service for National Agricultural Research) was invited to study the organization, management and programs of Kenya's research system and to prepare a comprehensive national research strategy and program.

- A GOK/donor Task Force has produced a comprehensive and

insightful analysis of the existing system and made recommendations based on ISNAR studies for a complete overhaul of the national agricultural research program.

- The Government published a Sessional Paper which states emphatically that research "suffers from a number of structural problems that will be corrected as a matter of urgency".

- The GOK/Donor Agricultural Sector Sub-committee formed a Pre-Appraisal Mission to redefine and clarify important features of the research system action plan.

- The MOALD leadership have committed themselves to begin implementation of the restructured KARI before the end of 1986.

B. Problems in Agricultural Research

Kenya currently has one of the largest research and extension establishments in Africa. Despite achieving significant success with maize hybrids in the mid-1960s to early 1970s (with substantial involvement of AID) Kenyan research is currently in a state of considerable disarray. The joint 1985 GOK/ISNAR study, financed in part by AID, stated that the governments "agricultural research organization, management and infrastructure have deteriorated and may soon reach an all-time low that will make it difficult for research to meet the needs of the nation for agricultural growth and development." (ISNAR, 1985). The Government's Agricultural Research Task Force confirmed that judgment, observing that despite attempts by the Government over the last decades to improve its research operation, "the system has continued to perform poorly". The reasons for the general failure of Kenya's agriculture research system to generate new technologies for farmers are rooted in basic managerial and organizational flaws of the system. Key shortcomings are enumerated below.

1) Organization. The current structure of public sector research in Kenya is a divided one, with three major organizational components. The mandate for crop research is shared between the Scientific Research Division (SRD) of the Ministry of Agriculture and Livestock Development and the Kenyan Agricultural Research Institute (KARI). KARI, a parastatal organization affiliated with the MOALD, was established in 1979 with the promise to become the new center for agricultural research in Kenya. However, at present, it is simply another in the series of research stations based at Muguga, a suburb of Nairobi, with responsibility for a number of facets of the Kenyan research program. Given its parastatal status, KARI operates independently from the SRD.

The SRD retains responsibility for the network of research stations, substations and experiment sites located throughout the rest of the country. A third component of the system is the Veterinary Research Division of the MOALD which operates independently of the other research units.

2) Proliferation of Research Stations and Programs. From a group of four stations in the early 1940s, Kenya's research station network has now grown to a total of 43 national and regional stations, sub-stations and testing sites. Many of these operations have evolved for reasons other than the need for geographically-specific research outlets. Along with the growth of physical facilities, research programs have proliferated, many sponsored by donors. The result is the spreading of existing research resources over too many stations and too many research "priorities". Lack of sufficient managerial controls on this overly extensive system also promotes lack of accountability over the use of resources within the system. Two examples of this lack of control include research programs designed by individual stations with no central coordination and the virtual absence of supervision and evaluation of research efforts and personnel. Regional and local interests in retaining stations as sources of employment and income will make reorganization and rationalization of the station network a difficult task.

3) GOK Funding. GOK funding of agriculture as a proportion of total expenditure has declined over the past several years. The share of the MOALD's budget devoted to research, especially for recurrent expenses, has also declined proportionately in comparison to other activities. The 1985 MOALD/ISNAR report concludes that "this situation has led to the emergence of inadequate recurrent funding as a major and critical constraint in research." Within the recurrent costs budget a serious imbalance exists between personnel costs and operating expenses. The worsening ratio in favor of personnel costs signifies a decline in operational support for scientists, which, in part, accounts for the system's low research productivity. The research system has continued to expand staff and facilities in the face of inadequate support funds with the predictable result of many personnel with too little available support money. These financial constraints must be addressed if sufficient resources are to be reallocated to address Kenya's priority research concerns.

4) Personnel. An over-abundance of personnel but the lack of sufficiently trained scientists continues to seriously limit research output. A 1982 ISNAR review of Kenya's research program highlighted this constraint as perhaps the most crucial. ISNAR proposed a 10-year public-sector manpower development plan, however the funds needed to implement the

plan have not been available. Allied with this problem is the incentive structure for those who achieve higher levels of education or perform well in the system. Lack of sufficient motivation of the research labor force in the public sector is inhibiting its ability to produce quality results.

5) Support Services. The inadequacies of research support facilities and their management are high among the major constraints to productive agricultural research. ISNAR found that research scientists spend too much time performing tasks better done by support staff. Personnel responsible for providing support services and facilities are few in number, poorly trained and have inadequate equipment and facilities. The support problem is partially a result of the disproportionate amount of recurrent budget devoted to staff salaries and the spread of available resources among too many stations. The result is that the few physical resources which are available are often in disrepair or are permanently disabled for lack of proper maintenance, spare parts or the human knowledge and equipment required to effect repairs.

6) Research Linkages. The "national" research system of Kenya as it presently operates is confined to the government's activities through KARI, MOALD/SRD and the MOALD Veterinary Research Division. Linkages between government research entities and university researchers are limited and informal as are those with private sector agricultural researchers. The Task Force report points out that "the utilization of these additional (research) resources would go a long way in strengthening the national research system and increasing the overall output of agricultural research for national development". Also, the sharing of information and transfer of technological advances between GOK researchers and the international centers (IARCs) is not institutionalized. These factors, in addition to the operational split between

Veterinary Research, SRD and KARI, combine to prevent Kenya from enjoying a truly integrated "national" research system benefiting from shared information and cooperative efforts.

C. Linkage to Kenyan Strategies and Programs

(1) Strategy Context

The GOK detailed its overall strategy for future development in the Fifth Development Plan (1984-1988). The specific objectives and strategy for agriculture and livestock include: increased food production, growth in agricultural employment, expansion of agricultural exports, resources conservation, and poverty alleviation. The plan targets nominal agricultural production to grow at an average of 4.5 percent per annum

while real per capita agricultural income increases slightly faster than 1 percent per annum. Most of the increased production was expected to come from higher yields and improved production from the drier zones and grazing lands. The Kenyan Government has recently published an official paper which updates its viewpoint on the economy, known as the Sessional Paper No. 1 of 1986 on "Economic Management for Renewed Growth". The paper notes that, "agriculture remains the leading sector in stimulating economic growth and job creation." In order to meet a planned overall GDP growth rate target of 5.6%, the paper projects that the annual GDP growth rate of the agricultural sector must be 4.1% through 1988 and 5.3% thereafter to the year 2000. The paper indicates that a number of key actions must be taken to reach such targets including: improvements in the marketing system for agricultural inputs and outputs, improvements in the national extension system and a reorganization and rationalization of the national agricultural research system. Recommendations are made in the document that resources should be concentrated on intensifying and expanding production of key commodities and products, to include: coffee, tea, maize, wheat, milk, meat and horticultural crops. First priority in research is given to maize, especially maize for smallholder production. The overall goal of the effort to support agricultural development is stated as one of achieving, "food security with rising farm incomes and employment without compromising the growth of agricultural exports."

In the Sessional Paper three strategies are outlined to assist agriculture attain the goals set for it of self-sufficiency in food crops, greater export earnings and growing rural incomes. First, through better extension efforts, policy reforms and adoption of more productive husbandry higher yields should be obtained. Second, research into new varieties "especially of maize and other grains," must be reorganized and accelerated to keep pace with consumption. Third, limited shifts in production patterns will allow diversification to higher value commodities like coffee, tea and vegatables.

The AID project clearly responds directly to the second need for greater research on grains. It also addresses the first concern through the focus on improving the management of the overall research system, including the crucial linkage with the extension service. Lastly, and of considerable importance, the project's Maize and Sorghum/Millet Component aims at increasing yields of those commodities in part, to allow for the needed land use shifts. As the Sessional Paper states, "to accommodate the area expansion for coffee and tea, while providing for food security, it will be necessary to manage a major intensification in the production of all basic

food commodities."

The theme of the need to improve agricultural productivity and output, as stressed in the Sessional Paper is reflective of the importance attached to this subject at the highest level of the Kenyan Government. Speaking at a September, 1985 seminar on Kenya's food crisis and national development, Kenya's President spoke on the causes of the country's low growth in food production and worsening per capita food output. The President said in part, "...the key to our future increases in food production does not lie in putting more land under production, but rather in the use of the limited land we have wisely. The challenge is to develop new food crop technology. The present technology we have for maize production will not be adequate after ten years. It is imperative that we start developing new higher-yielding maize seeds and adopt the new techniques of cultivation. It will be even more important to improve and strengthen the management of agricultural research systems. We must focus these (scarce research) resources on the research areas where pay-off is high and immediate."

(2) National Agricultural Research Program

Based on the 1985 ISNAR study, the MOALD Task Force recommended program and the recent GOK/donor Pre-Appraisal Mission, a comprehensive restructuring plan for the research system has been developed.

The Task Force's draft report referenced earlier, entitled "National Agriculture Research Project Proposal" calls for the integration of the SRD and KARI in one functional paratastal unit operating under the KARI name. This institution will be operated by a Board of Management appointed by and responsible to the Minister for Agriculture and Livestock Development. Veterinary Research is included as a component of this scheme as well. The plan focuses on a rationalization of the research system, to include sixteen national research centers and eight regional research centers. The national centers are assigned priority responsibility for the key commodities such as maize, wheat and oilseeds, sorghum and millet. The regional centers are responsible for adaptive testing and other research appropriate to the particular agro-ecological zone in which they are located. All other sites under the research system's control are relegated to the status of test sites. This reorganization follows in general the recommendations put forward in a study of the system carried out in association with ISNAR in 1985.

The Task Force also places emphasis on the need to prioritize research efforts among crops and lays the groundwork for

allocation of funds among crops based on their relative economic priority. In AID's view, too many commodities are still considered "priority". Budget rationalization along priority commodity lines cannot begin until the GOK FY 87/88 budget year, commencing in July, 1987. Therefore, while the groundwork has been laid, the actual process of terminating low priority research programs in favor of greater funding of research in higher priority areas like maize, dairy or horticultural crops is yet to happen. Until the new KARI management structure is in place and providing senior officials with a useful flow of information on research needs and research potentials, this rationalization process cannot be expected to happen. The Planning and Management Component of the project will facilitate this occurrence (see III D.I., below).

Cost projections made in the report foresee a substantial increase in outlays for research, largely financed by donor contributions. The Task Force Report estimates a need for increased recurrent financing over a five year period, above the level of current GOK funding on the order of Kshs. 610 million, or roughly $38 million. The Task Force Report budgets GOK financial input on a straight line basis given recent past experience in which the MOALD's share of the national budget has actually declined. Ultimately, such a situation is unacceptable. As the Sessional Paper states, the recurrent budget for research supported by the GOK must be substantially increased. The Paper suggests an increase from the current level of roughly 6.9 million Kenyan pounds to 10 million Kenyan pounds ($8.6 million to $12.5 million). A detailed review of budgetary requirements is provided in Section V and Unattached Annex H.5. of this paper.

Finally, the Task Force report emphasizes the requirement for training at all levels of the system. It notes the need for and plans the training of research officers at the MSc. and Ph.D. levels. It also targets technical assistants, laboratory workers and other support staff for upgrading.

D. Relationship to AID Program Priorities and Activities

The keystone of the present Country Development Strategy Statement is economic growth - growth in agriculture, growth in employment opportunities, growth in the role and vigor of the private sector. This strong emphasis on growth is justified because "there is not now a sufficiently high rate of production in Kenya to employ the growing population or to produce enough food, etc. for a minimally acceptable quality of life" (USAID Kenya CDSS). Kenya must rely heavily for its economic growth on increased output and employment generation from the agricultural sector and from associated small towns.

The CDSS identifies a number of means for AID to stimulate increased growth in agriculture. Increased private sector effort in marketing, processing and exporting is one such means. The CDSS also indicates that AID will provide management and technical training for public and private sector agriculturalists. Lastly, the CDSS describes AID's intention to assist in the development of the national agricultural research program, in close coordination with other interested donors.

AID's Africa Bureau recently prepared extensive guidelines for the development of agricultural research projects. The guidelines represent the current Agency policy on this topic, based on accumulated knowledge and present conditions in Africa. USAID/Kenya has reviewed the mission's approach to agricultural research with AID/Washington staff responsible for the Bureau guidelines. The project described in this paper is fully compatible with those guidelines.

The current project is a successor to a series of efforts directed toward the improvement of Kenya's agricultural research system. AID support to maize research has been almost continuous since the 1960s under six different projects each with a slightly different purpose and emphasis. During the early part of this period AID's involvement contributed to the development of Kenya's first high yielding commercial maize hybrids which were quickly adopted by smallholders. Under the Agricultural System Support Project (ASSP), begun in 1978, and the Dryland Cropping Systems Project, begun in 1979, research support shifted to the more arid areas of Kenya with emphasis on range management, soil and water conservation, and production of new varieties of drought tolerant crops. Much of this work was curtailed in 1984 when AID informed the GOK that further investment in agriculture research was fruitless unless there was a total restructuring of the national system. What remains, in terms of crop research, is an effort based at KARI to support the development of maize varieties better suited to the growing conditions of the Central Highlands area of Kenya. (A discussion of the lessons learned from AID experiences in these endeavors is found in Annex G.1.a., Technical Analysis-Maize and Sorghum/Millet Component).

E. Relationship to Other Donor Activities

Donor activity in Kenyan agriculture is very extensive, with most European donors plus World Bank, the U.N., Canada, Australia and Japan active. The very existence of this multitude of donors has distorted the use of Kenyan resources in addressing the research problems of Kenyan agriculture. A revamped Kenyan research system which focuses on priority

crops and key research problems, as proposed in the Task Force Report, is designed to provide the vehicle to rationalize donor input to the system. Through its assistance to the management of the new system, AID, working closely with the World Bank, will promote such rationalization as the GOK seeks donor support to meet the research requirements of key commodities. The Agricultural Sector Sub-committee of the Donor Steering Committee's recent Pre-Apraisal Mission has intensively reviewed the Task Force report and its recommendations (See Annex H.4 for the detailed recommendations.). While there is widespread support for the GOK program among the donors, at this time only AID has prepared a detailed project for agricultural research. The World Bank has made a firm commitment and others, notably EEC, FAO and CIDA (Canada) have, expressed strong interest.

Of key importance to the AID project are the efforts of the World Bank in support of the Kenyan agricultural research system and extension system. The Bank has played a major role, along with AID, in working with the government toward the design of a new research system and will no doubt continue to be very active in implementing the GOK program. In September 1986 the Bank expects to field a project design team (Appraisal Mission) which will produce a detailed, long-term plan for agricultural research. At this time it is the Bank's preliminary judgment that its support will be focused in the area of organization and management of the regional research centers and the adaptive research process. This Bank emphasis will bridge the AID effort of national research system institution-building with the Bank's on-going role in the extension network. The agricultural scientists financed in the Maize and Sorgnum/Millet Component of the AID project will work closely with the Bank's regional research centers project.

The Bank also intends to begin a second five-year phase of the National Extension Project sometime in 1988. (The current extension project has substantial unexpended funds which must be spent prior to initiation of a second phase.) The current project introduced the Training and Visitation (T & V) extension program to Kenya in 1983 and has made good progress. During the Second National Extension Project the Bank will work to improve extension management and supervision, staff technical capabilities and the linkage with the research system. Also of significance to AID's efforts in the commodity areas of maize, sorghum and millet are the activities of CIMMYT, ICRISAT and the SAFGRAD projects. CIMMYT (International Center for Research on Maize and Wheat) has an Eastern Africa program headquartered in Kenya. Approximately 20% of CIMMYT's eight-person staff time is to be devoted to support on Kenyan research. Their assistance is primarily in the form of germplasm development, manpower

training, limited commodity supplies and periodic consultancy services. CIMMYT's input to on-farm research organization and training has been valuable and will make an increasingly important contribution as the national and adaptive research linkages are strengthened under the new program.

The OAU-SAFGRAD project has been assisting the Kenyan sorghum and millet program with germplasm and limited resources since 1982. This support will continue as SAFGRAD II expands its Nairobi-based staff and regional responsibilities. Through SAFGRAD, Kenya continues to have access to ICRISAT sorghum and millet germplasm.

F. AID Project Approach

The AID project will assist the Government of Kenya institute a radical and complex readjustment of its agricultural research system. As stated above, this is primarily an institution-building process, assisting the Kenyans to develop the institutional capacity to manage a relevant and high quality research system. As such, it will require of AID devotion of adequate time for the project, perseverance in focus yet flexibility in approach, and patience with a process by its nature, gradual. Four features of the project distinguish it from typical development activities:

1. This project represents the initial 10 year project of a 15 to 20 year effort. In a recent paper on the experience of agricultural research in Africa, Carl Eicher documents that a ten year time-frame is a minimum for developing a new variety or achieving a technical breakthrough. It is a minimum time also for developing the depth and breadth of skilled manpower needed to sustain an agricultural research program and build a mature and lasting institution.

2. Because this is an institution-building project aspects of the proposed reorganization are as yet unformed, unclear or unsatisfactory; issues like the ability of the new KARI to terminate low priority research programs or close redundant research stations; the likelihood that the Research Institute scheme of service will increase the retention of trained personnel; the willingness of GOK and KARI officials to provide a continuing adequate level of funding to operate the research system. These and other questions cannot be answered with confidence at this juncture; it is the purpose of this project to help the GOK research system develop the means to provide a positive response to the challenges it will face. The phasing of the project will allow the satisfactory resolution of these issues before the second phase begins in 1990.

3. The project identifies a number of milestones in the form of Conditions Precedent to further disbursement to mark the acnievement of critical stages in KARI's management maturity. Inclusion of these C.P.s allows AID to monitor the progress the institution-building effort is making, proceeding with project activities as KARI demonstrates growing capacity.

4. The project objective is creation of a dynamic system able to evaluate the changing circumstances of Kenya's agriculture and adjust the research program accordingly. For this reason, and because detailed planning over a 10 year period is not practical, the project must be flexible and able to make adjustments in implementation as required. The evaluation to be conducted near the end of Phase I will provide guidance for any modifications in implementation of the subsequent years of the project. If, for example, the commodity research priorities have changed, a shift in project focus from coarse grains to horticulture may be appropriate.

III. PROJECT DESCRIPTION

A. Project Goal

The goal to which this project contributes is to increase Kenya's national food security through increasing agricultural productivity especially in the smallholder sector. The goal is in keeping with the objectives of the AID program in Kenya and with the objectives of Kenyan policy as defined in the 1984-88 Development Plan and the 1986 Sessional Paper on Economic Management for Renewed Growth.

B. Project Purpose

The primary purpose of this project is to develop a well-managed national agricultural research system providing the agricultural sector with appropriate technologies which will increase productivity on a continuing basis. Very little progress on commodity research is possible however without a thorough reorganization of the structure and management of the entire research system. Therefore, the AID project will be very much an institution building effort designed to improve the efficiency with which resources are used to produce new technologies which will improve productivity and output for priority Kenyan commodities. Likewise, the long-term capability of the research system depends upon the quality of the technical and managerial staff. Academic and practical training of Kenyan managers and scientists is therefore mandatory. Among the new technologies needed are improved varieties, improved techniques of disease control and pest management, increased knowledge of soil

fertility and water relationships, etc., which will all increase Kenyan agricultural output for selected priority crops in Kenya. An undisputed priority is maize, which will be AID's key commodity focus under this project. Given the GOK's focus on cereal grains research, and the complementarities which are possible to obtain on research among coarse grains, sorghum and millet will also be addressed by the AID project.

It is recognized at the outset that this project represents the initial phase of a 15 to 20 year effort.

The project will ultimately benefit the Kenyan farming population that will have a series of improved agricultural technologies available. Kenyan food consumers will also be beneficiaries through the continued access to sufficient quantity of food produced efficiently within Kenya.

C. Project Components

1. Research Planning and Management

Objective

The objective of this component of the Project is to improve the efficiency and effectiveness of Kenya's agricultural research system. As such this component relates directly to the greater project purpose of the development of a national agricultural research system which will increase productivity on a continuing basis. This component is also directly linked to and in support of the other project components. In the case of the maize and sorghum/millet research component, as with all the commodity programs of KARI, the Planning and Management Component is concerned with the allocation of scarce resources across commodities and factors to assure that the national priorities are maximized in light of potential technological breakthroughs, socio-economic returns, and the constraints of financial, material and human resources. The effective implementation of the Human Resource Development and Research Fund components also depends on improved KARI management that; 1.) plans for and pursues the development of the system's human resources and retains those resources through an improved scheme of service, and 2.) encourages the university and private research sectors to engage in those research areas in which they have a comparative advantage and are consistent with national priorities.

Outputs

The principal expected output is a viable national agricultural research program including improved systems for identification of research priorities, commodity/factor programming and evaluation, the allocation of resources, financial management, procurement of

necessary goods and services, maintenance of the physical plant, manpower development, data processing, and the receipt and dissemination of relevant information. Achievement of these outputs will require careful design, testing, implementation and follow-up training for a series of related critical planning and management systems. The central issue is perceived to be that of commitment by both the GOK and the donor community. Based on the degree of frank and productive collaboration between those parties during the past two years, it is USAID/Kenya's judgment that the commitment exists. Nevertheless, the integration of three previously distinct research organizations - SRD, KARI-Muguga, and Veterinary Research Division - into a single management structure will be a difficult, time-consuming and sensitive task. Once restructured, KARI will then require modern and effective management systems and a staff well-trained in their job to ensure successful research planning and execution.

Inputs

Component inputs will concentrate on technical assistance in management system design and training in their operation for headquarters and research station administrative staff. Two medium-to-long term technical assistance individuals will be assigned to KARI headquarters. A Research Counselor will serve for three years as a "right hand" to the KARI Director, helping senior management determine their managerial needs and to clarify for the system design personnel any issues which may develop. The basic role of the Counselor is to act as a link between senior management and the system design and implementation process during the new organization's initial years. Funding is provided in the project for the KARI Director to have access to the Counselor's periodic, short-term assistance after the first three years.

A second individual, with a strong background in agricultural economics and management, will be assigned for five years to assist the Assistant Deputy for Planning and Manpower Development. This unit is responsible for a series of vital tasks including the supervision of the annual programming and budgeting process and the development of the system's manpower. The technical assistance individual will work with the Deputy Director and the department staff to develop systems which will enable KARI to establish its research priorities and appropriate funding levels for commodities/factors and geographical areas. A further effort will be made to develop efficient research monitoring and evaluation programs. The results of these programs are to be utilized in the programming and budgeting process.

Short-term technical assistance will be substantial during the project's first year in order to systematically design, test, implement and train staff in the use of a wide range of management tools. Greatest attention will be given to the areas of research

evaluation and programming, financial management, station maintenance, and manpower development. Installing improved systems of procurement, data processing and library information systems will be included within the component.

Many senior and middle managers now employed in the existing research units will have their functions and responsibilities altered, either increased or decreased, as a result of the reorganization. Re-training of these individuals to discharge the new tasks required of them will be a crucial element of the project.

2. Maize and Sorghum/Millet Commodity Programs

Objective

This component's objective has two dimensions, to increase yields of maize, sorghum and millet, and to improve the management of these commodity programs resulting in more efficient and effective research. These commodity research programs should have self-sustaining ability to generate farmer-useable technologies for different agro-climatic regions. Linkages will be developed among basic researchers, adaptive researchers and the extension staff to ensure that the programs focus on practical solutions to real farmer problems. This activity closely complements the Planning and Management Component which is concerned with management of a national research system that maximizes the economic return to research investment in a commodity given funding constraints. The maize and sorghum and millet component likewise ties in with the Human Resource Development Component by assisting in the training and technical guidance of Kenyan research staff before, during and after formal academic training.

Outputs

Specific output of this component is an improved system of designing, conducting and evaluating research in three commodities. Maize, sorghum and millet research has been included in the AID project because of the important role coarse grains play in Kenya's agricultural economy and the impressive opportunity for increased yield they present. Together these commodities represent use of 23% of Kenya's arable land and some 17% of the agricultural GDP. Kenya's Agricultural Gross Domestic Product (AGDP) (excluding coffee) has been increasing at annual rate of only 1.8% since the mid-1970s. Regrettably, maize and sorghum/millet have contributed to this sluggish growth with annual increases of only 0.9% and 1.8%, respectively. The research programs for these commodities, most particularly maize, have three fundamental problems; 1.) the late maturity genetic bias, 2.) the large-holder bias, and 3.) the lack of a coordinated program across stations which is capable of

establishing research priorities and serving as a reservoir for knowledge gained. This project activity will address the first and third problems directly through assisting the KARI Maize Program Coordinator design and conduct research with a national perspective, seeking especially to develop new varieties suitable to Kenya's diverse agro-climatic conditions. The commodity research will be integrated with the regional, on-farm research efforts to replace the historic large-farm focus with appreciation of smallholder production issues.[1/] Although the general lines of appropriate research attention are known, the specific goals of these commodity research programs will be determined by the Specialist Committees and Programming Committees constituted for maize and sorghum/millet research. The project component will serve to assist KARI implement these research strategies and develop the planning and evaluation processes which will guide commodity research programming in the future. Component outputs are expected to include the following:

- A functioning system of national planning and coordination of research efforts within maize and sorghum/millet to assure the most efficient use of human and physical resources in producing useful research results for Kenya.

- Improved maize varieties tested, adapted and available for farmers in the principal ecological zones of Kenya including the Western Highlands, the Central Highlands and the Coastal Lowlands.

- Improved sorghum and millet varieties available to farmers in the same ecological zones noted above.

- A functioning system of agronomic and adaptive testing which produces up-to-date recommendations on agronomic practices to be utilized in each agro-ecological zone, to maximize the potential from the improved maize and sorghum/millet varieties.

- A functioning system of linkages to the extension system and on-farm trial work conducted through the regional research centers which provides feedback from the farm

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[1/] Detailed discussions of the rationale for maize, sorghum and millet research is found in Annexes 1 and 3, Technical and Economic Analyses. The policy context of these grains is described in Annex 4, Policy Environment.

level to orient the breeding and agronomic research work. The project will assist with development of research design based on farm-trials and farmer feedback and will finance short-term specialists as needed to strengthen the on-going adaptive testing.

Improved linkages with relevant International Agricultural Research Centers.

Inputs

The primary input will be long-term technical assistance in the form of cereal breeders and agronomists. One maize breeder will be posted at the Kitale National Research Station which will be the headquarters of the national maize program. The breeder's primary responsibility will be to assist the Kenyan staff in the planning and execution of the national program. A second breeder will be stationed at the Embu Regional Research Station to assist with breeding work for the mid-altitude, medium-maturing varieties in the Central Highlands. This individual will lend support to those activities of the national program being conducted at the Katumani and Mtwapa stations. A third breeder (for sorghum and millet) will be stationed at Kakamega, the headquarters of the national sorghum/millet program. He will assist the leadership of this program in design and execution of scientific activities conducted out of Kakamega and Katumani and will assist with the breeding work at the Alupe sub-station.

Two long-term agronomists will be on the technical assistance team, one stationed at Kakamega and a second at Embu. The Kakamega-based agronomist will support the national maize program's agronomic research, parallel to the Kitale-based breeder. In addition, a large proportion of time will be devoted to the regional maize and sorghum adaptive testing and trials conducted at the Kakamega Regional Station. The maize regional programs will execute a large part of their research trials on farmers' fields in collaboration with extension staff. The proper interpretation of these on-farm results and their integration with the on-going breeding programs will be a major responsibility of this scientist. In this capacity he/she will work closely with the research/extension liaison staff. This scientist is also to provide agronomic input as needed for the national sorghum and millet program.

A second agronomist specializing in maize will be posted at Embu. Embu is both a major national and regional site for maize research. The agronomist's primary function will be to assist with adaptive research for the Central Highlands. Guidance and assistance with agronomic research at the Katumani and Mtwapa station will also be provided.

All the long-term technical experts will be present for seven years. During that time the technical assistance team will have, in addition to their main responsibilities of program and scientific support, an important role in providing appropriate on-the-job training and guidance to Kenyan research staff. Six and one-half person years of short-term expertise will be provided as needed to give additional, specialized help to these research programs in the areas of technical, scientific inquiry or socioeconomic issues.

3. Human Resources Development

Objectives

All evaluations made of Kenya's agricultural research system quickly conclude that the lack of trained manpower continues to be the most crucial constraint in the planning, organization and management of research. The Sessional Paper, the GOK's major current policy statement, recognizes that "a program of training and upgrading research staff must be undertaken and the terms of service modified." This component's purpose therefore is to contribute to the upgrading of the human resource base of Kenya's research system with particular emphasis on the training needs in systems management and maize, sorghum and millet research.

Output

The public research system currently has 469 agricultural research officers[1/] of whom only 44% can be considered to have the minimum scientific training, the MSc. degree, necessary to perform their functions. The system is especially weak in the category of Ph.D. scientists. Only 16 are in the system, just 4%, and of these only three work on crop programs. Overcoming this remarkably low level of training will be a lengthy and costly process. The Task Force Report proposes training 60 Ph.D.s and 300 MSc.s over the coming five years, boosting the proportions of adequately trained scientists in the system to 62%. The Pre-Appraisal Mission concurs in this ambitious program, noting that "the alteratives of reducing the rate of training ... would amount to further lowering the productivity of the research system."

This component will train the following numbers of Kenyan scientists:

43 researchers trained in the U.S. to the Ph.D. level for

1/Excludes Veterinary Research Division.

maize and sorghum/millet research work.

- 70 researchers trained in the U.S. and Nairobi to the MSc. level for maize and sorghum/millet research work.
- 12 researchers trained in the U.S. to the Ph.D. level for work in other priority fields of research.
- 18 researchers trained in the U.S. and Nairobi to the MSc. level for research work in other priority fields..

Representative disciplines will include plant breeding, agronomy, plant pathology, agricultural economics and soil science.

The numbers and disciplines were determined by examination of the current level of trained technicians assigned to these research programs. There is only one Ph.D. breeder in the research system. That individual is assigned to vegetable research. The maize program has three MSc. breeders and thirteen breeders with a BSc. or lower degree.

The system has one Ph.D. agronomist (not assigned to maize or sorghum/millet) and one Ph.D. pathologist in the National Agricultural Laboratory. The training levels targeted in this component will, over the ten years life of the project, bring sufficient well-trained scientists into these programs to create the critical mass required for technically sound, Kenyan-conducted research.

The depth of productive scientists is very shallow throughout all other research programs, with the possible exceptions of tea and coffee research. System-wide there are no Ph.D.s and only twenty-five MSc.s in such specialized fields as agricultural economics, soil science, and plant pathology. The unspecified Ph.D. and MSc. training slots identified above are to be used in support of other priority needs as identified over time. It should be noted that those scientists whose training is related to the maize, sorghum and millet programs will in fact be able to work on other commodities; e.g. a "maize" agronomist can easily be productive on wheat or oilseed-related research.

Other forms of training for scientists will include annual seminars on important research issues to be given in Kenya by noted researchers; internships and "practical attachments" of Kenyan scientists with research organizations in the United States and elsewhere; and annual workshops conducted in Kenya on research methodology for junior researchers.

Training for management will concentrate on two areas; targeted study-tours for senior headquarters and station management and practical training in the operation of new administrative systems

for mid-level staff. Many managers now working in the research system will have their functions and responsibilities altered, possibly radically, with the restructuring of the system. Re-training of these individuals to discharge the new tasks required of them will be a crucial element of this component. On-the-job training and short-term courses for the lower level managers and administrators will be done largely under the Planning and Management Component.

Under the reorganization planned for KARI, a Manpower Development and Training Office will be created under the jurisdiction of the Deputy Director for Planning, Finance and Administration. As the name suggests, this office will have the important task of anticipating the system's manpower needs and planning, often in coordination with donors, the accomplishment of training objectives. This office will also address the issues of employees' scheme of service and retention of skilled manpower within the system. The research system has been adversely affected by attrition of trained personnel to either the parastatal or private sector. As the Pre-Appraisal Mission stated, "it would be inappropriate for the system to invest so much in training without making adequate provision for the absorption, retention and encouragement of such highly trained staff". With the grouping of all research activities under the KARI parastatal structure, all employees will come under the scheme of service for Research Institutes which is more favorable than that of GOK line ministries. The project includes a Condition Precedent to disbursement of funds for training until this improved scheme of service is in effect and has been designed with accommodation of the recent Ramtu Commission which recommended increased salary levels for Kenya civil servants. The retention of productive scientists is expected to be enhanced as the system becomes more able to support skilled, dedicated technicians with the necessary operational needs (vehicles, expense money, etc.) and programming needs (coordinated, results-oriented programs).

Inputs

The post-graduate training will be provided at both the University of Nairobi and selected universities in the United States and other overseas locations. Fifty-four of the MSc. students will be trained at Nairobi, with the remaining thirty-four sent to overseas institutions, primarily in the U.S. At present the University of Nairobi's capacity to train graduate students is limited by constraints in supervisory staff, post-graduate research facilities and support costs. For this reason the number and pace of entries to Nairobi is geared to the gradual expansion of the university's capabilities. Students trained through this component will receive additional financial support in their second year to cover the cost of their research. The number of

MSc. students sent to the U.S. will gradually diminish as the number enrolled in the University of Nairobi increases.

The Ph.D. training will be done at U.S. land-grant institutions with strong maize research capabilities. The pace of Ph.D. training will be slow in the initial years, building to an annual maximum of eight entrants during the middle stage of the project. This pace permits a gradual build-up in the reservoir of eligible MSc. holders and allows for the satisfaction of the C.P. concerning the scheme of service to be developed properly without a severe disruption of the training schedule.

Important features of the Ph.D. training will be the Kenya-focus of research and the trainer follow-through. All Ph.D. dissertation research will be done in Kenya on Kenyan agricultural problems. Technical assistance individuals and senior Kenyan scientists will participate in local supervision of students. Upon the return of each trainee to his or her work assignment, follow-through scientific guidance will be provided by the student's major professor through periodic short-term visits to Kenya for a two or three year period.

Short-courses for research technicians will be organized by KARI and conducted at the Egerton College Agriculture Resources center. Short-term specialists will be used to assist with the preparation and presentation of these courses as necessary, with the emphasis however will be on using Kenyan scientists.

4. Research Fund

Objective

The objective of the Agricultural Research Fund is to foster greater scientific cooperation between government, university, and private agricultural researchers so that Kenya can profit from a truly "integrated" research system benefiting from shared information and cooperative efforts.

A number of agribusiness concerns are involved in agricultural research in Kenya. These research activities include fairly sophisticated research programs such as the tea and coffee research stations, to one-man efforts limited simply to testing outside materials. Several of the private companies doing agricultural research in Kenya have access to extensive resources and outside technology, which can have an impact on agricultural development in Kenya in a relatively short time. Some of these companies have created new industries and new export crops where none existed before. Private, university and parastatal research efforts have resulted in numerous agricultural advances. Private agricultural concerns have made significant advances in such areas as barley, tobacco, french beans, sunflower and sesame seed, all

of which contribute to the nation's need for labor-intensive, higher value commodities. University researchers recently have registered progress in the improvement of amaranth, an ancient grain with new promise for Kenya. Despite such examples of scientifically sound, problem-solving research, productive linkages and collaboration between these distinct parties active in agricultural research have been limited and weak. As the Task Force report correctly points out, "high calibre scientific potential exists in universities and colleges and the private sector in Kenya which could be exploited to contribute usefully to basic and strategic technologies in agricultural research and development."

Output

One element of the fund will provide funds through a "contract window" to researchers outside the GOK research system to undertake specialized studies or tasks which the GOK system either does not have the technical capacity or fiscal resources to execute. These contracts will be directed to the Kenyan university system or to private researchers to perform work which will complement activities where the bulk of the work is being executed within the GOK research system. Another element of the fund will be designed to support requests for funding of innovative and independent research efforts being conducted by the academic or private sectors. The objective in this case will be to provide resources for research in those fields of endeavor which are either too specialized, have immediate commercial application, or where the risk of failure is too high to support the activity within the public system. Examples of activities which might be funded through this "innovative research window" of the fund include experimental work with new cash crops for export and experiments with new processing techniques for commercial cash crops.

The fund will also make money available for the training of Kenyan private sector staff in appropriate aspects of agricultural research. Short-term, specialized training in the form of study tours or internships as well as degree training can serve to further the long-term capability of private firms to advance agricultural innovation. Matching funds will be sought for all private sector training grants, either from the grant recipient or other sources such as the newly-initiated Rotary International Foundation "Freedom from Hunger" Scholarship Program.

During the past year several commercial agricultural interests have inquired of AID about financial support for specific problem-oriented research needs. It is for these types of activities that the fund is designed. Some example have been:

- problems with propagation of jojoba rootstock;

- interest to conduct agronomic tests of sunflower multi-cropped with sugarcane and rice;

- importation and testing of improved sesame lines;

- research on processing and marketing of sorghum food products.

The fund will be managed by a small secretariat staff responsible to the Deputy Director for Planning, Finance and Administration. The KARI Board of Management will appoint a Research Fund Sub-Committee representing the GOK, the private and university sector and USAID to oversee fund operations. Grantees will be selected, in the case of contract research, on the basis of their technical Scope of Work and institutional capacity and in the case of the innovative research, on relevance to national priorities, scientific soundness and institutional capacity. Grant fund accounting and research monitoring will receive heavy emphasis. These are two areas in which grant-funded research most often encounters problems which limit its effectiveness. These functions will be performed by KARI headquarters staff in the Department of Planning, Finance and Administration.

Inputs

The project will provide funds for both types of grants-contract and innovative non-governmental. The funding for the contract grants will be $75,000 per year while the grant money available annually for independent research will gradually increase from an initial level of $75,000 to $420,000 for the final three years. In addition to making grant funds, available, the project will assist KARI with establishing the administrative procedures essential for the proper management of the fund.1/ One short-term technical assistance individual will work with the KARI fund sub-committee and fund manager on determining selection criteria, designing the grant application and agreement procedures, formulating review and selection methods, and clear and effective means for disbursing and accounting for grant moneys. No grants will be made through the fund until all the necessary mechanisms have been developed to the satisfaction of KARI management and AID. Annual short-term consultancies will be

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1/ AID and Rockefeller Foundation have discussed the possible role of Rockefeller in providing this needed technical guidance. Given its expertise in this field, Rockefeller could be of great assistance. At the time of the Project Paper final preparation Rockefeller was unable to yet give a firm commitment.

available, if needed, to review and advise on fund operations.

Limited commodities, such as a vehicle and office equipment will be provided for fund operation. AID will assist with operation and maintenance costs on a decreasing scale over the life of the project.

IV. Implementation Arrangements

A. Administrative Arrangements

1. Government of Kenya

A condition precedent to initial disbursement of AID funds under this project is the restructuring of the Kenyan government agricultural research system under a single operating entity, the Kenya Agricultural Research Institute. The Government of Kenya also recognizes the significance of this step as evidenced in the plan for reorganization proposed in the Task Force report and refined during the GOK/Donor Pre-Appraisal Mission. Therefore, the first administrative steps which must be taken by the Government involve the implementation of the blueprint for the new KARI. No legislative action is required since the Kenya Science and Technology Act of 1979 provides already the basic legal framework which will support the revitalized organization. The Minister of Agriculture and Livestock Development is empowered to appoint a new Board of Management for the organization and select a Director. Deputy directors and assistant directors must then be chosen and the staffing completed for the headquarters administrative structure along the lines of the organigram included in the Institutional Analysis, Annex G 5. Many of these initial actions are the subject of a condition precedent to initial disbursement for the project.

Once the KARI structure becomes operational, the new organization must rapidly turn its attention to the development and installation of new management and budgeting systems which will permit the realization of the goals set in the Task Force report regarding setting of a prioritized research agenda. In coordination with the Ministry of Finance, a new budgetary structure must be established which will allocate monies to the research system according to the priorities set for commodity research. A planning system must be established at the central headquarters which will allocate funds to stations on the basis of established priorities. Coordination mechanisms for national commodity programs must be strengthened where they exist and developed for other commodities so that the research approach to a particular commodity proceeds in a rational, efficient fashion throughout

the country.

Operating systems which exist within the current KARI are insufficiently developed to support the greatly expanded organizational structure of an integrated national research organization. During the first year of operation, the management of KARI must concentrate on the development and installation of strengthened and expanded systems of procurement, financial management, data processing, equipment maintenance and the like. In the succeeding years, these systems must be fully developed at the station level so that available resources are used efficiently and in a fully accountable fashion.

Regarding the GOK's role vis-a-vis the AID project, the vast majority of services to be provided by the project will be obtained through two host-country contracts. These contracts will be written with the reorganized KARI which, by statute, is empowered by the Government of Kenya to enter into contractual agreement of goods and services. It is anticipated that all technical assistance and training will be obtained under one host-country contract. Off-shore commodity procurement will require the services of a Procurement Services Agent (PSA) which will also be obtained through a host-country contract. Establishment of the research fund component of the project is expected to require the creation of a Project Selection Committee and a specific management unit under the Board of Management of KARI. Only when these administrative structures are in place will AID provide financing for the Research Fund.

Liaison between the AID technical assistance team and the reorganized KARI on key administrative issues will be conducted primarily between the Director of KARI and the agricultural economist attached to the Office of Planning and Manpower Development. Members of the technical assistance team assigned to research stations in the field will liaise principally with the Officers in Charge of the stations to which they are assigned. In two of three cases, these station heads are also the designated national coordinators of key research programs, namely the maize and sorghum/millet commodity programs.

2. AID

Responsibility for AID's oversight of the project will rest with the Mission's Office of Agriculture which will be supported as required by other offices of USAID/Kenya and REDSO including the Mission's Office of Projects, the Regional Legal Advisor and the Regional Financial Management Center (RFMC). Within the Office of Agriculture, a Project Officer

working under the direction of the Chief of the office will be assigned line responsibility for monitoring of project progress from both an administrative and technical perspective.

Initial actions which will be required on AID's part will be assistance to KARI in the preparation of a complete scope of work for the technical assistance and training contract, preparation of procurement documentation necessary to initiate the PSA contract, oversight of the bidding processes for all such contracts, and review of all contractual documentation to assure compliance with AID requirements for host-country contracts.

Once the project passes this initial start-up phase, the role of the Project Officer and other mission staff will become more heavily focused on monitoring and evaluation. AID, in association with the GOK, will develop the scopes of work for periodic full-scale evaluations of project progress. It is planned that AID, working closely with KARI, will contract directly for services to execute these major evaluations.

3. Contractors

The principal contractor for the project will be responsible for the technical and managerial requirements of the project as well as its training needs. The contract team must include a strong U.S.-based management unit capable of fulfilling those financial and administrative requirements of the field team which can only be met from the United States. Furthermore, the U.S. administrative arrangements must include the capacity to arrange for the placement of significant numbers of participants in MSc. and Ph.D. programs at leading agricultural universities. In the field, the technical team must be supported by a high calibre administrative team consisting of an administrative assistant and an accountant, both local hire, under the direction of the Agricultural Economist assigned to the Deputy of Planning, Finance and Administration. It is expected that this individual will also serve as the team leader of the technical assistance and training operations.

The overseas training element of the project will be handled by a full-time unit in the United States. This unit may be in the university sector or may be independent of any university or consortium. It is necessary, however, that this unit be completely familiar with the Kenya research context, knowledgable about the Kenyan educational system and the job responsibilities to which the trainees will return. Close coordination must be maintained between this U.S.-based training operation, the technical assistance team in Kenya, and with KARI management. It is vital that this training

TABLE I
SUMMARY COST ESTIMATE
AND FINANCIAL PLAN BY COMPONENT

Phase I

(000 US$)

Input	AID FX	AID LC	GOK FX	GOK LC	TOTAL FX	TOTAL LC	COMBINED TOTAL
COMPONENT 1: PLANNING AND MANAGEMENT	2,534.4	1,532.7	0.0	4,788.6	2,534.4	6,321.3	8,855.7
COMPONENT 2: MAIZE, SORGHUM AND MILLET COMMODITY PROGRAMS	4,420.7	928.8	0.0	7,808.2	4,420.7	8,737.0	13,157.7
COMPONENT 3: HUMAN RESOURCE DEVELOPMENT	3,608.2	431.6	0.0	816.6	3,608.2	1,248.2	4,856.4
COMPONENT 4: NON-GOVERNMENTAL RESEARCH	83.9	798.5	0.0	378.4	83.9	1,176.9	1,260.8
EVALUATION	150.0	0.0	0.0	50.0	150.0	50.0	200.0
ADMINISTRATION	227.6	473.0	0.0	87.0	227.6	560.0	787.6
COMPONENT SUB-TOTAL	11,025.0	4,164.6	0.0	13,928.9	11,025.0	18,093.5	29,118.5
ROUNDED TO	11,065.0	4,185.0	0.0	13,940.0	11,065.0	18,125.0	29,190.0

NOTE: $1.31 Million equivalent of the GOK Contribution to Operations & Maintenance is to be provided by Counterpart Funds.

TABLE IA
SUMMARY COST ESTIMATE
AND FINANCIAL PLAN BY COMPONENT

LOP

(000 US$)

Input	AID FX	AID LC	GOK FX	GOK LC	TOTAL FX	TOTAL LC	COMBINED TOTAL
COMPONENT 1: PLANNING AND MANAGEMENT	4,970.9	2,328.4	0.0	17,792.2	4,970.9	20,120.6	25,091.5
COMPONENT 2: MAIZE, SORGHUM AND MILLET COMMODITY PROGRAMS	12,077.2	928.8	0.0	31,966.6	12,077.2	32,895.4	44,972.6
COMPONENT 3: HUMAN RESOURCE DEVELOPMENT	11,658.8	1,170.4	0.0	3,056.0	11,658.8	4,226.4	15,885.2
COMPONENT 4: NON-GOVERNMENTAL RESEARCH	176.4	4,250.8	0.0	1,354.9	176.4	5,605.7	5,782.1
EVALUATION	480.0	0.0	0.0	160.0	480.0	160.0	640.0
ADMINISTRATION	440.8	1,747.3	0.0	310.2	440.8	2,077.5	2,518.3
INPUT SUB-TOTAL	29,804.1	10,445.8	0.0	54,639.8	29,804.1	65,085.6	94,889.7
ROUNDED TO	29,895.0	10,505.0	0.0	54,700.0	29,895.0	65,205.0	95,100.0

NOTE: $2.57 Million equivalent of the GOK Contribution to Operations & Maintenance is to be provided by Counterpart Funds.

TABLE 2
SUMMARY COST ESTIMATE
AND FINANCIAL PLAN BY INPUT

PHASE I

(000 US$)

Input	AID FX	AID LC	GOK FX	GOK LC	TOTAL FX	TOTAL LC	TOTAL
TECHNICAL ASSISTANCE	4,451.4	578.1	0.0	0.0	4,451.4	578.1	5,029.5
TRAINING	3,857.2	1,340.0	0.0	816.6	3,857.2	2,156.6	6,013.8
COMMODITIES	2,338.8	0.0	0.0	543.4	2,338.8	543.4	2,882.2
OPERATIONS & MAINTENANCE	0.0	682.9	0.0	2,668.0	0.0	3,350.9	3,350.9
CONSTRUCTION	0.0	448.3	0.0	0.0	0.0	448.3	448.3
RESEARCH FUND	0.0	642.4	0.0	274.9	0.0	917.3	917.3
LOCAL PERSONNEL	0.0	0.0	0.0	9,488.9	0.0	9,488.9	9,488.9
EVALUATION	150.0	0.0	0.0	50.0	150.0	50.0	200.0
ADMINISTRATION	227.6	473.0	0.0	87.0	227.6	560.0	787.6
INPUT SUB-TOTAL	11,025.0	4,164.6	0.0	13,928.9	11,025.0	18,093.5	29,118.5
ROUNDED TO	11,065.0	4,185.0	0.0	13,940.0	11,065.0	18,125.0	29,190.0

NOTE: $1.31 Million equivalent of the GOK Contribution to Operations & Maintenance is to be provided by Counterpart Funds.

TABLE 2A
SUMMARY COST ESTIMATE
AND FINANCIAL PLAN BY INPUT

LOP

(000 US$)

Input	AID FX	AID LC	GOK FX	GOK LC	TOTAL FX	TOTAL LC	TOTAL
TECHNICAL ASSISTANCE	12,061.5	630.9	0.0	0.0	12,061.5	630.9	12,692.4
TRAINING	12,178.2	2,874.5	0.0	3,056.0	12,178.2	5,930.5	18,108.7
COMMODITIES	4,643.6	0.0	0.0	1,329.8	4,643.6	1,329.8	5,973.4
OPERATIONS & MAINTENANCE	0.0	682.9	0.0	8,854.8	0.0	9,537.7	9,537.7
CONSTRUCTION	0.0	448.3	0.0	0.0	0.0	448.3	448.3
RESEARCH FUND	0.0	4,041.9	0.0	956.5	0.0	4,998.4	4,998.4
LOCAL PERSONNEL	0.0	0.0	0.0	39,972.6	0.0	39,972.6	39,972.6
EVALUATION	480.0	0.0	0.0	160.0	480.0	160.0	640.0
ADMINISTRATION	440.8	1,767.3	0.0	310.2	440.8	2,077.5	2,518.3
INPUT SUB-TOTAL	29,804.1	10,445.8	0.0	54,639.8	29,804.1	65,085.6	94,889.8
ROUNDED TO	29,895.0	10,505.0	0.0	54,760.0	29,895.0	65,205.0	95,100.0

NOTE: $2.57 Million equivalent of the GOK Contribution to Operations & Maintenance is to be provided by Counterpart Funds.

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TABLE 3:
PROJECTION OF EXPENDITURES
BY FISCAL YEAR
A.I.D.
PHASE I

(000 US$)

Input	FY 86	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	TOTAL
COMPONENT 1: PLANNING AND MANAGEMENT	0.0	1,760.4	1,324.7	982.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4,067.1
COMPONENT 2: MAIZE SORGHUM AND MILLET COMMODITY PROGRAMS	0.0	2,732.6	1,237.1	1,379.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5,349.6
COMPONENT 3: HUMAN RESOURCE DEVELOPMENT	0.0	647.3	1,113.1	1,504.4	480.0	240.0	55.0	0.0	0.0	0.0	0.0	4,039.7
COMPONENT 4: NON-GOVERNMENTAL RESEARCH	0.0	275.2	290.3	317.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	882.5
EVALUATION	0.0	0.0	0.0	150.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	150.0
ADMINISTRATION	0.0	278.6	215.8	206.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	700.6
INPUT SUB-TOTAL	0.0	5,694.1	4,181.0	4,539.5	480.0	240.0	55.0	0.0	0.0	0.0	0.0	15,189.6
ROUNDED TO	0.0	5,710.0	4,195.0	4,555.0	485.0	245.0	60.0	0.0	0.0	0.0	0.0	15,250.0

(000 US$)

Input	FY 86	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	TOTAL
COMPONENT 1: PLANNING AND MANAGEMENT	0.0	1,760.4	1,324.7	982.0	848.2	477.4	853.1	500.3	245.2	161.1	147.1	7,299.3
COMPONENT 2: MAIZE SORGHUM AND MILLET COMMODITY PROGRAMS	0.0	2,732.6	1,237.1	1,379.8	1,551.2	1,541.7	2,043.2	1,196.6	903.8	294.8	125.0	13,006.0
COMPONENT 3: HUMAN RESOURCE DEVELOPMENT	0.0	647.3	1,113.1	1,504.4	1,687.1	1,629.9	1,824.5	1,768.9	1,292.1	782.8	379.3	12,829.2
COMPONENT 4: NON-GOVERNMENTAL RESEARCH	0.0	275.2	290.3	317.0	388.4	449.6	472.5	524.4	560.5	569.6	579.7	4,427.2
EVALUATION	0.0	0.0	0.0	150.0	0.0	0.0	150.0	0.0	0.0	180.0	0.0	480.0
ADMINISTRATION	0.0	278.6	215.8	206.2	200.3	203.2	337.4	227.8	220.3	208.5	110.0	2,208.1
INPUT SUB-TOTAL	0.0	5,694.1	4,181.0	4,539.5	4,675.2	4,501.7	5,680.6	4,218.0	3,221.9	2,196.8	1,341.2	40,249.9
ROUNDED TO	0.0	5,710.0	4,195.0	4,555.0	4,690.0	4,520.0	5,695.0	4,235.0	3,235.0	2,210.0	1,355.0	40,400.0

TABLE 4:
PROJECTION OF EXPENDITURES
BY FISCAL YEAR
G.O.K.
PHASE I

(000 US$)

Input	FY 86	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	TOTAL
COMPONENT 1: PLANNING AND MANAGEMENT	0.0	1,599.7	1,580.0	1,608.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4,788.6
COMPONENT 2: MAIZE SORGHUM AND MILLET COMMODITY PROGRAMS	0.0	1,986.5	2,831.8	2,989.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7,808.2
COMPONENT 3: HUMAN RESOURCE DEVELOPMENT	0.0	191.5	273.9	351.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	816.6
COMPONENT 4: NON-GOVERNMENTAL RESEARCH	0.0	114.2	130.9	133.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	378.4
EVALUATION	0.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0
ADMINISTRATION	0.0	22.0	31.7	33.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	87.1
INPUT SUB-TOTAL	0.0	3,913.9	4,848.3	5,166.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13,928.7
ROUNDED TO	0.0	3,915.0	4,855.0	5,170.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13,940.0

LOP

(000 US$)

Input	FY 86	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96	TOTAL
COMPONENT 1: PLANNING AND MANAGEMENT	0.0	1,599.7	1,580.0	1,608.9	1,634.0	1,676.1	1,714.0	1,780.2	2,223.2	1,941.2	2,034.9	17,792.1
COMPONENT 2: MAIZE SORGHUM AND MILLET COMMODITY PROGRAMS	0.0	1,986.5	2,831.8	2,989.9	3,148.4	3,116.1	3,278.5	3,421.2	3,580.5	3,717.1	3,896.7	31,966.6
COMPONENT 3: HUMAN RESOURCE DEVELOPMENT	0.0	191.5	273.9	351.2	329.7	409.2	415.5	415.0	301.4	203.7	116.0	3,055.9
COMPONENT 4: NON-GOVERNMENTAL RESEARCH	0.0	114.2	130.9	133.4	135.2	139.0	140.7	144.8	143.2	140.0		1,354.8
EVALUATION	0.0	0.0	0.0	50.0	0.0	0.0	50.0	0.0	0.0	60.0	0.0	160.0
ADMINISTRATION	0.0	22.0	31.7	33.3	32.4	32.8	35.0	33.7	35.5	34.7	19.0	310.2
INPUT SUB-TOTAL	0.0	3,913.9	4,848.3	5,166.7	5,327.1	5,369.4	5,631.8	5,790.7	6,285.3	6,100.0	6,206.6	54,639.8
ROUNDED TO	0.0	3,915.0	4,855.0	5,170.0	5,335.0	5,380.0	5,640.0	5,795.0	6,295.0	6,105.0	6,210.0	54,700.0

coordinator work on a continuing close basis with the KARI Office of Planning and Manpower Development.

Procurement of goods in the U.S. will follow the procurement plan outlined in this paper, as refined during the later phases of implementation by the KARI management working in association with members of the technical assistance team. A PSA will be selected through a host-country procurement process, utilizing the IQC mechanism established in AID/W if possible.

B. Implementation Plan

1. Start-up Phase (months 1 - 9)

The first nine months of the project will be occupied with the activities necessary to initiate the principal project activities. The Government of Kenya will be engaged in the development of the reorganized KARI including the naming of the KARI Board of Management, the KARI Director and the development of the KARI headquarters management staff. The MOALD must also establish the physical location for the new headquarters team. With AID assistance, the MOALD must also prepare a series of procurement documents for obtaining the technical and training services as well as the commodity procurement services required for the execution of the project. Issuance of the solicitation documents, review and evaluation of proposals, selection of contractors and the negotiation and preparation of contracts will consume the remainder of the time dedicated by GOK staff to the project during the start-up period.

AID is prepared to assist the MOALD in necessary pre-implementation activities during the next several months of transition to the new research system. Project funds have been identified for this purpose and disbursement of them are not dependent on the GOK satisfying the Conditions Precedent.

Several months before the completion of contracting arrangements for the technical assistance and training components of the project, a host-country contract with a U.S.-based procurement services agent will be let. This arrangement will allow for the procurement of the initial commodities required for the management and research components of the project and for those goods required by the TA team members on arrival. The PSA arrangement is expected to remain in existence throughout the life of the project to facilitate the procurement of goods from the U.S. and from other sources outside of Kenya as required. Further details regarding the procurement of goods for the project are provided in Annex F.

AID's role during the start-up period will be one of assisting KARI through its critical transition state, monitoring the satisfaction of conditions to initial disbursement and support to the MOALD/KARI staff in the procurement actions necessary to obtain the goods and services required to execute the project. AID will also execute directly the procurement of design and construction services required to build housing for those technicians who will live outside of Nairobi on a long-term basis. AID will arrange for the oversight and supervision of the construction.

2. Initial Implementation Phase (months 10 - 15)

Once the preliminary actions have been taken to establish KARI as a functional entity and to contract for the goods and services required for the project, contract implementation can begin.

The technical assistance and training requirements for the project are expected to be executed through a single contract with provision for subcontracts to provide specialized skills or services. The objective of the entire project is to assist the GOK in the development of a research system which functions in a well-planned and coordinated manner, which selects and executes research activities on the basis of economically justifiable priorities and which trains people to meet the needs of the system as defined by management. It was judged advisable to apply the same coordinated approach to the provision of services and training through the AID-financed project. The material below is organized by project component, even though the same contractor will be providing all the personnel and services discussed.

3. Full Implementation Phase (months 16-60)

Planning and Management Component:

- Arrival of Research Counselor to begin three year tour;
- Arrival of Agricultural Economist (and Team Leader) to begin five year tour;
- Establishment of Nairobi-based Project Administration Unit using quality local personnel;
- Start of short-term management specialist terms for following areas: financial management, manpower planning and development, station maintenance, procurement, data processing and information systems

development;

- Begin on-the-job training for administrative staff as required in above areas of concern.

Maize and Sorghum/millet:

- Arrival of maize breeders (to Kitale and Embu);
- Arrival of agronomists (to Kakamega and Embu);
- Arrival of sorghum/millet breeder (to Kakamega);

Human Resources Development Component:

- Establishment of Manpower Development Office in KARI headquarters (with assistance from Planning and Management Component);
- Study - tour number 1 for senior KARI management and station directors;
- First tranche of MSc. and Ph.D. students enter training. Note: This may be delayed if Condition Precedent concerning modified research scientist scheme of service is not satisfied;
- Conduct initial Research Methodology seminar.

Agricultural Research Fund:

- Establishment of all administrative mechanisms and procedures for grant review and management;
- when above is accomplished, begin accepting and reviewing grant applications.

4. The Ten-Year Program

Long-term technical assistance to the management and planning improvement component of the project is expected to continue for a period of approximately five years, following which short-term support will be provided to reinforce the newly installed systems and planning mechanisms at the central headquarters. The installation of systems and accompanying human resources development required to properly apply those systems will be carried out through short-term technical assistance throughout the life of the project.

Entrance into Ph.D. training programs will commence in FY 87 and will be phased over a period ending in FY 93. The last

participants from the program will be expected to return to Kenya in FY 96. MSc. training will also commence in FY 87 and proceed in a phased fashion with the last participants entering the program in FY 93 and graduating in FY 95. Short-term training programs in specialized research management and research skill topics will continue throughout the life of the project.

Long-term technical assistance to the maize and sorghum/millet commodity programs will be phased with the initial efforts of three scientists beginning in FY 87. Two other scientists, an agronomist to be based at Embu and a sorghum/millet breeder to be based at Kakamega will arrive at those stations during FY 88. All long-term technical assistance to the project is expected to be completed by FY 94. Short-term technical support in specialized fields will be available as desired throughout the life of the project.

Financing activities under the Research Fund will commence in FY 87 and will continue through FY 94. The last two years of the project will be utilized to complete outstanding research work and to complete a thorough assessment of the results of the grant-funded program. Commodity procurement work from sources other than Kenya will be handled under the PSA contract throughout the life of the project.

The table below summarizes the flow of technical assistance and training inputs throughout the the life of the project.

Annex F. provides further details.

Summary of Technical Assistance
and Training Inputs

Input	Units	Project Month Beginning	Ending
Management/Planning Component			
Research Counsellor (LT)	36 p/m	8	43
Research Mgmt Support (ST)	18 p/m	1	120
Research Planning Spec. (LT)	60 p/m	8	67
Research Planning Support (ST)	14 p/m	1	120
Financial Mgmt Systems Design and Support (ST)	133 p/m	8	120
Manpower Development Systems	68 p/m	8	120

Design and Support (ST)			
Procurement Systems Design and Support (ST)	12 p/m	8	108
Data Processing Systems Design and Support (ST)	14 p/m	8	108
Station Maintenance Systems Design and Support (ST)	112 p/m	8	120
Library and Information Systems Design and Support (ST)	13 p/m	8	108
Audit Systems Design and Support (ST)	8 p/m	8	108

Input	Units	Project Month Beginning	Ending
Commodity Research			
Maize Breeder-Kitale (LT)	72 p/m	8	80
Maize Breeder - Embu (LT)	84 p/m	8	92
Maize Agronomist-Embu (LT)	84 p/m	20	104
Sorghum/Millet Breeder-Kakamega (LT)	84	8	92
Maize/sorghum Agronomist - Kakamega (LT)	84 p/m	8	92
Short-term specialists (Ag. Econ., Pathology, Virology, Entomology, Pest Management, Agrometeorology, Soil Fertility)	77 p/m	12	120

Input	Units	Project Month Beginning	Ending
Human Resources Development			
Ph.D. - Maize, Sorghum/Millet	43	11	118
Ph.D. - Other Specialities	12	23	94

Ms.C. - Maize, Sorghum/Millet	70	11	106
Ms.C. - Other Specialities	18	23	106
Research Methodology Seminar	195	8	114
Research Update Seminar	300	8	114
Research Accounting Seminar	280	8	114
Station Maintenance Seminar	168	8	114
Computer Literacy Seminar	200	8	114
Visiting Scientists Program	40	8	114
Management Seminar (U.S.)	30	12	36
Research Fund			
Fund Coordinator	32 p/m	8	108
Grants/Contracts Made	156	8	114

C. Monitoring and Evaluation Plan

1.. Monitoring

Monitoring of the operations of the total agricultural research program will be the function of the planning and evaluation unit which is to be part of the reorganized KARI management structure. This unit will be responsible for the formulation of reporting documents to be completed by the station network and for the development of narrative reports and statistical programs which will summarize the status of research efforts. A program of field visits for the verification of written materials supplied by the stations will also be developed. A primary responsibility of the AID-financed technical advisor assigned to this unit will be to assist in the planning and execution of these monitoring functions.

The USAID project officer assigned to the project will devote the majority of his time to monitoring the management and technical results flowing from the AID-financed project. Frequent liaison with the Director of KARI and the management team stationed at the national headquarters will assure monitoring of the management support and training aspects of the project. Contact on a regular basis with the management unit of the Research Fund will be essential to review Fund-sponsored activities. It is anticipated that AID will

also be a voting member of the Project Selection Committee for those AID-financed projects underwritten by the Research Fund. Field visits by the project officer and other concerned AID staff will be necessary to review the technical work being undertaken for maize and sorghum and millet and to review the development of improved management systems at the station level.

2. Evaluation

This project is a long-term effort which will require thorough evaluation to assess progress against stated goals, identify any key constraints and to suggest modifications as required to overcome those constraints. Changes in environmental, bureaucratic and economic conditions in the country over the project period of ten years will also require periodic review and assessment to determine their impact on the operation and outcome of project activities. Prior to the first evaluation, sufficient time should be allowed for initial start-up activities and for the project inputs to begin to produce their first results. Therefore, the first major evaluation will be scheduled three years after the initial obligation of project funds for phase one. This evaluation will precede the authorization for the project's second phase and will assist AID and the GOK in making any suitable project design modifications. Thereafter, subsequent major evaluations will be conducted at two-year intervals.

During the first several years, the AID financed project will concentrate a significant amount of its efforts on the upgrading of the management and planning functions of the Kenyan research system. Therefore, the first evaluation will focus on that aspect of the project. The next two evaluations will concentrate increasingly on the management and technical products of the commodity research programs being supported by AID as well as the products being produced under the Research Fund. The last two evaluations will be able to provide an assessment of the first results from the training program. The final evaluation, to be held in the ninth year of the project, will provide a definitive assessment of the accomplishments of all aspects of the project a year before the project is scheduled to terminate. Results of this assessment will form the basis for the second phase of AID's efforts to support agricultural research in Kenya.

All such evaluations will be conducted by a team of specialists who will have no contractual linkages to the firm(s) responsible for the execution of the project. AID will contract directly for the services of the evaluation team, probably through the available IQC mechanism. The composition of the evaluation teams will vary over time. Expertise which will be needed to evaluate the project over its lifetime will

include specialists in the following fields: research management, human resources development, agricultural economics, rural sociology, maize breeding and agronomy and sorghum and millet breeding and agronomy. $480,000 have been set aside in the project budget to execute the evaluation program.

V. Financial Plan and Analysis

A. Financial Plan

A summary of the Financial Plan is presented in Tables 1-4. Supporting tables are found in the Unattached Annex H.5. The total cost of all inputs to the Project is estimated at $95.1 million. Of this amount, AID will provide $40.4 million (42.5%) and the GOK will provide $54.7 million (57.5%). Seventy-four percent of AID funding will be used to provide foreign exchange financing.

Budgetary allocations for the Project should be viewed as a flexible tool for accompanying the objectives of the Project. The total budget level for the project is well established, but the exact requirements for any given component may vary over the 10-year life of the project. Therefore, flexibility in moving budget line items among components is essential to insure the most timely and effective use of funds and to accommodate changing circumstances and requirements such as in levels and types of technical expertise and training.

The bulk of goods and services to be produced from AID's $40.4 million contribution to the project will be handled through a host country contract with the MOALD which will be financed on the basis of reimbursement directly by AID of allowable expenditures made by the contractor. This contract will be used to finance all technical assistance and training services for the project with the exception of the pre-implementation technical assistance and long-term research counselor positions which will be financed through a separate grant/contract due to the sensitivity of the position. The contract will also provide for the procurement of most of the office, research, and training contract financed under the project. Provision will be made under this contract to provide necessary operation and maintenance costs directly associated with the work of the technical assistance personnel. Recurrent cost support of the operation and maintenance costs for the project which are not directly associated with the work of technical assistance personnel will be paid on a reimbursement basis to KARI.

Some procurement actions will be required prior to the signing of this major contract in order not to delay project start-up and implementation. KARI will arrange the provision of necessary

office furnishings and the procurement of household furnishings and vehicles since these items will revert to KARI at the end of the project. AID will arrange direct payment for these items to the selected suppliers. AID will procure offshore items which must be purchased prior to the letting of the principal contract for services. These items may include: initial office equipment as well as household appliances and equipment. Direct payment to the selected suppliers of these goods will of course be made by AID. AID will also directly procure and finance all required construction and evaluation services. Should funding of any audit be required, it will be obtained from funds set aside for evaluation purposes. A detailed listing of all goods is found in Unattached Annex H.6. Section 2 of Annex E provides details regarding procurement arrangements.

The MOALD has handled successfully a number of service procurements financed by AID including a major technical assistance and training contract with SECID on behalf of Egerton College (over $10 million) and a technical assistance contract for services to the On-Farm Grain Storage Project (over $7 million). The execution and implementation of these contracts indicates that the MOALD possesses the skills and knowledge to successfully carry out the host-country contracting functions assigned to it under the project.

While the reorganized KARI does not yet have formal experience, both KARI-Muguga and MOALD/SRD have had previous experience in providing commodities and related services. KARI is familiar with AID procurement procedures and is formalizing a system for soliciting proposals and negotiating contracts for the required procurement. KARI has the necessary staff in place to review and approve invoices.

The concept of a single contract to handle the bulk of the provision of goods and services to the project is fully supported by the GOK. While it is possible to implement the individual components separately, it is recognized that such implementation would inevitably weaken the linkages between planning and management, specific commodity research, and the training of personnel to fill specific functions within the system. It was therefore decided to proceed with a single master contract to provide the majority of goods and services required by the project. Due to the range of skills required, it is expected that proposals will include sub-contracting arrangements to assure the availability of the most qualified personnel. It is believed that this approach also limits AID's overall vulnerability in terms of the potential for fraud, waste, abuse or mismanagement of resources. Financing of this contract will most likely be handled on the basis of direct reimbursement by AID of expenditure made. The amount of equipment involved is relatively small and the PSA will be directly responsible for procurement and shipping. The

entire project is regarded to have a low vulnerability.

B. Financial Analysis

The principal issues with respect to AID's investment in the National Agricultural Research Project are: (1) Is the overall Project financing realistic; (2) Is the GOK financial management system capable of utilizing the relatively large levels of project funding; and (3) On what basis has it been determined that the GOK will be able to meet the incremental project costs.

1. Budget Analysis

a.) Total Project Costs

The Summary Financial Plan is presented following this discussion. Table 1 presents the costs which have been allocated with respect to the components financed by the AID and the GOK as follows: Planning and Management (26.4%), Maize and Sorghum/Millet Research (47.3%), Human Resource Development (16.7%), Non-Governmental Research (6.1%), Evaluation (0.7%), and Project Administration (2.7%). Table 2 provides the summary financial plan by inputs which indicates that technical assistance accounts for 13.4%, training - 19.1%, commodities - 6.3%, operations and maintenance 10.0%, construction 0.5%, the research fund 5.3%, KARI personnel 42.1%, evaluation 0.7% and project administration 2.7% of the budget when contingencies are excluded.

Table 3 and 4 summarizes all contributions by sources of financing and between the four component for each of the ten years of Project Funding. These tables show the initial years of funding range between 9.5% in FY 1988 and 11.9% in FY 1992. This latter number is the maximum due to the presence of a full complement of technical assistance and the procurement of replacement commodities. It is expected that disbursements in FY 1996 will be reduced to $7.57 million (8.0%) as the project financial technical assistance is replaced by a trained Kenyan staff. The GOK contribution begins at a modest 41% and increases to 82% by FY 1996.

(b.) AID Contribution

The AID grant contribution to the project will provide $40.4 million or 42.5% of total Project Costs. Budget Table 3 provides a summary as follows: Planning and Management $7.30 million (18.1%), Maize and Sorghum/Millet Commodity Programs -- $13.00 million (32.2%); Human Resource Development -- $12.83 million (31.8%), Non-Governmental Research -- $4.43 million (11.0%), Evaluation -- $0.48 million (1.2%), and Project Administration -- $2.21 million (5.5%). AID financing is

greatest in FY 1987 at $5.71 million and in FY 1992 at $5.70 million. The final years show a significant decrease to only $1.36 million in FY 1996.

c. GOK Contribution

The Government of Kenya contribution is calculated on the basis of the value of GOK resources that will be used for the Project and the incremental costs created by Project activities. The GOK contribution may be broken down as $1.06 million in-kind, $47.62 million attribution, and $3.32 million additional funding, and $2.57 million of counterpart generations for recurrenct cost support.

d. Comments on the Financial Plan

The Financial Plan for the Project is reasonably phased and realistically funded. In terms of donor financing, overall levels are aggressive yet still realistic. The AID funded project will increase the financing for agricultural research by 50 percent over the FY 1985/86 Budget Levels, but given the planned expansion in agricultural research over the next decade AID financing will represent less than 10% of the total KARI budget. The characteristic of the financing arrangements highlight the need to ensure there are sufficient personnel available to start the procurement and contracting processes in order to maintain scheduled disbursement. The significant levels of financing assigned for administrative support are believed to be adequate to cover all the implementing and operating expenses required by project activities. Contingencies have also been calculated at realistic rates in order to maintain a reasonable margin/safety during project implementation.

2. Financial Management Systems

Although the GOK financial management system is generally sound, there is a consensus that these must be strengthened to fully utilize and account for the greater levels of funding proposed by the Project. It was agreed in the GOK/Donor Pre-Appraisal Mission that the financial management system would employ procedures to account for monies by station commodity/factor, and source. Planning and Management Component has been designed specifically to permit the design, testing, implementation, and on-the-job-training of financial management and audit personnel within the KARI system. It is expected that with these additional resources KARI will be capable of managing the levels of financing contained within this Project.

3. Summary of Recurrent Cost Analysis

As discussed in Annex. G.3, should the Task Force Proposed Program be fully implemented, the recurrent cost of the GOK National Agricultural Research Program will increase by more than 90%. While in Sessional Paper No. 1 (1986) the GOK indicates a commitment to increase real recurrent cost support to a level of KPound 10.0 million per year ($12.5 million) there is a high probability that there will continue to be a financing shortfall. At the same time it must be noted that the KARI proposal increases the professional staff from 469 to 600 and includes research on virtually all commodities, including those which are being researched by the private sector and some which may not be national priorities.

Due to the historical underfunding of recurrent costs and the expected difficulty in allocating additional funds during the initial years of the project, funds have been budgeted from the AID account to permit the funding of operation and maintenance (non-personnel recurrent costs) for central management and the maize and sorghum/millet programs. The proposed formula is that counterpart funds will be used to finance 70% share of these costs in the GOK FY 1988-89. This share will decrease to 60% in FY 1989-90 and by 10% per year until the end of the project. It is believed that this plan of recurrent cost support will enable the project to achieve its stated objectives while allowing the GOK sufficient lead time to increase the recurrent cost levels and/or implement cost-saving procedures.

The calculation of incremental cost to the GOK following completion of the 10-year project is $1.23 million per year. This increase is expected to be covered by at least 75% due to a conservative 5% cost-savings of the total budget associated with improved efficiency and effectiveness of operation. Should savings increase to 6.25% (GOK/AID expectation is 10%), the incremental costs will be totally offset by GOK savings. Given the institution-building nature of the project which has as its focus the implementation of efficient and effective management systems, we do not envision that the project will pose an excessive recurrent cost burden on the GOK.

VI. Summary of Project Analyses

A. Technical Analysis - Maize and Sorghum Millet Component

The AID project will support the strengthening of Kenya's national program in maize and sorghum/millet improvement. Two objectives will be pursued; 1.) the establishment of well-managed and coordinated research programs for these commodities, with a national focus; and 2.) development of improved maize, sorghum and millet varieties and husbandry recommendations suitable to various

agro-climatic areas of Kenya.

The coarse grains (maize/sorghum and millet) play a very large role in Kenya's agricultural economy and diet. These crops account for 2,000,000 hectares (23% of Kenya's arable land) and 17% of the agricultural GDP. Maize consumption alone accounts for an estimated 40-45% the total caloric intake of the Kenyan population. The Government recognizes the importance of increasing the production of these crops. Given Kenya's population growth rate, and limited possibilities of area expansion it is imperative that productivity increase in order to provide sufficient supplies for domestic food consumption, to supply a growing feed industry and potentially to reduce the wheat importation bill via sorghum/millet blending with locally produced wheat.

Technical assistance provided through the project will include; one maize breeder at Kitale, one maize breeder at Embu, maize/adaptive research agronomists at Embu and Kakamega, and a sorghum and millet/adaptive research agronomist at Kakamega. The role of the technical assistance in this component is to assist in the development of the Kenyan capacity to perform the required scientific work of commodity research. The technical assistance team will assist their Kenyan counterparts in the design, implementation and evaluation of various maize and sorghum research endeavors rather than be assigned themselves to discrete research tasks. They will function also as trainers for younger scientists during and after their formal academic training. Additional short-term specialists are budgeted to provide assistance as needed in such fields as agricultural economics, pathology, soil science and others.

In addition to providing technical guidance to program formulation and execution and performing an important training role, the technical assistance team will also be deeply involved in the strengthening of linkages between the research community, the private and public extension systems and Kenyan farmers. The IBRD is currently in the first phase of a national extension improvement project and will begin a counterpart research project next year. The technical assistance provided in the AID project, especially the agronomists, will collaborate closely with their Kenyan counterparts and the complementary IBRD projects in this vital area of research/extension/farmer communication.

B. Human Resource Development

The Kenyan agricultural research system is characterized by an of inadequately trained technical staff. Within the present system 469 research officers only 4% have Ph.D.s and 41% have MSc. degrees. The remaining 55% are not trained to conduct research. The analysis determined that adequately staffed maize and

sorghum/millet research programs would require 21 breeders (10 Ph.D.), 19 agronomists (7 Ph.D.) and 26 additional Ph.D.s and 57 MSc.s in other desciplines to support the national maize, sorghum and millet programs. The Task Force recommends a five-year training program of 60 Ph.D.s and 300 MScs.

The project will serve to create a cadre of well-trained agricultural scientists to staff the maize and sorghum/millet programs. Post-graduate training will also be available to strengthen the scientific staff in priority disciplines such as pathology, agricultural economics, soil science and horticulture. Total academic training over ten years will be 55 Ph.D.s and 88 MSc. 43 and 70 respectively directly related to maize, sorghum and millet and the remaining in other priority areas. On-going programs will be instituted for strengthening senior and mid-level scientific and managerial personnel.

U.S. land-grant universities will provide the bulk of the post-graduate training. Some degrees may be taken in third-country institutions. Masters degree training will be shared between U.S. universities and the University of Nairobi. Due to the latter institution's relative weakness in post-graduate training, the proportion of students enrolled there will be gradually increased as the University's training capacity develops. Students receiving MSc. training at University of Nairobi will receive additional support for their field research. Egerton College facilities will be used for short-courses intended to upgrade the capabilities of technical station staff.

An Office of Planning and Manpower Development will be established in KARI headquarters to guide all aspects of the training program. This office will receive initial assistance through the Planning and Management Component and will work closely with the contractor training team on the selection, processing and supervision of all candidates. No adverse effect on the productivity of on-going research programs is anticipated as a result of the training plan. Many of those to be trained are of relatively low productivity; also technical assistance personnel will bolster scientific output during most of the project life.

Three features of the human resource development are distinctive. First, all technical assistance personnel will provide valuable on-the-job guidance and training to Kenyan staff, whether or not participating in post-graduate programs. Second, all Ph.D. research and MSc. research of University of Nairobi trainees will be undertaken in Kenya on Kenya agricultural problems. Lastly, follow-up consultations will be arranged for returned Ph.D. graduates and their major professors to help them become fully operational research scientists.

C. Economic Analysis

An indicative break-even analysis was done by aggregating the incremental costs and expected benefits from the AID project. The analysis demonstrated that the project is economically feasible and will have paid for itself by 2007. The benefits are estimated from only two sources; from improvements in maize yields and from system-wide earnings due to management efficiency. This is not to imply there will not be benefits due to increased productivity in other commodities. Rather, the intention is to demonstrate that even with very conservative assumptions, improvements in these areas alone can generate sufficient benefits to cover the costs associated with all four project components; Planning and Management of the KARI program, the Maize and Sorghum/Millet Commodity Programs, the Human Resource Development Component, the Research Fund Component and the incremental cost of research-extension linkages.

Various combinations of increases in the productivity of maize, increases in adoption rates for improved technologies, and efficiency savings in KARI's operations were tested to determine the level of incremental benefits necessary to justify project-related investments. The scenario which proved most realistic and easily achievable includes: (1) an initial improved yield effect of 2.7% per year which increases progressively to 3.5% in year 15 of the project; (2) an adoption rate of 0.8% in year 5, increasing to 25% in year 20; and (3) and the progressive increase of efficiency savings from 0.5% of the base budget in year 1 to 5.0% percent in year 12 of the project. The total increase in average yield attributable to research is only required to be 35.5% (from 1.373 MT/Ha in 1987 to 1.861 MT/Ha in 2007).

The estimated increases in the productivity of maize are realistic and are significantly below the proven yield potential of improved maize varieties and production practices. The projected adoption rate increase of 2% per year is conservative when location-specific maize technologies are developed and is well within the capacity of the existing public and private extension network. In terms of cost savings, the plans for the merger of KARI and MOALD/SRD as well as the reduction in stations from 43 to 24 have been approved at the highest levels of the GOK. Furthermore, the shift of the station-by-station approach to that of an integrated commodity approach and the programming/budgeting of research activities on a prioritized basis consistent with economic principles have also been approved within the GOK. Due to the relatively recent date of these structural changes, and an inadequate pre-reorganization management system, precise cost savings cannot be calculated. This function will however be included within the scope of work for the Office of Planning, Finance, and Administration. The current best conservative estimate by KARI and USAID/Kenya is a minimum of 10% of the

incremental costs to GOK due to the project. For purposes of the indicative break-even analysis, this figure has further been reduced to 5%. It was found that a cost savings of 6.25% will completely offset the incremental costs of the project to Government.

Other less quantifiable benefits are expected to be generated by the project. These include: (1) improved income distribution between producers and consumers; (2) positive effects on employment generation and nutrition; and (3) additional farm incomes and foreign exchange earnings through agricultural diversification.

D. Policy Analysis

It is USAID/Kenya's assessment that the GOK agricultural development strategy and policy guidelines represent a rational and viable course for long-term development. In particular the overall strategy for agricultural research which includes: the reorganization of the research structure, the prioritization of research activities, the focus on small-holder constraints, and a commitment to increase recurrent cost financing must be implemented for the national research program to be revitalized.

There are four policy areas of concern in the successful implementation of this project - budget rationalization, agricultural input marketing, agricultural output marketing and to a limited extent, credit. The reorganized structure and improved management of programs is expected to result in greater share of GOK budget and expenditure on programs based on established priorities. Regarding budget rationalization, agricultural research has been historically under-funded and available funds have often been expended on low priority activities.

The project addresses the commitment on recurrent cost financing by the covenant which assures that a minimum of K Pounds 10 million, will be committed to the National Agricultural Research Program for the first three years of the program with the provision that thereafter the basis for future recurrent cost support will be determined by the analyses of expected returns to investment. It is USAID/Kenya's assessment that this procedure is consistent with the GOK objective of budget rationalization and will serve as an incentive for improved planning and management system within KARI. USAID/Kenya is not requiring that incremental savings attributed to the project be returned to research due to the fact that savings to the system should be re-allocated to investment of greatest probable return.

Agricultural input marketing is another area of concern. Mechanical inputs, seeds, agro-chemicals and labor are marketed freely and will not constrain success of project. Fertilizer

marketing an area receiving of emphasis from USAID, is rapidly expanding into the private sector and to smallholders and it should not inhibit project objectives. In the third area, agricultural outputs marketing, the GOK sets prices for maize (and other key commodities) but the trend has been toward increasing real prices and the Kenyan track record is good. We anticipate no price disincentives to increased maize productivity. The bigger problem is with the parastatal and cooperative-dominated market structure which has contributed to disincentives for smallholder production. Recent changes in wheat and maize marketing are encouraging. Many of the management reforms recommended by the 1984 Booker Study have been implemented and the GOK has requested further assistance from the EEC and IBRD in this regard. The GOK also began to permit the right of first refusal by private sector millers under the FY 1985 PL 480 Title I Program and intends to expand this effort in FY 1986. Most significantly, in March 1986, the GOK announced that effective immediately the legally monopsonistic position of NCPB was broken with respect to domestic grains enabling producers to sell to the thirteen licenced private millers.

Regarding credit, it has been found that the existing credit system has suffered inefficiencies which are believed to have limited credit availabilities to the smallholder. The IBRD Agricultural Sector Adjustment Agreement intends to assist the GOK with the rationalization of the public credit program, promote the channeling of donor funds through commercial institutions, and work with the National Extension Project to assure that smallholders receive appropriate information on agricultural credit.

It is USAID/Kenya's assessment that the GOK has a viable strategy for long term agricultural development. There have been historic problems in terms of input (including agricultural credit) availabilities and output market structure. While these policies have served as a disincentive to productivity increases in the past, we are confident that the recent policy reforms reflect the commitment to increased agricultural productivity expressed in the Sessional Papers of 1981 and 1986. USAID/Kenya will continue to work within the multi-donor forum as well as through the ESF and PL 480 programs to encourage policies which will not limit the potential project environment. Indeed, project CPs and Covenants will reinforce governments intentions (1) to restructure and prioritize the research system, (2) to provide sufficient recurrent cost funding and (3) to liberalize the market structure.

E. Institutional Analysis

Given the severe fiscal constraints faced by the GOK, it is unlikely that budgetary support for agricultural research will increase to the levels necessary to sustain all commodities/

factor research within Kenya. The AID financed Institutional Analysis further found weakness within the pre-reorganization management structure and processes which have severely constrained the efficiency and effectiveness of on-going research. In light of these factors, the proposed National Agricultural Research project will assist KARI in the critical functions of planning and managing agricultural research.

1. Planning and Manpower Development Office

Historically, the system has been relatively ineffective and inefficient due to the fact that individual stations developed and implemented their own research programs while receiving little direction or supervision from Central Management with minimal collaboration between stations researching the same commodity/ factor. It was further found that individual research stations have limited control over their human resources. For these reasons, the Planning and Manpower Development Office has been established within the Division of Planning Finance and Administration and assigned the functions of programming and budgeting monitoring and evaluation, manpower development and training, and data processing. The AID financed project will provide technical assistance, on-the-job training, commodities, and decreasing recurrent cost support over the life of the project to improve the Planning and Manpower Development's capabilities.

2. The Financial Management Office

Closely related to the Planning and Manpower Development Office is that of Financial Management. Previously, all accounting was performed on a station-by-station basis. While this system was appropriate for internal management of the station, it proved impossible to aggregate for an analysis of investment into a particular commodity or factor. Consequently, there is the need to design, test, implement and train accountants at headquarters and in the field on accounting procedures appropriate to the requirements of the reorganized structure as well as those of donor-financed programs. Additional input will also be required in the areas of assets management and procurement.

3. Administration

The third area which will require strengthening is that of administration. The most critical areas within this office are station maintenance and personnel management. The institutional analysis found that the lack of a station maintenance program along with recurrent cost and procurement difficulties has resulted in serious inefficiencies within the research program. The design and implementation of a regular

maintenance program supported by on-the-job training and travel grants to observe station management (including maintenance) for senior managers is to be completed under the AID financed project. The personnel unit will be assisted with the manpower development office to develop individual position descriptions and a program of regular evaluation for all personnel. These activities are expected to add clarity to the researcher's assignment and serve as motivation for improved efficiency/effectiveness.

4. Adaptive Research/Research-Extension Linkages

The fourth area will be assistance to the Regional Research Center Division in the form of technical assistance to complement the IBRD's program. The focus of this element will be to follow-up on the CIMMYT initiated farming system program. The technical assistance will work with the GOK multidisciplinary teams at the Regional Centers to assure that there is a thorough understanding of the farm enterprise; that constraints to the farm household's productivity are identified; that research is conducted in response to a prioritized list of constraints; and that extension messages/ contact points will be targeted to accommodate the diversity in farming practices within a region. This unit will interact at the local level with MOALD services, the private sector, input suppliers, and the Provincial Agricultural Research and Extension Advisory Committee (PAREAC).

5. Maize and Sorghum/Millet Program Administration

To date, only the maize program has had collaboration across stations through the operation of the Maize Specialist Committee. Under the proposed re-organization, all commodities research programs will be coordinated, monitored and supervised through a lead station (Kitale for Maize and Kakamega for Sorghum/Millet.). Annually the Commodity Programming Committee, consisting of the Commodity Coordinator and members of the commodity programs from the respective stations where research is undertaken will review the past year's program and determine a workplan for the following year's budget. The Commodity Programs will therefore be receiving macro guidance regarding funding levels and recommended priorities from the Planning and Manpower Development Office, while retaining as technical scientists the responsibility for assuring that the program developed is an efficient use of resources to overcome the constraints experienced by the farm household.

6. USAID/Kenya Assessment

The AID financed project is an institution-building project which has as its pivotal focus the organization and management

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of KARI. The re-organization of KARI as a semi-autonomous government organization implies the development of management systems which have either not existed, or performed responsibilities to the benefit of station management but not necessarily to the benefit of the national research system. The proposed input of technical assistance, on-the-job training, commodity procurement, and the initial assumption of recurrent costs are perceived as the minimum necessary to assure that the KARI institution has the capacity to implement an effective and efficient agricultural program which will increase agricultural productivity within Kenya.

F. Social Soundness

Kenya's present population growth rate of 4% will lead to a year 2000 population of approximately 34 million. Even if the country achieves a slakening of this rate to the targeted 2.8% by that year, severe pressures will be placed on agriculture. In addition to feeding an additional 14 million people, the agricultural and non-formal sectors must absorb 2.6 times the labor force in 2000 as they did in 1976.

Internal population migration patterns reflect two trends; a positive net migration to urban centers and the Rift Valley in response to the availability of wage labor and land, respectively; and, negative net migration from Western and Central Kenya in response to population pressures and historic urban work patterns. The rate of urbanization is increasing, up from 5% in 1948 to 15% in 1979. Intradistrict migration shows indications of movement to more marginal lands.

Maize is now Kenya's staple food crop, having supplanted sorghum and millet in this regard over the past 50 to 70 years. Food preferences vary by region. For example, the proportion of caloric in take represented by maize ranges from 82% in Rift Valley to 44% in Eastern Province. Sorghum and millet consumption is highest in Western Kenya, reflecting local production patterns.

The analysis states that a strong socio-economic underpinning of the commodity research programs is necessary if farmer-usable technologies are to be developed. This conclusion rests on analysis of historical and current approaches at developing innovations intended for widespread adoption by farmers. Under the T&V extension approach some progress has been made in providing extension services with technical messages to pass to farmers. Still, relatively few formal linkages exist between the farmer and the extension and research entities. Agricultural researchers have little practical knowledge of farmers' strategies and conditions which relate directly to the applicability of their research work. Also, neither researchers nor extensionists have a sufficient systems perspective and are often unaware of the full

economic implications of their production recommendation.

To move forward a fuller integration of research, extension and farming perspectives, the analysis recommends greater involvement of socio-economists in the technology development and diffusion process. Specialists should participate in planning and evaluation of on-farm testing and gather appropriate socio-economic data on regions of interest to the research program. Although CIMMYT has been providing training sessions in the farming systems approach and the methodology of on-farm research, Kenya has insufficient agricultural professionals with these important skills. The analysis observes that "it is unlikely that the posts of socio-economist at the research stations will be filled with people with the requisite skills and experiences". The project should contribute to the gradual build up of the skill base of the socio-economists at the research centers through long and short-term training. Short-term consultancies in these disciplines will be arranged as necessary to bolster the Kenyan capacity for evaluating critical social and economic variables.

Project beneficiaries will ultimately be Kenyan food producers and consumers who will benefit from improved production technologies and greater food resources, respectively. With continuous technological advances, there will be positive effects on employment and nutrition, farm income and foreign exchange earnings. Specific beneficiaries will include KARI staff receiving training and working under improved conditions and recipients of Research Fund grants.

G. Environmental Analysis

The IEE (PID Annex B) which was subsequently approved by the Bureau Environmental Officer, recommended that the research management and training components of the project receive a categorical exclusion. However, the environmental determination for the Maize and Sorghum/Millet Commodity Program and Research Fund components were deferred. In the environmental review of this paper these (unattached Annex H.7) two components are treated separately. The Commodity Program component is taken up in Part A which consists of a Risk/Benefit Analysis and recommendations to the Contractor on: a) handling of pesticides; b) research methodologies and orientation; and c) a listing of recommended pesticides for maize, sorghum and millets. Part B contains the procedure and conditions for reviewing research project proposals for the Research Fund component, and Part C is a summary of environmental actions needed.

H. Engineering Analysis

Each of the Agricultural Research Centers located at Kitale,

Kakamega, Embu and Mtwapa was visited by REDSO engineering. Requirements of physical facilities at each of the stations have been determined on the basis of the project needs and are outlined in the Unattached Annex. All the sites for the proposed housing/office construction are located within the station's boundary and all sites are suitable for proposed construction. Soil characteristics do not require specific foundation designs. The project will utilize Kenya Government standard type 'D' Upland housing plans and relevant specifications, bills of quantities, etc., for the construction of senior staff houses. The standard housing plans will need some minor modifications to house and operate standard equipment authorized to technical assistance personnel.

The proposed construction and renovation cost estimates are summarized below.

Station	US$
Kitale	97,500
Kakamega	83,000
Embu	153,000
Mtwapa	37,000
TOTAL	370,500

The cost for the proposed construction is based on current costs of building construction in those areas. Inflation and contingency costs have been added to all local costs in the financial analysis. In the event that rental/lease housing is available at some of these sites, the construction of those facilities shall be omitted. Based on the foregoing analysis, a reasonably firm planning has been made for the proposed construction/renovation works and the cost estimates are reasonably firm to accomplish the described works. The requirements of FAA section 611(a) as amended are accordingly satisfied.

I. Donor Coordination.

The genesis of Kenya's proposed re-organization of the public sector agricultural research system has benefited from an unusually active and constructive dialogue between government and donors. Starting in 1984, the Agricultural Sector Sub-Committee of the GOK/Donor Steering Committee has met regularly. High on the agendas of these discussions which have included GOK officials and representatives from all major donors, has been the need for and means of revitalizing agricultural research in Kenya.

In May, 1985 the GOK presented to the Sub-Committee a discussion paper outlining the government's ideas, based largely on the recommendations of the recent ISNAR study, on how to reorganize

the national agricultural research system. The donors and GOK officials engaged in a productive exchange of ideas on research and agreed in a subsequent meeting to organize a task force, under Kenyan leadership, to develop an action plan for the national agricultural research program. During the several months of Task Force's operation a senior World Bank agriculturalist served as an active participant in its deliberations.

With the release of the Task Force Report in April, 1986, the donor group met to review the report recommendations and subsequently discussed the report with GOK officials, identifying a series of specific issues requiring further analyses. It was agreed to form a joint GOK/donor Pre-Appraisal Mission to conduct an intensive collaborate review of the Task Force draft action plan.

The main objectives of the the mission were an assessment of:

a.) the overall framework of the proposed program with a view to allow donors to prepare their support to specific components of the project;

b.) the organizational and funding aspects and,

c.) identification of those issues which need to be resolved for the program to be successfully implemented.

The mission included representatives of the Bank, USAID, CIDA, EEC, FAO, SIDA, ISNAR, IDA and the Swiss. Working groups addressing elements of the terms of reference met for three weeks with full-time participation of senior officials from the Government including the current directors of SRD, KARI and Veterinary Services plus several other senior staff members. As a result of this unusual degree of donor/Government collaboration, the Ministry recommendations for the KARI reorganization were thoroughly analyzed, clarified and, in the area of management and organization, significantly revised. The Aide Memoire of the mission, containing its summary conclusions and recommendations, is included as Unattached Annex H.4.

VII. Conditions, Covenants and Negotiating Status

A. Conditions

1. Initial Disbursement. There will be one major condition to initial disbursement which will require the Government of Kenya to present evidence to AID that it has: (a) appointed the Board of Management of the reorganized KARI, (b) appointed the Director of the reorganized KARI, and (c) appointed the three Deputy Directors of KARI. The principal objective of the project is to institute a

reorganized research structure for Kenya. Satisfaction of this condition will provide evidence that the GOK is taking steps to implement the new organizational format for research.

2. Training. A significant complaint within the research system is the difficulty in retaining highly qualified manpower under the salary scale and associated scheme of service of the Kenyan civil service. Some relief from this situation will be offered through the restructured KARI which will be able to offer an improved scheme of service already approved for public research institutes. Therefore, as a pre-condition to beginning MSc.and Ph.D. training financed by the project, the Government of Kenya must submit evidence to AID that the scheme of service for research institutes, as approved by the Government of Kenya, is operative for KARI personnel. This will also include precise guidelines on the regrading of staff and other transitional arrangements. (Note that the restriction is on calling forward Ph.D. candidates for training under the major technical assistance and training contract for the project. Inclusion of provision for financing of Ph.D. candidates under the terms of the contract is not affected by this condition).

Subsequent MSc. and Ph.D. level training will be subject to additional conditions. First, by year 2 of the project KARI will have a staffed and operational Office of Planning and Manpower Development that is actively involved in planning for the improvement of KARI's human resource base. Second, by the fourth year of the project KARI will have instituted personnel policies consistent with those recommended by the Pre-Appraisal Mission. Foremost among these are merit-based promotion and the development of distinct career tracks for scientific and managerial staff.

3. Research Fund. Prior to disbursement of and AID financing for the Research Fund, the Government of Kenya must present evidence to AID of the appointment by the KARI Board of Management of a Project Selection Committee and the establishment of a functional management structure for the Research Fund which will ensure technical review of proposals, financial controls and adequate monitoring and evaluation services for funded projects.

4. Operations and Maintenance Activities. Prior to disbursement of AID funds for KARI, management will develop detailed administrative and financial procedures regarding station and equipment maintenance.

5. Subsequent Disbursement. Any disbursements after August 1,

1989 (beginning of the GOK fiscal year 1989/90) will be dependent on the establishment of a commodity-based Government budget for agricultural research. Such a budget will allow the allocation of resources for research on a priority basis according to commodity.

B. Covenants

The covenants for this project are designed to implement plans for setting priorities and rationalization of the research system.

1. The Government of Kenya will covenant to raise total funding for agricultural research in the Recurrent Estimates from the 1984/5 level of 6.9 million Kenyan pounds to a minimum of 10.0 million Kenya pounds in 1984/5 constant prices in the Kenyan budget year 1989/90.

2. The Government of Kenya will covenant to execute the plan presented in the National Agricultural Research Proposal (final draft) to reorganize the system of research stations to include 24 national and regional stations. All other sites under control of the system will used as testing sites only.

3. The Government of Kenya will covenant to determine priorities for research activities in Kenya on the basis of the relative economic benefits of the planned outputs from various lines of research in Kenya.

4. The Government of Kenya will covenant the following with regard to the development and execution of research programs:

   a.) establish a process of determining long-term research strategies and detailed workplans through the Commodity Specialist Committees and KARI Programming Committees as specified in the Task Force Report (final draft);

   b.) that research programs developed through this procedure will reflect adequate consideration of farm-based production concerns; and

   c.) that relevant research results will be transmitted to farmers through the public and private extension network.

5. The Government of Kenya will covenant the following with regard to the marketing of sorghum and millet:

   a.) the prices received by producers will continue to

be market-determined; and

b.) it will encourage the continued private sector marketing and distribution of sorghum and millet products.

C. Negotiating Status

The authorization for this project allows for negotiation of the project agreement by the Principal Officer of USAID/Kenya. Those negotiations will be conducted with officials of the Ministry of Finance. Either the Minister or the Permanent Secretary of the Ministry of Finance are empowered to execute grant documents with a donor on behalf of the Government of Kenya.

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ANNEX A

AIDAC, NAIROBI FOR MISSION AND REDSO/RLA

C O R R E C T E D C O P Y (PORTIONS OF TEXT OMITTED)

E.O. 12356: N/A
TAGS:
SUBJECT: ECPR GUIDANCE: NATIONAL AGRICULTURAL RESEARCH PID (615-0229)

REF: STATE 376809

1. THE ECPR CHAIRED BY DAA SAIERS ON DECEMBER 6, 1985 APPROVED THE NATIONAL AGRICULTURAL RESEARCH PID. AID/W WILL BE THE APPROVAL VENUE FOR THE PP. THE ECPR NOTED THAT THE PID WAS WELL WRITTEN AND WELL CONCEIVED. THE PROBLEMS FACING AGRICULTURAL RESEARCH AND PROPOSED RESPONSES WERE PRESENTED IN AN UNDERSTANDABLE CONCEPTUAL FRAMEWORK WITHOUT EXCESS DETAIL AS IS APPROPRIATE FOR A PID SUBMISSION. IT WAS NOTED THAT THE PROJECT WAS CLEARLY IN LINE WITH THE BUREAU'S QUOTE PLAN FOR SUPPORTING AGRICULTURAL RESEARCH IN AFRICA UNQUOTE. THE ECPR RECOGNIZED THAT THE MISSION FACES AN ONEROUS PP DESIGN PHASE WHERE MANY DIFFICULT QUESTIONS REMAIN TO BE ANSWERED ABOUT AGRICULTURAL RESEARCH IN KENYA AND THE ROLES TO BE PLAYED BY THE GOK, AID, AND OTHER DONORS.

2. THE TOPICS AND CONCERNS DISCUSSED DURING THE AID/W REVIEW OF THE PID AND THE SPECIFIC GUIDANCE POINTS OF THE ECPR ARE AS FOLLOWS:

A. INSTITUTIONAL ANALYSIS: THE SUCCESS OF THIS PROJECT IS PREDICATED ON THE REORGANIZATION OF THE ENTIRE AGRICULTURAL RESEARCH SYSTEM IN KENYA. ALTHOUGH THE PROGRESS MADE BY THE MOALD IN IMPLEMENTING THE RECOMMENDATIONS OF THE ISNAR STUDY TO DATE IS ENCOURAGING, THE PP SHOULD CONTAIN AN INSTITUTIONAL ANALYSIS OF THE AGRICULTURAL RESEARCH SYSTEM. OF PARTICULAR INTEREST WILL BE THE SPECIFIC STEPS THE MOALD HAS TAKEN TOWARD REORGANIZATION, THE IMPORTANT STEPS REMAINING WITH A TIMETABLE FOR ACCOMPLISHMENT, AN ASSESSMENT OF THE IMPEDIMENTS FACING THE REORGANIZATION AND HOW THIS PROJECT CAN INFLUENCE THE OUTCOMES (THROUGH CPS, ADVICE, STUDIES, ETC.). THE ECPR ENCOURAGED THE MISSION TO ADD A MANAGEMENT/ INSTITUTIONAL SPECIALIST TO THE DESIGN TEAM TO DEVELOP

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THIS SECTION OF THE PP.

B. RECURRENT COSTS: THE RECURRENT COST IMPLICATIONS OF THIS NEW APPROACH TO AGRICULTURAL RESEARCH WILL NOT BE FULLY KNOWN UNTIL THE PP ANALYSIS IS COMPLETED. CLEARLY, THE ABILITY OF THE GOK TO CARRY ITS FINANCIAL COMMITMENTS, PARTICULARLY IN VIEW OF THE DECLINE IN GOK RESOURCES DEVOTED TO BOTH AGRICULTURE AND AGRICULTURAL RESEARCH IN RECENT YEARS, REQUIRES THOROUGH TREATMENT IN THE PP. THE PP ANALYSIS SHOULD CONSIDER IF THE PROPOSED RESTRUCTURING AND CONSOLIDATION OF THE RESEARCH SYSTEM WILL RESULT IN OVERALL RECURRENT COST SAVINGS TO THE GOK. CERTAINLY THIS PROJECT AND THE GOK'S PROPOSED AGRICULTURAL RESEARCH SYSTEM WOULD BE JEOPARDIZED IF IT WERE FOUND THAT RECURRENT COSTS WOULD RISE BY ANYTHING MORE THAN VERY MODEST AMOUNTS. IT WOULD BE VERY ENCOURAGING IF EFFICIENCY ASSOCIATED WITH THE REORGANIZED APPROACH COULD ACCOUNT FOR MOST OF THE GOK'S REQUIRED RESOURCES FOR AGRICULTURAL RESEARCH. WILL ALL RECURRENT COSTS BE BORNE BY THE GOK OR WILL AID RESOURCES BE REQUIRED? IF THE LATTER, THE MISSION SHOULD BE GUIDED BY THE AGENCY'S RECURRENT COSTS POLICY PAPER IN FORMULATING ITS CONTRIBUTION.

C. OTHER DONORS: AS THE PID NOTES, THE COMMODITY APPROACH TO RESEARCH HAS NOT BEEN FULLY ACCEPTED BY THE IBRD WHICH IN THE PAST HAS SUPPORTED STATION-BY-STATION RESEARCH. AS A MAJOR AGRICULTURAL DONOR IN KENYA, THE BANK'S VIEWS ARE IMPORTANT. RESOLUTION OF DIFFERENCES BETWEEN AID AND THE BANK ON APPROACHES TO AGRICULTURAL RESEARCH SHOULD BE WORKED OUT BEFORE THE PP IS SUBMITTED. THE BANK'S PROPOSED INVESTMENT IN THE KENYAN EXTENSION SYSTEM SHOULD BE OUTLINED AND ASSESSED IN THE PP IN TERMS OF THE CAPACITY OF THE EXTENSION SERVICE TO DISSEMINATE RESEARCH RESULTS. THE PP SHOULD ALSO ASSESS THE RECURRENT COST IMPACT OF THE BANK'S EXTENSION PROGRAM. THE DONORS WOULD BE DOING KENYA A DISSERVICE IF SOME PROJECTS ARE DESIGNED TO KEEP RECURRENT COSTS DOWN (E.G., USAID'S AGRICULTURAL RESEARCH PROJECT) WHILE OTHER PROJECTS MORE THAN OFFSET THESE ECONOMIES BY HIGH RECURRENT COST COMPANION PROJECTS (E.G., THE BANK'S AGRICULTURAL EXTENSION PROJECT). THE PLANS OF OTHER MAJOR AGRICULTURAL DONORS AND THEIR COMMITMENT TO THE PROPOSED NEW NATIONAL RESEARCH SYSTEM SHOULD ALSO BE PRESENTED IN THE PP.

D. POLICY ENVIRONMENT: THE GOVERNMENT'S PRICING POLICIES, COMMITMENT TO FUNDING AGRICULTURAL RESEARCH, SUPPORT FOR THE NEW NATIONAL RESEARCH ORGANIZATION, MARKETING MECHANISMS, ETC., WILL DETERMINE WHETHER THIS PROJECT SUCCEEDS. THE PROJECT PAPER MUST PRESENT THE SPECIFIC POLICY CONSTRAINTS FACED BY THE PROJECT AND EXAMINE THE EFFECTS OF GOK ACTION OR INACTION IN THESE POLICY AREAS. THE PP SHOULD ALSO LAY OUT IN SOME DETAIL THE MISSION'S APPROACH IN DEALING WITH THE GOK ON REQUIRED REFORMS. THIS DISCUSSION SHOULD SHOW HOW OTHER PROGRAMS (E.G., ESF CONDITIONALITY) ARE BEING USED TO SUPPORT THIS PROJECT.

E. RESEARCH FUND: THE IDEA OF ENCOURAGING UNIVERSITY AND PRIVATE RESEARCH THROUGH A FUND OF THIS KIND IS ATTRACTIVE BUT THE PID IS VAGUE ON JUST HOW IT WILL WORK. THE PP WILL HAVE TO SHOW HOW THE RESEARCH SUPPORTED BY THIS FUND WILL BE INTEGRATED WITH NATIONAL PRIORITIES AND THE COMMODITY RESEARCH CONDUCTED UNDER THOSE PRIORITIES. SINCE THE RESEARCH PROPOSALS WILL NOT BE IDENTIFIED (OTHER THAN ILLUSTRATIVELY) OR FULLY COSTED OUT IN THE PP, CRITERIA WILL HAVE TO BE DEVELOPED FOR APPROVING THESE PROPOSALS. SOME CRITERIA THAT SHOULD BE CONSIDERED ARE: FIT WITH NATIONAL PRIORITIES, COST SHARING WITH PRIVATE FIRMS, COMPARATIVE ADVANTAGE POSSIBILITIES FOR EXPORT CROPS, NEED FOR MARKET RESEARCH, BENEFITS TO SMALLHOLDERS. THE PP SHOULD IDENTIFY WHAT ENTITY(IES) WILL HAVE CONTROL OVER THE FUND, WHAT MECHANISM WILL BE USED TO ALLOCATE FUNDS AT WHAT TIME INTERVALS, ONCE THE CRITERIA ARE ESTABLISHED.

F. TRAINING: AS THE PID POINTS OUT, SEVERAL HUNDRED KENYANS HAVE BEEN TRAINED BY AID IN AGRICULTURAL FIELDS. THE ECPR REQUESTED AN ANALYSIS OF WHAT HAS HAPPENED TO THESE TRAINEES. IT WOULD BE USEFUL TO KNOW, FOR EXAMPLE, HOW MANY HAVE EMPLOYMENT APPROPRIATE TO THEIR TRAINING, HOW MANY GOVERNMENT TRAINEES HAVE MOVED TO THE PRIVATE SECTOR AND WHAT THE EFFECTS OF THESE TRANSFERS ARE, HOW MANY DID NOT RETURN TO KENYA OR ASSIGNED JOBS, ETC. PLEASE NOTE THAT THE PP SHOULD CONTAIN A SOURCE WAIVER FOR THIRD COUNTRY TRAINING IF IT IS OUTSIDE THE MISSION'S AUTHORITY TO APPROVE.

G. PROJECT IMPLEMENTATION: DURING THE REVIEW PROCESS, IT WAS AGREED THAT THERE IS A MAJOR ROLE FOR U.S. UNIVERSITIES IN BOTH THE RESEARCH AND TRAINING COMPONENTS OF THE PROJECT BUT THE CENTRAL MANAGEMENT AND PLANNING COMPONENT COULD PERHAPS BE MORE APPROPRIATELY IMPLEMENTED BY A PRIVATE FIRM. THE ECPR DECIDED THAT SINCE THE GOK MAY PREFER A HOST COUNTRY CONTRACT (ALL CURRENT MOALD CONTRACTS ARE HC), THE GOVERNMENT MUST BE CONSULTED ON THE CONTRACTING MODE AND INSTITUTIONAL PREFERENCES. THE PP WILL HAVE TO JUSTIFY AND EXPLAIN THE CONTRACTING ARRANGEMENTS PROPOSED FOR THE PROJECT.

H. GRAY AMENDMENT: THE ECPR DISCUSSED THE MISSION'S PERFORMANCE IN CONTRACTING WITH SMALL AND DISADVANTAGED BUSINESSES AND FOUND THAT PERFORMANCE SOMEWHAT BELOW TARGET FOR A MISSION WITH KENYA'S FUNDING LEVELS. THEREFORE, THE BUREAU WILL EXPECT THE PP TO PROVIDE MORE SPECIFICITY CONCERNING THE MISSION'S PLANS FOR INVOLVING GRAY AMENDMENT INSTITUTIONS IN PROJECT IMPLEMENTATION.

I. PERFORMANCE CONTRACTING: THE IDEA OF PERFORMANCE CONTRACTING (I.E., BASING A CONTRACTOR'S REMUNERATION ON ACTUAL DELIVERY OF QUALITY OUTPUTS, SPEED OF DELIVERY, ETC.) IS RECEIVING INCREASING ATTENTION AND THE BUREAU WOULD LIKE TO EXECUTE A NUMBER OF PERFORMANCE CONTRACTS IN THE NEAR FUTURE. SEPARATE MESSAGES WILL BE SENT TO THE FIELD SOON AND DAVE LUNDBERG HANDCARRIED A RECENT MEMO BY STEVE MINTZ ON THIS SUBJECT FOR MISSION USE. THE ECPR REQUESTED THE MISSION TO CONSIDER POSSIBLE PERFORMANCE CONTRACT ALTERNATIVES FOR THE AGRICULTURAL RESEARCH PP.

J. IEE: AS PROPOSED IN THE PID'S IEE, THE BUREAU'S ENVIRONMENTAL OFFICER AND LEGAL ADVISOR APPROVED A CATEGORICAL EXCLUSION FOR THE RESEARCH MANAGEMENT AND TRAINING COMPONENTS, AND THE THRESHOLD DECISION FOR THE CROP RESEARCH AND RESEARCH FUND COMPONENTS WAS DEFERRED UNTIL THE TIME OF PP PREPARATION. SIGNED COPIES OF THE IEE FACESHEET ARE BEING POUCHED.

3. THERE WERE A NUMBER OF USEFUL OBSERVATIONS AND SUGGESTIONS FOR PP DESIGN WHICH WERE RAISED DURING THE PID REVIEW PROCESS BUT WERE NOT FULLY DISCUSSED AT THE ECPR. MANY OF THESE SUGGESTIONS ARE CONTAINED IN A MEMORANDUM FROM PPC/PDPR TO AFR/PD/RAP. THIS MEMO WAS PASSED TO LUNDBERG FOR MISSION USE IN PP PREPARATION. WHITEHEAD BT
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Annex A. Commentary on ECPR Guidance Cable (State 389802)

The following comments are keyed to the paragraphs and sub-paragraphs of the ECPR cable.

2A. A thorough institutional analysis of the agricultural research system and its proposed reorganization has been conducted by the Kenyan branch of Coopers and Lybrand. The final report by Coopers forms an unattached annex to the Project Paper and is summarized in Annex 6. This analysis has been utilized to structure conditionality for the project with regard to institutional development and has also formed the basis for a greater emphasis on support to management functions than was contained in the PID.

The Government of Kenya, specifically the Ministry of Agriculture and Livestock Development, has taken a series of positive strides in the past several months towards a radical reorganization of its agricultural research establishment. Foremost of these has been the preparation of the Ministry's Task Force Report, published in April, 1986, which provides a critical analysis of the existing research system and proposes a complete overhaul of that system. The findings and recommendations of this study have been embraced by the Ministry's senior officials, including the Permanent Secretary, Director of Agriculture and current heads of the three elements of the research system whose functions will be most dramatically affected - the Directors of the Scientific Research Division, the Veterinary Research Services and KARI.

The determination of Ministry leadership to proceed with the reorganization is demonstrated by the full and active collaboration of its senior research official mission with representatives from the IBRD, USAID and other donors in a three - week pre-appraisal designed to closely examine the Task Force recommendations, clarifying and modifying them as needed, in preparation for donor financing of the reorganization. That Mission resulted in sharpening numerous Task Force recommendations, including a substantial revision of the proposed organization and management system of the restructured research system. The Ministry has accepted Mission findings and will incorporate them in the final draft of the Task Force Report.

The next steps toward implementation of the reorganization will be the appointment of the new KARI Board of Management, the Director and three Deputy Directors. The AID project includes a Condition Precedent to initial disbursement that these central management position be filled. The Permanent Secretary has estimated that those appointments will be made by late summer; the Pre-Appraisal Mission recommended that they be made by September 1, 1986 at the latest. Once these officers are identified the existing research functions will begin to be reorganized within the restructured KARI. The ATD

project will assist with this difficult process through the technical assistance, commodities and training it will provide. The Permanent Secretary has stated his intention of having the restructured KARI beginning its function as an integrated research management entity by the end of 1986.

Parallel with the establishment of the KARI headquarters staff and management systems the new mode of research programming and budgeting will be initiated, at first for a limited number of key commodities. This will require naming of National Program Coordinators, convening Specialist Committees and perhaps assignment of new Station Directors. KARI's first year of existence (1986/87) will be a year of transition to a new system with the research program largely defined by on-going activities and funds budgeted through June, 1987. In July and August of 1986 preparation will begin on the KARI's forward budget for 1987/88 and onwards, based on the Task Force Report which sets out the framework of the agricultural research strategy. During the following months KARI will initiate meetings of commodity and factor specialist committees to chart long-term research strategies. In January 1987 the process of preparing the draft budget estimates and national research programs under the reorganized KARI for 1987/85 will begin. This process will require the combined efforts of the KARI Department of Planning finance and administration, National Commodity Program Coordinators and Station Managers. Again, the Planning Management and Component of the project will provide vital assistance to this undertaking. The Maize and Sorghum/Millet Component will also help because maize will be the crop for which the redesigned programming system is first attempted.

Some resistance from existing station management to the reorganization of research under a restructured KARI may be found to impede implementation of the program. Ministry headquarters officials will be consulting with affected station administrators on the reorganization and any resulting changes in their roles and responsibilities. Management training exercises included in the project's Planning and Management Component have been designed with attention to the necessity of assisting station managers adjust to demands on them from reorganization.

2B. Recurrent costs were thoroughly considered in the financial analysis for the Project Paper conducted by Coopers and Lybrand. Additional analyses of recurrent cost implications of reorganizing the agricultural research system were made during the GOK/Donor Pre-Appraisal Mission and by USAID/Kenya. The findings of these reviews are discussed in Annex 4, Recurrent Costs.

2.C Other Donors

During the Pre-Appraisal Mission the commodity approach to programming national research activities was strongly reconfirmed by all parties.

Each national program will have its research priorities and budget established through commodity or factor programming committees, with input from KARI headquarters (Department of Planning, Finance and Administration) and through close consultation with participating research centers. National commodity (and factor) coordinators will be responsible for maintaining technical supervision of all work conducted nationally under each program, regardless of venue. Administrative and fiscal authority for implementation of national research programs will reside with station directors. For example, the National Maize Program will be headquartered at the Kitale NRC and managed nationally by the Kitale Station Director. Technical supervision of all maize work and direction of both the periodic Maize Specialist Committee meeting and the annual programming meeting will be under the Maize Program Coordinator. Individual station budgets will reflect the national program activities to be undertaken at that station plus any supporting basic and adaptive research. The KARI budget will be a compilation of headquarters and station budgets but will be constructed to also demonstrate the overall budget for each national program, distinguished by type and location of activity.

Rapidly escalating recurrent costs associated with the growing extension service are a cause of concern. The recurrent cost budget is expected to increase in 1986/87 59.1% over the 1985/86 level to a new high of K Pounds 14.4 million (USD 18 million). This increase is almost entirely due to the increase in personnel from 2,353 to 8,257. There is to be a joint GOK/IBRD evaluation of the extension program in mid-1987 with a view to establishing cost savings while improving the dissemination of improved agricultural practices.

Among donors active in Kenya, only AID has presented a detailed project in support of the Governments' reorganization for its agricultural system. The World Bank has voiced its plans to provide substantial assistance to the magnitude of $30 million but will not be designing its project until it fields an Appraisal Mission in September or October, 1986. Other donors have expressed interest in participating in the research program but have advanced no details, neither technical nor financial, concerning intended projects. Once the reorganized KARI is operational other donors may be expected to become active in the new agricultural research program.

2D. A review of the impact of GOK policies on this project and its outputs in contained in Annex 5 and summarized in Section VI of the Project Paper. This review has directed much of the language on conditionality found in the Paper.

2E. The Research Fund is described in general terms in Section III, Project Description, of the Project Paper and in greater detail in Annex 1 D.

2F. A thorough human resources analysis was conducted for this project by Devres under an IQC work order. The results of that analysis are included in Annex 1.C. and are summarized in Section IV. B. of the Paper.

Firm data is not readily available on the movements of AID-supported trainees following their return from training. Neither USAID/Kenya nor the GOK keep complete records of the progressions of ex-trainees. However, several points are clear. First, there has been no problem of Kenyans failing to return to Kenya after training. Conversations with GOK officials indicate that only one such incident has occurred in recent years. Second, Kenyans most recently trained with AID support, specifically the 65 trainees associated with Egerton College and Kiboko Range Research Stations, have all returned to appropriate assignments at their respective institutions. (To the best of USAID's knowledge, only one of these individuals has since transferred, due to an overseas job transfer of the spouse.)

Lastly, retention of qualified personnel has been historic problem in the MOALD (and other GOK ministries) as salaries and other benefits in the private and parastatal sectors are attractive. The ISNAR and Task Force reports, plus the findings of the Pre-Appraisal Mission and USAID/Kenya's own analysis, all concur that an improved scheme of service for KARI researchers is essential if the investment in training is not to be lost. With the imminent reorganization, the scheme of service designed for Kenya Research Institute will apply to KARI personnel. It is judged that this change, plus the establishment of an Office of Planning and Manpower Development, will contribute significantly to improving KARI's ability to retain quality personnel. A final observation is that MOALD officials believe that retention is considerably less a problem now than in past years. They point to increased interest on the part of private sector employees in joining the Ministry and the apparent decline in the attirition rate from 6% to 4% annually.

2G. Contracting arrangements for the project are discussed in Section IV of the Project Paper.

2H. The mission purposes to involve a Gray Amendment institution in project implementation by reserving the Procurement Services Contract for such purpose. The total amount of project money involved in off-shore procurement, including the contract itself, represents approximately 10% of total costs.

2I. USAID/Kenya has concluded that only certain components of the project are reasonable candidates for performance contracting. Deliverables in the form of new management systems installed under the research component could be subject to a performance contract approach tied to quality outputs, not time. Return of long-term participants according to an agreed schedule could also be a target for performance

contracting. However, the pressure to produce would be more upon the student than the contractor and could prove counter productive. Delivery of goods under the PSA contract could certainly be subject to a time-influenced performance contract. These options will be further pursued at the time of PIO/T preparation.

2J. Further environmental analysis has been conducted for the Maize and Sorghum/Millet Research and Research Fund components and forms Annex E.7 of the Project Paper.

3. The PPC/PDPR memo has been reviewed and utilized in the PP design exercise.

LOGICAL FRAMEWORK
NATIONAL AGRICULTURAL RESEARCH (615-0229)

GPOI	INDICATORS	VERIFICATION	ASSUMPTIONS
GOAL: To increase Kenya's national food security through increasing agricultural productivity especially in the smallholder sector.	Stable farmgate and food prices. Improved rate of growth in agricultural sector. Sufficient food availability to meet demand.	MOALD/CBS Production Statistics. CBS Consumption Statistics. Local Market Prices.	GOK will adopt policies/ programs to assure positive incentives for ag. production. Infrastructure and other externalities will be in place to support increased growth in the ag. sector.
PURPOSE: Develop a well-managed national agricultural research system capable of providing the agricultural sector with appropriate technologies which will increase productivity on a continuing basis.	1. Consolidation of MOALD research efforts into one entity under one director. 2. Organization of research entity upgraded so that: a) National subject matter programs and area-oriented programs are related to each other and; b) Size and structure of the research entity is related to national resources made available to it. 3. Management systems upgraded so that managers can effectively manage budgets, program, facilities and personnel. Increased accountability.	1. Organization flow charts, program documents, budgets, and financial and annual reports. 2. On-site examination of program operations. 3. Interviews with research and extension personnel.	GOK will provide the necessary financial and bureaucratic support to effect the reorganization and rationalization of the research system. GOK will adopt a commodity approach to agricultural research programming. System will be flexible to permit expectations, interim targets, and project strategy and plans to be adjusted in line with new information, better understanding, and changes in the status of agriculture in Kenya.

LOGICAL FRAMEWORK

GPOI	INDICATORS	VERIFICATION	ASSUMPTIONS
	4. Improved varieties of maize and sorghum/millet used by increasing numbers of farmers. 5. System continuously testing and evaluating promising new varieties and technologies.		The extension program proves an effective technological delivery system to the farmer and can be strengthene through improved linkages to the commodity research programs.
OUTPUTS: 1. Strengthened management of agricultural research in Kenya. System capable of setting research priorities and allocating financial and personnel resources accordingly.	MAGNITUDE OF OUTPUT: 1A. Workable national research program in action, upgraded management systems for budget, programming, facilities and personnel. 1B. National commodity program functioning according to established priorities. 1C. Structure of the research budget, and other resources reflects established priorities.	1. Annual reports. 2. Plans of work and long-range plans. 3. Other documents, including project evaluations. 4. On-Site observations	GOK will have sufficient commitment to improved manage ment to implement needed changes. Qualified Kenyan personnel are available for key admin. positions. Regional and other political interests do not impede rationalization of the research system.

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LOGICAL FRAMEWORK

GPOI	INDICATORS	VERIFICATION	ASSUMPTIONS
2. Improved farmer usable technologies developed for maize and other selected crops.	2A. New varieties developed, tested and approved for farmer use. 2B Technological packages need to optimally support the new varieties are developed, tested and approved for farmer use.		Genetic material exists which can be adapted to produce significantly higher yielding crop varieties in the Kenyan environment. The IBRD financed extension program will prove an effective delivery system to the farmer and can be strengthened through improved linkages with the commodity research programs at the trial stage.
3. Contract/grant research fund established and operating to fund research activities undertaken by the, private sector and the academic community.	3A. Procedures established to review, and approve research proposals. 3B. Utilization of research funds by private and public based scientists. 3C. Approximately 150 grants and contracts averaging $20,000 made through the life of project.	Review of the number of grantees, the funds utilized and the results produced.	

PRELIMINARY LOGICAL FRAMEWORK

GPOI	INDICATORS	VERIFICATION	ASSUMPTIONS
4. Trained research personnel functioning effectively in research and administration.	4A. Admin/Mgt. staff skills upgraded. 4B. Research scientists skills upgraded and maintained. 4C. Approximately 54 research personnel at M.S. (Univ. of Nairobi), 34 at M.S. (U.S. institutions), and 55 Ph.D. degrees in various disciplines. Short term courses on specialized research topics conducted in Kenya. Three research management seminars conducted in U.S.	Review of training plans, execution of those plans. Review of placement of trainees in both public and private research organizations.	A reorganized, efficient research system has the capacity to absorb the number of trainees envisioned.
INPUTS: USAID: Technical Assistance: 1 Senior Research Counselor (36 PM) 1 Planning/Programming Spec. (60 PM) Short-term Mgmt Design Spec. (105 PM) LT Maize, Sorghum Millet Breeders, Agronomists (408 PM) ST Agricultural Specialists (77 PM)	USAID: $10,868,300 for technical assistance.	Records and Reports of TA teams, and implementing agency(ies). USAID/Kenya and GOK Monitoring Reports. Audit reports verifying receipt and use of commodities and equipment.	Specialized technical assistance proposed can be supplied by a U.S. institution.

LOGICAL FRAMEWORK

GPOI	INDICATORS	VERIFICATION	ASSUMPTIONS
Training: In research and extension, U.S. long-term and internships, 3rd Country Short-term, and Host Country Short-term and in-service training.	$12,794,200 for training.		
Commodities: Office, Farm and Lab Equipment, Seed and Plant Materials, Audio-Visual and Printing Equipment, Professional Texts and Journals, Vehicles and Motor Cycles.	$ 4,000,000 for commodities.		
Operations and Maintenance Vehicle O&M Research Supplies, Communications	$2,626,000		
Research Fund	$3,135,000 for research grants.		
Evaluation Monies:	$480,000 for evaluation work.		
Administration	$1,785,000		
Provision for Inflation/ Contingency	$7,146,400		
GOK: Staff Salaries Training Operation and Maintenance GOK Overhead Land Offices and Equipment Staff housing.	GOK budget contribution will total the equivalent of at least $52.0 million.		

ANNEX C

COUNTRY CHECKLIST FOR 1986 WAS INCLUDED IN THE PAAD FOR THE STRUCTURAL ADJUSTMENT ASSISTANCE PROGRAM (615-0240)

PROJECT CHECKLIST

A. GENERAL CRITERIA FOR PROJECT

1. FY 1986 Continuing Resolution Sec. 524; FAA Sec. 634A Describe how authorizing and appropriations committees of Senate and House have been or will be notified concerning the project.	Congress was notified of the project in the FY 86 Congressional Presentation of A.I.D.'s budget (page 218, Annex 1, Africa).
2. FAA Sec. 611(a)(1). Prior to obligation in excess of $500,000, will there be (a) engineering, financial or other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the U.S. of the assistance?	a. The necessary engineering and financial plans have been prepared for the project. b. Based on the financial data developed for the project, a reasonably firm estimate of costs has been developed.
3. FAA Sec. 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of the assistance?	No further legislation is required.
4. FAA Sec. 611(b); FY 1986 Continuing Resolution Sec. 501. If for water or water-related land resource construction, has project met the principles, standards and procedures established pursuant to the Water Resources Planning Act (42 U.S.C. 1962,et.seq.)?	Not applicable

5. FAA Sec. 611(e). If project is capital assistance (e.g., construction), and all U.S. assistance for it will exceed $1 million, has Mission Director certified and Regional Assistant Administrator taken into consideration the country's capability effectively to maintain and utilize the project?	Not applicable
6. FAA Sec. 209. Is project susceptible to execution as part of regional or multilateral project? If so, why is project not so executed? Information and conclusion whether assistance will encourage regional development programs.	No. It is a country-specific activity. Project may produce research products which can be adapted by other countries in East Africa.
7. FAA Sec. 601(a). Information and conclusions whether project will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; and (c) encourage development and use of cooperatives, and credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.	The project may increase the flow of international trade in some selected agricultural products if the research effort succeeds in increasing productivity. Private initiative in terms of agricultural production and the supply of inputs will be fostered. The objective of the project is to increase productivity and output by improving the technical efficiency of agriculture.
8. FAA Sec. 601(b). Information and conclusions on how project will encourage U.S. private trade and encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).	U.S. contractors will participate in the provision of technical assistance in research and management, training and the procurement of a substantial volume of commodities.

9. FAA Sec. 612(b), 636(h); FY 1986 Continuing Resolution Sec. 507. Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost support while they are of contractual and other services, and foreign currencies owned by the U.S. are utilized in lieu of dollars.

The provision of local currencies by the GOK to support the agricultural research system, and this project, is the subject of a major covenant associated with the project. The U.S. owns no excess Kenyan shillings which could be used in lieu of U.S. dollars.

10. FAA Sec. 612(d). Does the U.S. own excess foreign currency of the country and, if so, what arrangements have been made for its release?

No, the U.S. does not own excess Kenyan currency.

11. FAA Sec. 601(e). Will the project utilize competitive selection procedures for the awarding of contracts, except where applicable procurement rules allow otherwise?

Yes.

12. FY 1986 Continuing Resolution Sec. 522. If Assistance is for the production of any commodity for export, is the commodity likely to be in surplus on world markets at the time the resulting productive capacity becomes operative, and is such assistance likely to cause substantial injury to U.S. producers of the same, similar or competing commodity?

Any periodic surpluses of white maize or sorghum and millet will most likely be exported only in the East African region. Kenya's principal export in years of surplus, white maize, is neither injurious to U.S. producers nor likely to be in surplus on world markets.

13. FAA 118(c) and (d). Does the project comply with the environmental procedures set forth in AID Regulation 16? Does the project or program take into consideration the problem of the destruction of tropical forests?	Yes, actions have been taken to assure compliance with Reg. 16. The project does not specifically take into consideration the problem of the destruction tropical forests.
14. FAA 121(d). If a Sahel project, has a determination been made that the host government has an adequate system for accounting for and controlling receipt and expenditure of project funds (dollars or local currency generated therefrom)?	Not applicable
15. FY 1986 Continuing Resolution Sec. 533. Is disbursement of the assistance conditioned solely on the basis of the policies of any multilateral institution?	No
16. ISDCA of 1985 Sec. 310. For development assistance projects how much of the funds will be available only for activities of economically and socially disadvantaged enterprises, historically black colleges and universities and private and voluntary organizations which are controlled by individuals who are black Americans, Hispanic Americans, or Native Americans, or who are economically or socially disadvantaged (including women)?	The contracting for Procurement Services Agent will be reserved for a Gray amendment entity. This activity, including contract and commodity procurement, amounts to approximately $4.3 million, or 10% of the total project cost.

B. FUNDING CRITERIA FOR A DEVELOPMENT ASSISTANCE PROJECT

a. FAA Sec. 102(b), 111, 113, 281(a). Extent to which activity will (a) effectively involve the poor in development, by extending access to economy at local level, increasing labor-intensive production and the use of appropriate technology, spreading investment out from cities to small towns and rural areas, and insuring wide participation of the poor in the benefits of development on a sustained basis, using the appropriate U.S. institutions; (b) help develop cooperatives, especially by technical assistance, to assist rural and urban poor to help themselves toward better life, and otherwise encourage democratic private and local governmental institutions; (c) support the self-help efforts of developing countries; (d) promote the participation of women in the national economies of developing countries and the improvement of women's status; and (e) utilize and encourage regional cooperation by developing countries?

a) Research activities will focus on support for increasing productivity on smallholder plots; b) research produced by the project will be available for use by cooperatives and the rural poor; increased food availability will benefit rural and urban poor alike; c) the objective of the project is to support the improvement of one of Africa's most important agricultural research systems to the point where it can operate on an efficient, self-sustaining basis d) as the majority of the farming population of Kenya, women will benefit from an improved agricultural research system; e) research products developed in Kenya may prove adaptable and thus of major importance, to Kenya's East African neighbors.

b. FAA Sec. 103, 103A, 104, 105, 106. Does the project fit the criteria for the type of funds (functional account) being used?	Yes, ARDN funds will be used for this agricultural research project
c. FAA Sec. 107. Is emphasis on use of appropriate technology (relatively smaller, cost-saving, labor-using technologies that are generally most appropriate for the small farms, small businesses, and small incomes of the poor)?	Yes, feedback from small farmers will be utilized to direct research activities undertaken under the project.
d. FAA Sec. 110(a). Will the recipient country provide at least 25% of the costs of the program, project, or activity with respect to which the assistance is to be furnished (or is the latter cost-sharing requirement being waived for a "relatively least developed" country)?	Yes. The estimated host country contribution is above 25 percent.
e. FAA Sec. 122(b). Does the activity give reasonable promise of contributing to the development of economic resources, or to the increase or productive capacities and self-sustaining economic growth?	Yes, agricultural research is a key element necessary for future improvement of Kenya's agricultural productivity.
f. FAA Sec. 128(b). If the activity attempts to increase the institutional capabilities government of the country, or if it attempts to stimulate scientific or technologal research, has it been designed and will it be monitored to ensure that the ultimate beneficiaries are the poor majority?	Research to be conducted by this project will be directed toward the problems of smallholder agriculturalists in Kenya. Smallholders should thus benefit directly from the project's research products.

g. FAA Sec. 281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civil education and training in skills required for effective participation in government processes essential to self-government.	The farming population of Kenya needs and desires improved agricultural output and productivity. A key ingredient of any such improvement is the availability of improved technology - to be supplied by this project. Through training and U.S. technical assistance, Kenyans will be encouraged to foster the institutional development of their agricultural research system, vital element of the series of institutions which support agricultural development in the country.

5C(3) - STANDARD ITEM CHECKLIST

A. Procurement	
1. FAA Sec. 602. Are there arrangements to permit U.S. small business to participate equitably in the furnishing of commodities and services financed?	Grant financed host-country contracts will follow A.I.D. contracting procedures which contain provisions for small business participation.
2. FAA Sec. 604(a). Will all procurement be from the United States except as otherwise determined by the President or under delegation from him?	Yes.
3. FAA Sec. 604(d). If the cooperating country discriminates against marine insurance companies authorized to do business in the U.S., will commodities be insured in the United States against marine risk with such a company.	Kenya does not discriminate against U.S. marine companies.

4. FAA Sec. 604(e); ISDCA of 1980 Sec. 705(a). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity? (Exception where commodity financed could not reasonably be procured in U.S.)	No agricultura commodities or products will financed by the project.
5. FAA Sec. 604(g). Will construction or engineering services be procured from firms of countries which receive direct economic assistance under the FAA and which are otherwise eligible under Code 941, but which have attained a competitive capability in international markets in one of these areas? Do these countries permit United States firms to compete for construction or engineering services financed from assistance programs of these countries?	No, all construction or engineering services will be obtained from U.S. or Kenyan sources.
6. FAA Sec. 603. Is the shipping excluded from compliance with requirement in section 901(b) of the Merchant Marine Act of 1936, as amended, that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed shall be transported on privately owned U.S. flag commercial vessels to the extent that such vessels are available at fair and reasonable rates?	No

7. FAA Sec. 621. If technical assistance is financed, will such assistance be furnished by private enterprise on a contract basis to the fullest extent practicable? If the facilities of other Federal agencies will be utilized, are they particularly suitable, not competitive with private enterprise, and made available without undue interference with domestic programs?	Technical assistance from the U.S. will be furnished by private enterprise. Services by other Federal agencies is not anticipated.
8. International Air Transport. Fair Competitive Practices Act, 1974. If air transportation of persons or property is financed on grant basis, will U.S. carriers be used to the extent such service is available?	Yes.
9. FY 1986 Continuing Resolution Sec. 504. If the U.S. Government is a party to a contract for procurement, does the contract contain a provision authorizing termination of such contract for the convenience of the United States?	Yes, such a provision will be included in all such contracts
CONSTRUCTION	
1. FAA Sec. 601(d). If capital (e.g., construction) project, will U.S. engineering and professional services to be used?	Construction of housing for technicians will take place under the project. Kenyan firms will most likely be utilized in the design of this relatively small-value construction element.

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2. FAA Sec. 611(c). If contracts for construction are to be financed, will they be let on a competitive basis to maximum extent practicable?	Yes
3. FAA Sec. 620(k). If for construction of productive enterprise, will aggregate value of assistance to be furnished by the U.S. not exceed $100 million (except for productive enterprises in Egypt that were described in the CP)?	N/A
C. OTHER RESTRICTIONS	
1. FAA Sec. 122(b). If development loan, is interest rate at least 2% per annum during grace period and at least 3% per annum thereafter?	N/A
2. FAA Sec. 301(d). If fund is established solely by U.S. contributions and administered by an international organization, does Comptroller General have audit rights?	N/A
3. FAA Sec. 620(h). Do arrangements exist to insure that United States foreign aid is not used in a manner which, contrary to the best interests of the United States, promotes or assists the foreign aid projects or activities of the communist-block countries?	Yes.

4. Will arrangements preclude use of financing:

a. FAA Sec. 104(f); FY 1986 Continuing Resolution. Sec. 526. (1) To pay for performance of abortions as a method of family planning or to motivate or coerce persons to practice abortions; (2) to pay for performance of involuntary sterilization as method of family planning, or to coerce or provide financial incentive to any person to undergo sterilization; (3) to pay for any biomedical research which relates, in whole or part, to methods or the performance of abortions or involuntary sterilizations as a means of family planning: (4) to lobby for abortion?	(1) Yes. (2) Yes. (3) Yes. (4) Yes.
b. FAA Sec. 488. To reimburse persons, in the form of cash payments, whose illicit drug crops are eradicated.	Yes.
c. FAA Sec. 620(g). To compensate owners for expropriated nationalized property?	Yes.
d. FAA Sec. 660. To provide training or advice or provide any financial support for police, prisons, or other law enforcement forces, except for narcotics programs?	Yes.
e. FAA Sec. 662. For CIA activities?	Yes.

f. FAA Sec. 636(i). For purchase, sale, long-term lease, exchange or guaranty of the sale of motor vehicles manufactured outside U.S., unless a waiver is obtained?	Yes.
g. FY 1986 Continuing Resolution, Sec. 503. To pay pensions, annuities, retirement pay, or adjusted service compensation for military personnel?	Yes.
h. FY 1986 Continuing Resolution, Sec. 505. To pay U.N. Assessments, arrearages or dues?	Yes.
i. FY 1986 Continuing Resolution, Sec. 506. To carry out provisions of FAA section 209(d) (Transfer of FAA funds to multilateral organizations for lending)?	Yes.
j. FY 1986 Continuing Resolution, Sec. 510. To finance the export of nuclear equipment, fuel, or technology.	Yes.
k. FY 1986 Continuing Resolution, Sec. 511. For the purpose of aiding the efforts of the government of such country to repress the legitimate rights of the population of such country contrary to the Universal Declaration of Human Rights?	Yes.
l. FY 1986 Continuing Resolution, Sec. 516. To be used for publicity or propaganda purposes within U.S. not authorized by Congress?	Yes.

MINISTRY OF AGRICULTURE AND LIVESTOCK DEVELOPMENT

Telegrams: "MINAG", Nairobi
Telephone: Nairobi 720030/9, 720600/9
When replying please quote
Ref. No. RES/KARI/1A Vol.111/119
and date

CATHEDRAL ROAD
P.O. Box 30028, NAIROBI
KILIMO HOUSE

.....20th June 19.86

ANNEX D

~~CONFIDENTIAL~~ NOT US CLASSIFICATION

Mr. Charles L. Gladson,
Director,
U.S. Agency for International Development,
P O Box 30261,
NAIROBI.

Dear Mr. Gladson,

I refer to this Ministry's National Agricultural Research Project recently developed by a Task Force of experts from this Ministry. The project report responds to the needs for improvement in the agricultural research as expressed in the Government of Kenya's most recent policy statement, the Sessional Paper No.1 of 1986 entitled, "Economic Management for Renewed Growth." The report as you know has received wide support by the Agricultural Sub-Committee of the Donor Co-ordination Committee.

The report focusses on research institutional building and technological improvement required to strengthen the agricultural research system in Kenya. Among the major recommendations of the report are:-

(a) the reorganization of the agricultural research system under the Kenya Agricultural Research Institute (KARI);

(b) the establishment of a functional system for developing priorities in the execution of research activities;

(c) the rationalization of the existing system of research stations in order to focus research work on high priority programmes;

(d) a reorganization of the research budget to target financial resources on priority research topics;

(e) the establishment of a Research Fund which will support research work by Kenyan academic and private sectors which complement work being undertaken by the public sector; and

(f) the improvement through training of the educational level of the professional and technical staff of the national agricultural research system.

We would like to request that the Government of United States, acting through the USAID assist in the execution of this important programme whose objective is reorganization and strengthening of the agricultural research system Speciffically, this support is required in the following areas:-

(a) Management and Planning in the development and installation of improved planning and management systems for the reorganized KARI and the system of agricultural research stations located throughout the country.

(b) Commodity Research to strengthen the planning and technical execution of the priority national programmes of commodity research in the national maize programme and the allied national programme of sorghum and millet research;

(c) Human Resources Development to improve the educational level and technical skills of the research system's personnel by financially supporting higher level (PhD and MSc) and technical level training (short-courses) associated with the maize, sorghum and millet programmes as well as other priority areas of research and management.

(d) Research Fund to improve institutional linkage between the public sector research establishment, and its counterparts in the academic and private sectors through a Research Fund to support complementary research work by these two communities.

The development of such an assistance programme by USAID will be of great value in the revitalization of the Kenyan agricultural research system. It will be appreciated if USAID were to consider providing the assistance requested with effect from 1986/87 fiscal year.

Yours sincerely,

J. M. KAMUNGE
PERMANENT SECRETARY.

c.c.

Mr. H. M. Mule,
Permanent Secretary,
Ministry of Finance,
P O Box 30007,
NAIROBI.

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ANNEX E

IMPLEMENTATION PLAN

1. The schedule on the following page provides a detailed review of project activities in the start-up phase, and the early stages of supply of technical inputs and training through FY 88. Subsequent pages provide implementation details by quarter for the period from FY 88 through FY 96.

2. Following the schedule is a plan for the execution of procurement activities required by the project.

3. Justifications for all waivers noted as necessary in the procurement plan form the third section of this annex.

IMPLEMENTATION SCHEDULE
NATIONAL AGRICULT RESEARCH
FY 86 - 89

IMPLEMENTATION SCHEDULE
NATIONAL AGRICULT RESEARCH
FY 86 - 89

1986 Jun Jul Aug Sep Oct Nov Dec 1987 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec 1988 Jan Feb Mar Apr May Jun Jul Aug Sep

A. OBLIGATION
First
Second

B. CONDITIONS/COVENANTS
1. GOK
Name KARI Board
Name KARI Director
Name Office Heads

C. PROCUREMENT :
1. AID/GOK
TA/Training Docs
Procure TA/Training Services
PSA Documentation
Procure PSA
PSA Contract in Operation
Housing Design Docs
Housing Design Preparation
Procure Housing Contractor
Housing Construction

D. MANAGEMENT/PLANNING
Advisor to Director/KARI
Advisor, Planning Programming
Systems Design - ST Advisors
Systems Installation/Training

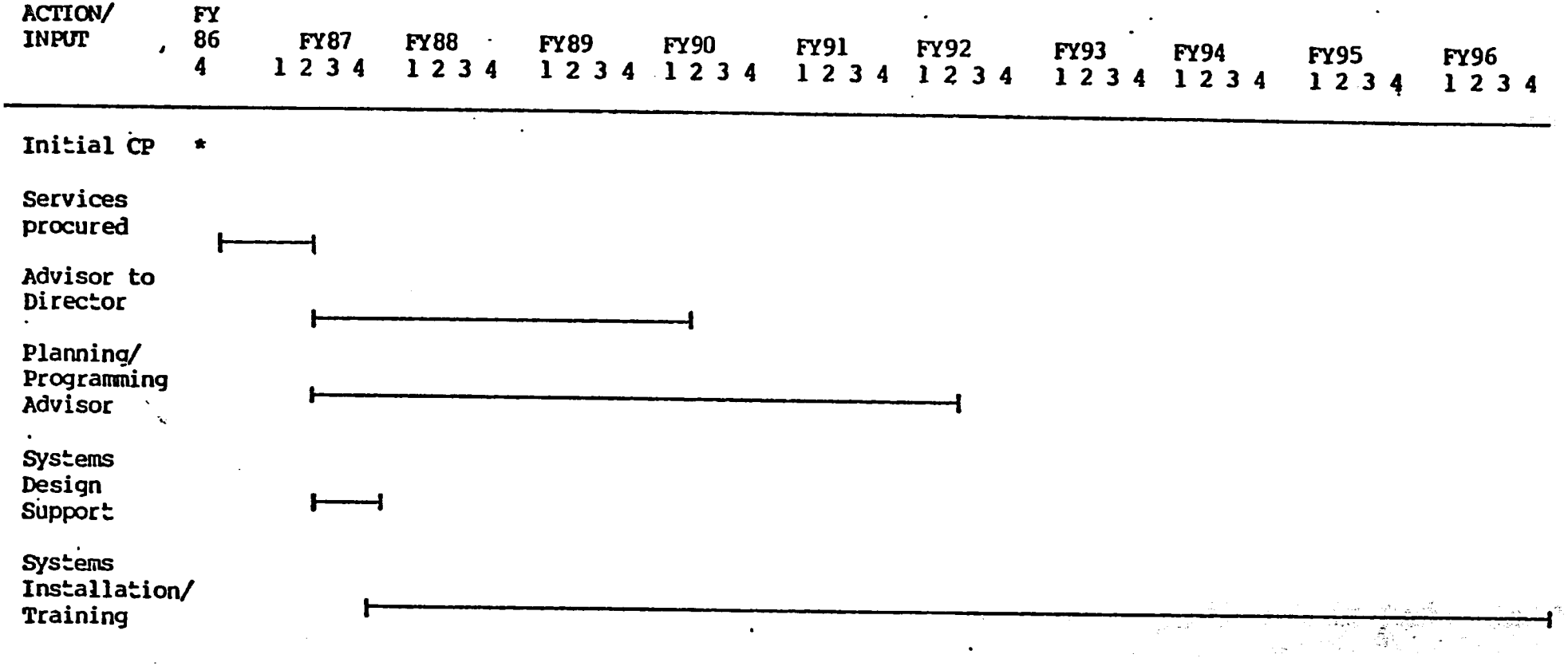
E. COMMODITY PROGRAMS
Maize Breeder - Kitale
Agronomist - Kabete
Maize Breeder - Embu
CP set on Sorgh/Millet Market
Sorgh/Millet Breed - Kabete
Agronomist - Embu
Short-term Specialists

F. HUMAN RESOURCE DEVEL.
CP on Extent of Service Net
PhD Training
MSc Training
Short Courses

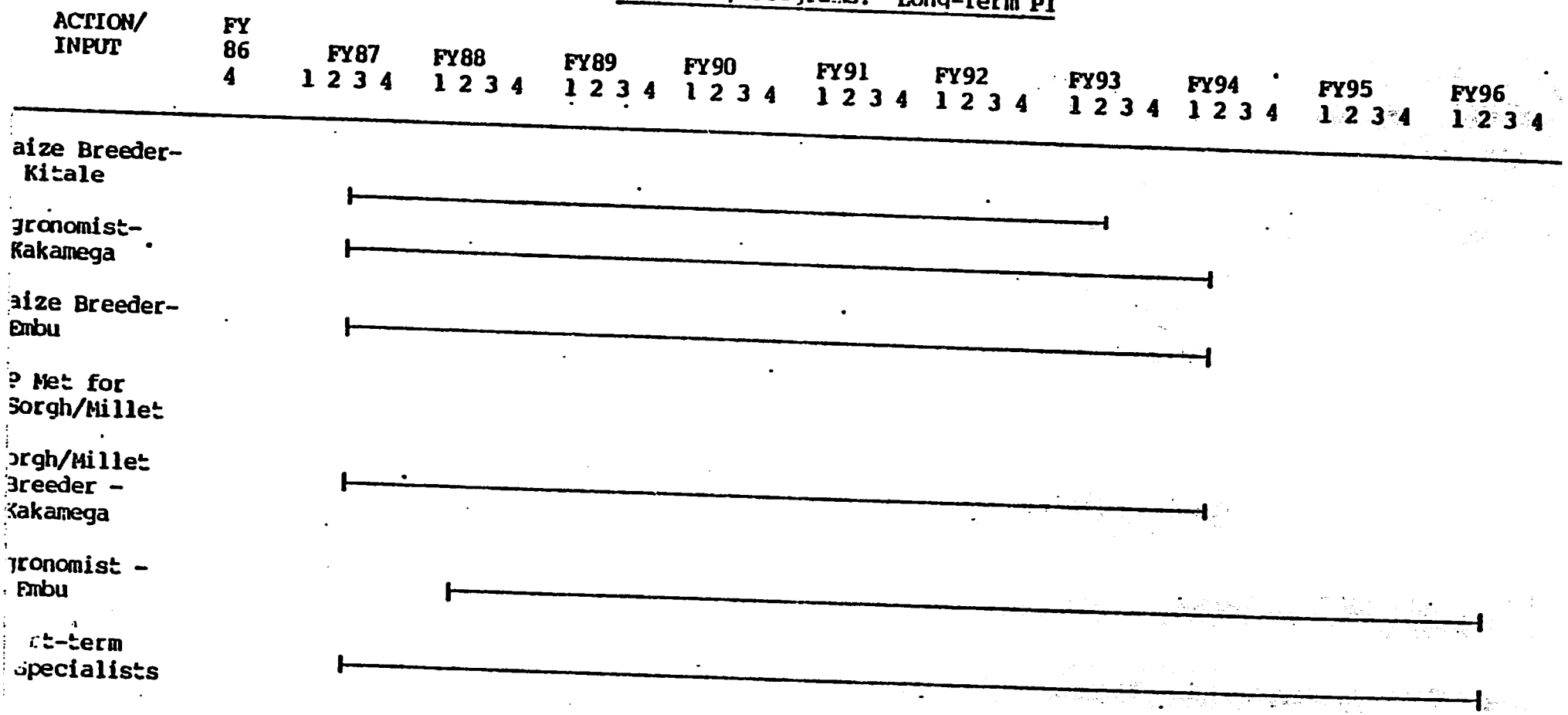
G. NON-GOK RESEARCH
Project Selection Docs Need
Coordinator Named
Management System Developed
CP on Fund Spt Met
NGO Funding Available

H. MAJOR EVALUATIONS
Impact Eval Design

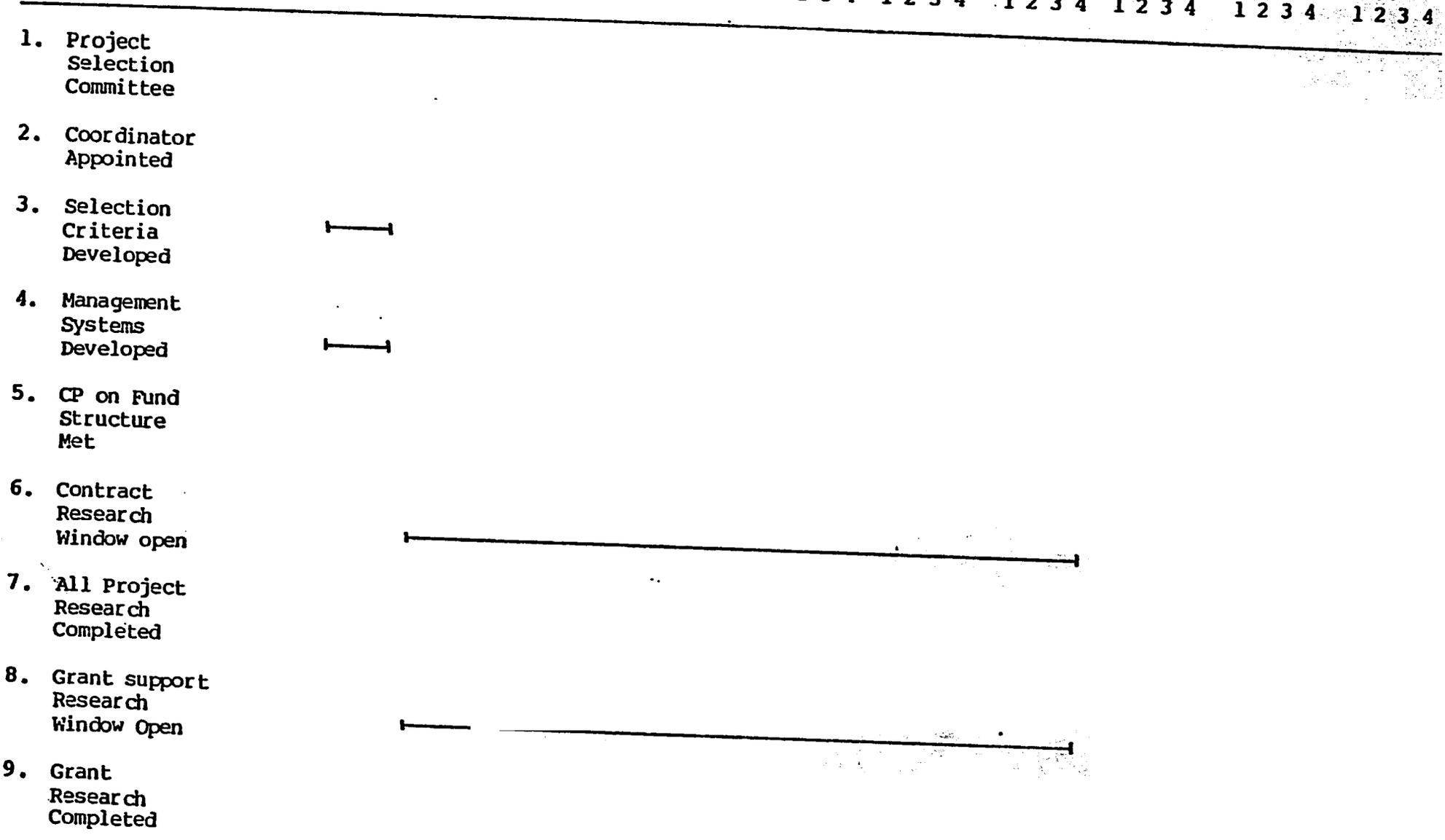
IMPLEMENTATION PLAN
NATIONAL AGRICULTURAL RESEARCH
Management/Planning Component: Long-Term Plan



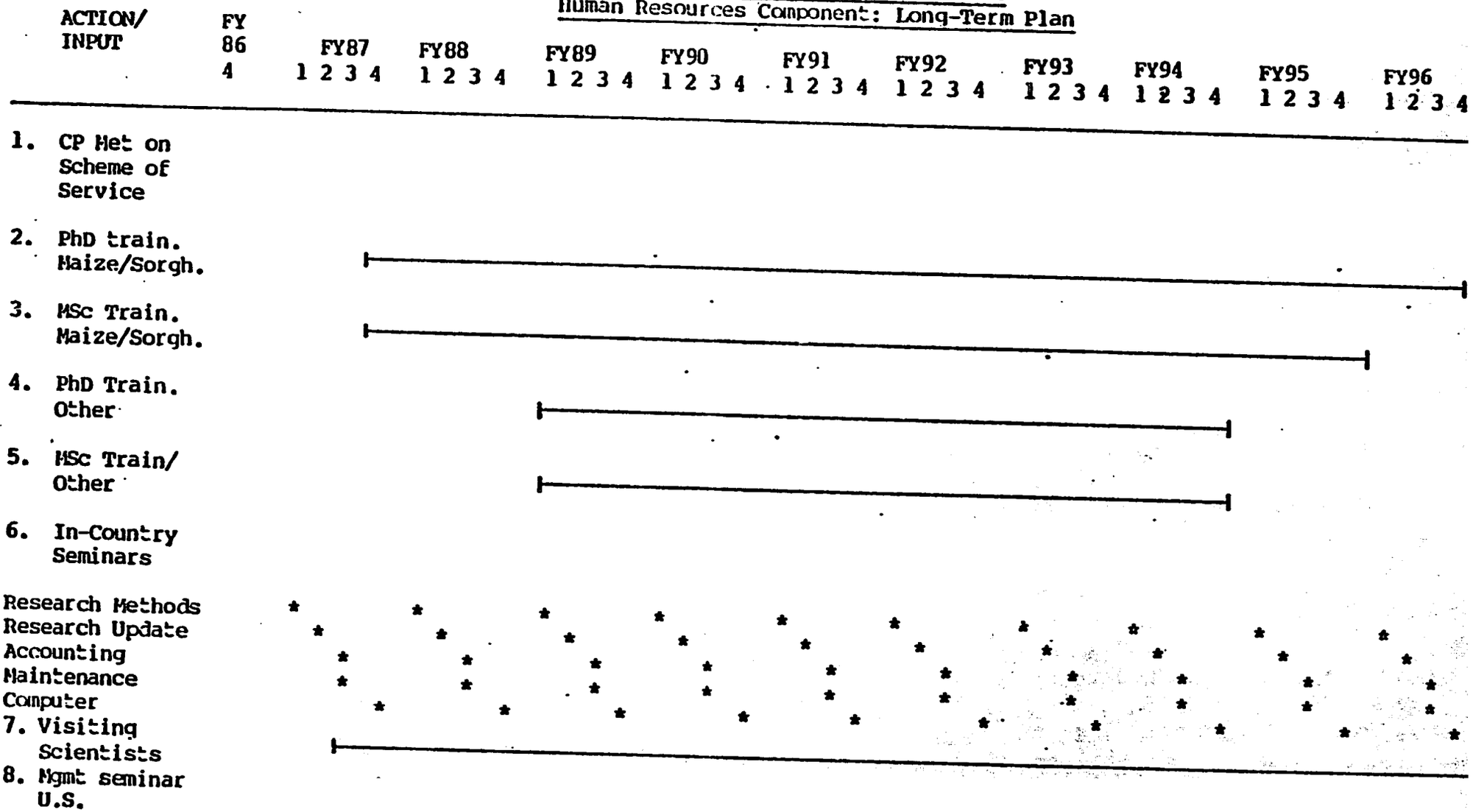
IMPLEMENTATION PLAN
NATIONAL AGRICULTURAL RESEARCH
Commodity Programs: Long-Term Pl



IMPLEMENTATION PLAN
NATIONAL AGRICULTURAL RESEARCH
Research Fund Component: Long-Term Plan



IMPLEMENTATION PLAN
NATIONAL AGRICULTURAL RESEARCH
Human Resources Component: Long-Term Plan



IMPLEMENTATION PLAN
NATIONAL AGRICULTURAL RESEARCH
Other Components: Long-Term Plan

ACTION/ INPUT	FY 86 4	FY87 1 2 3 4	FY88 1 2 3 4	FY89 1 2 3 4	FY90 1 2 3 4	FY91 1 2 3 4	FY92 1 2 3 4	FY93 1 2 3 4	FY94 1 2 3 4	FY95 1 2 3 4	FY96 1 2 3 4
EVALUATION (major)				*		*		*		*	
ADMINISTRATION Admin Asst.											
Accountant											

PROCUREMENT PLAN

1. Responsible Agency:

The Kenya Agricultural Research Institute (KARI), a parastatal institution under the direct authority of the Permanent Secretary, MOALD will be the responsible agent to contract for all goods and services under this project. it is expected that the procurement office of KARI will be strengthened after reorganization and will be able to adequately coordinate all contracting actions. It will be the responsibility of the USAID/Kenya Project Development Officer and the Agricultural Development Officer assigned the responsibility to monitor KARI's procurement activities.

a. Commodity Contracting: KARI's responsibilities for commodity procurement will include such activities as technical specification writing (or contracting for that service either locally or through one of the U.S. IQC firms available to AID for that purpose), preparing and issuing solication documents (IFBs and RFQs), coordinating advertising, reviewing and evaluating offers or bids, placing orders or issuing contracts, expediting, inspecting commodities, arranging transportation and arranging for insurance collections. However, responsibilities for the portion of commodity procurement to be implemented by the prime contractor for technical services will be specified in detail in the contract for those services, and KARI's role would be limited.

b. Service Contracting: KARI will be responsible for major contracting activities for the services of a technical assistance and training contractor and a U.S.-based procurement services agent (PSA) under AID host country contracting procedures on behalf of the MOALD. KARI's responsibilities for contract administration will include the monitoring of commodity procurement activities to be conducted by these entities.

2. Method of Payment:

The method of payment to the prime TA contractor will be by Direct Letter of Commitment between AID and the contractor under which AID makes payment directly to the contractor for eligible services and commodities furnished under the contract. Payment to the PSA for procurement fees will also be by an AID Direct Letter of Commitment, with payment for the commodities to be effected by an AID Bank Letter of Commitment to a U.S. commercial bank, naming the PSA as the approved applicant to instruct the bank regarding the issuance of commercial letters of credit to the various commodity suppliers selected by the PSA.

Direct payment methods are necessary because of the lack of financial resources available to the Government of Kenya. Although the GOK will be able to provide financing for a portion

of the recurrent expenditures associated with the project, the GOK is not in a position to finance initially the cost of these two service contracts.

Furthermore, a number of recurrent items will be required for the proper execution of the project. These include local purchases of fertilizer, pesticides, fuel and other expendables for vehicles, vehicle maintenance, other maintenance activities, and local labor. During the initial stages of the project, the volume of expenditures for these recurrent items is expected to exceed the GOK's fianancial capacity.

Two possibilities were pursued during the design to resolve this difficulty. One option was to arrange for the procurement of a portion of these items under the contract for technical services; another to establish a reimbursement mechanism to offset a portion of the GOK expenditure for these items. However, since AID has had difficulty implementing the reimbursement financing mechanism in the past in Kenya and since the GOK is attempting to hold public sector use of foreign exchange to modest levels, it was determined that the terms of the TA contract will include the costs of a portion of recurrent expenditures for commodities and services. As such, AID will pay the contractor directly for such procurement done by the contractor under the terms of the prime contract.

The need for having the prime contractor administer these procurements could reasonably be expected to decline over time as the GOK's ability to support the recurrent costs burden increases. If evaluation and analysis of the project activities after several years of execution reveal that the GOK budget for research could be leveraged by use of a reimbursement payment mechanism, AID could then consider use of reimbursement in support of a portion of the recurrent cost burden. The TA contract could be amended accordingly.

Increasing the level of budgetary resources for agricultural research requires a restructuring of priorities within the limits of the existing GOK budget. This process of restructuring will require a number of years to implement and is the subject of conditionality associated with this project.

3. Use of a Procurement Services Agent (PSA):

In view of the large amount of U.S. and offshore commodity procurement, KARI will seek the services of a U.S.-based PSA firm to handle these procurements. The contract for these services is intended to be with one of the Gray Amendment entities currently under IQC with AID.

4. AID Direct Contracting for Construction Services:

The principal construction activity under the project will be the building of a series of houses for long-term project technicians working in locations outside of Nairobi (see the Engineering Analysis in Annex G.7). A review of the GOK procedures utilized for the design and construction of physical facilities for the Government indicates that housing design and construction could not be executed in a timely fashion given the schedules for the arrival of the project technicians. Officials of the MOALD have recommended that AID contract directly for the construction of these units.

Two contracts will be required. The first contract will be for the development of designs and specifications required for the houses, utilizing as a basis of the standard plans for senior staff housing developed by the GOK. A second contract will be required for construction. AID will contract directly with construction firms and payment will be made directly to the contractors by AID following standard AID financing procedures for construction contracts. It is anticipated that a Kenyan-based construction firm would be selected.

5. Equipment and Materials List:

A general listing of equipment and materials follows this discussion. It contains a breakdown of annual commodity requirements, probable source and origin, and cost estimates. Cost estimates have taken into consideration delivery, insurance, PSA fees, and an allowance for inflation. The list provides an analysis of equipment and materials needs of the project by year by component and also by year by type of equipment.

6. Eligible Source, Origin, and Nationality:

The source and origin for all goods and services financed by this project will be from countries or areas included in AID Geographic Code 000 (U.S. only) or Kenya except as authorized under waivers or exempted as shelf items purchased under local cost financing.

Imported shelf items can be bought from Kenya or from any other sub-Saharan African country. Shelf items located in one of the above countries which have their origin in countries included in Code 941 are eligible for financing in unlimited quantities. Shelf items of Code 899 origin are eligible if the price of one unit does not exceed $5,000. The total amount of imported shelf

item purchases from code 899 may not exceed $25,000 or 10% of total local costs financed by AID under this project whichever is higher; however in no case may the total amount of such purchases exceed $250,000 without first obtaining a geographic source waiver. Transactions involving shelf items which exceed $5,000 per unit or which are in excess of the total cost limit would require individual geographic source waivers.

7. Applicable Regulations:

Contracting for the supply of goods and services will follow guidelines contained in AID Handbook 11 regarding host country contracting procedures. General procedures to be followed will be set forth in a Project Implementation Letter. As a matter of procedures the following will be observed:

-- In the case of U.S. and other offshore procurement, the selected PSA will initiate action on the basis of the approved equipment list using PIO/C like documentation prepared by KARI and approved by AID prior to issuance to the PSA.

-- In the case of the local procurement by KARI, KARI will utilize standard GOK procurement procedures to the extent that they are compatible with procedures set forth in AID Handbook 11. Approval for specific purchases and reservation of funding will be provided by AID upon request by KARI through the issuance of PILs.

-- In the case of commodities to be procured by the main T.A. contractor, procedures detailed in Handbook 11 will be utilized. AID will monitor these purchases but approval of small value procurement is not required.

-- KARI will be responsible for proper receipt and expeditious utilization of items purchased.

8. Delivery:

All imported goods will be shipped on the basis of CIF Nairobi delivery. Suppliers will be required to obtain all-risk marine insurance in the amount of 120% of the C&F value of the commodities. AID's shipping requirements contained in AID Handbook 11, Chapter 3, will be observed. Contracts with suppliers of commodities which are shipped on ocean carriers must include appropriate language regarding ocean transportation

regulations, and the GOK must insure that U.S. Cargo Preference requirements which apply to all ocean shipments of AID-financed commodities are met.

9. Marking:

It will be the responsibility of KARI to assure that proper instructions regarding AID marking requirements are contained in both the TA and PSA contracts and that these requirements are observed. Appropriate marking material will be procured for use on all locally purchased equipment.

10. Receipt and Utilization:

KARI will be responsible for arranging the monitoring of arrival of all goods and their clearance through the Kenyan customs authorities. It will be responsible for arranging for the inspection of goods as they arrive and for the preparation of receiving reports. Reports of shortages and damages will be forwarded to the PSA together with documentation necessary for the filing of insurance claims. KARI will also insure that all contracts for commodities specify the consignee and establish appropriate final delivery points. KARI will ensure prompt and proper utilization of all goods received and will ensure that all goods are properly inventoried and will submit to AID/Kenya annual utilization reports.

11. Procurement Schedule:

Commodities will be procured according to the schedule shown in the following lists. This schedule will be refined and modified from time to time by KARI, in coordination with the TA contractor, in order to assure a proper flow of materials to this ten-year project.

ANNEX E.3

PROCUREMENT WAIVERS

A.

FROM: Project Review Committee

TO: Mark L. Eldeman, Assistant Administrator

PROBLEM: Your approval of a source and origin waiver from AID Geographic Code 000 (U.S. Only) to Code 935 (Special Free World) is requested for the purchase of photocopiers, electric desk typewriters, desk calculators, and miscellaneous electrical office machines valued at approximately $225,000.

A. Cooperating Country	:	Kenya
B. Authorizing document	:	Project Authorization
C. Project	:	National Agricultural Research Project No. 615-0229
D. Nature of Funding	:	Grant
E. Description of Goods	:	Photocopiers, calculators, typewriters, office machines, with spares and consumables
F. Approximate Value	:	$225,000
G. Probable Source	:	Kenya, Western Europe or Japan
H. Probable Origin	:	Western Europe or Japan

DISCUSSION:

The National Agricultural Research Project supports the newly reorganized Kenya Agricultural Research Institute (KARI) a parastatal of the MOALD and AID efforts to strengthen the national agricultural program and its capability to provide relevant improved technology to its farmers. Appropriate office equipment is needed for use in the offices at the headquarters and offices and laboratories at the several research stations associated with the commodity research programs supported by the project. This equipment will be used to facilitate the implementation of research conducted by KARI staff and

to prepare publications recording and distributing research results. This equipment is valued at approximately $225,000 to be purchased over the four year phase one of the project.

It is essential that these items have replacement parts and service facilities readily avialable within Kenya. U.S. and Code 941 manufacturers have no active local dealers in Kenya, and therefore these machines from eligible sources cannot be serviced or repaired locally. Only equipment manufactured in Western Europe and Japan are commonly used in Kenya and spare parts and service are readily available from dealers in Nairobi for these machines. Repair service and spare part availability is essential because office machines are subject to frequent breakdowns and servicing requirements that require prompt attention to avoid substantial downtime. In addition, 220/240 volt office machines of the type required are not manufactured in the U.S.

PRIMARY JUSTIFICATION:

The subject machines are essential to the operation of the project. They are not available from the authorized source, and non-AID funds are not available for the purpose.

You have the authority to waive and grant exceptions in accordance with AID Handbook 1, Supplement B, of source and origin requirements to permit procurement of goods and services from outside the authorized geographic code. Handbook 1, Supplement B requires that waivers or exceptions for goods must be based upon one or more of the criteria set forth in Section 5B.4a. One criteria under this section is the unavailability of a commodity from an authorized source country or area. As stated above, electrical office equipment which can be adequately maintained by representatives located in Kenya is not available from sources within the authorized geographic code.

RECOMMENDATION:

For the above reasons, it is recommended that you approve this request for a source and origin waiver in the amount of $225,000 to permit the procurement of photocopiers, typewriters, calculators and other office equipment with spares and consumables from countries included in AID Geographic Code 935, and certify that "exclusion of procurement from Free World countries other than the cooperating country and countries included in Code 941 would seriously impede attainment of U.S. foreign policy objectives and objectives of the foreign assistance program." Appropriate legal and technical clearances have been obtained. Your approval of this waiver will be given by your signing of the Project Authorization.

B.

FROM: Project Review Committee

TO: Mark L. Edelman, Assistant Administrator for Africa

PROBLEM: Your approval of source and origin waiver from AID Geographic Code 000 (U.S. only) and Kenya to Code 935 (Special Free World) is requested to procure Right Hand Drive Vehicles, motorcycles of 125cc displacement or less and related spare parts valued at approximately $340,000.

A. Cooperating Country	:	Kenya
B. Authorizing document	:	Project Authorization
C. Project	:	National Agricultural Research Project No. 615-0229
D. Nature of Funding	:	Grant
E. Description of Goods	:	RHD vehicles, motorcycles and spare parts
F. Approximate Value	:	$340,000
G. Probable Source	:	Japan. Western Europe, Kenya

DISCUSSION:

Under the subject project AID is providing technical assistance and training to the Kenya Agricultural Research Institute to assist in the development of viable research programs capable of providing improved technologies to Kenya's farmers. Reliable transport is an essential input into the research program and training to enable project T.A. and Kenyan staff to supervise and administer the research program and to conduct on-station and on-farm trials.

The project paper proposes to finance the purchase of 23 vehicles and 15 motorcycles from the AID contribution of the project.

Probable origin of the vehicles to be purchased under the project is the United Kingdom, Europe, Japan and/or France.

Vehicles are currently covered under the Blanket Vehicle Waiver for East and Southern Africa. This waiver approved by the Administrator in March 1986 permits procurement from Geographic Code 935 countries of light weight (11,000 pound gross vehicle weight or less) right hand drive vehicles and one-wheel drive motorcycles of 125cc displacement

or less. Although this waiver must be reviewed annually, it has existed since 1982 and it is assumed that it will continue to be extended. The current Blanket Waiver expires March 6, 1987. Handbook 1B, Chapter 5, Section B4A(2) permits a waiver of the authorized geographic code when "the commodity is not available from countries or areas included in the authorized geographic code"; and in Chapter 4, Section 636(i) waiver include "inability of U.S. manufacturer to provide a particular type of needed vehicle. Motorcycles and vehicles of the type required by the project are not available from the authorized origin (Code 000), and non-AID foreign exchange is not available for this purpose.

Vehicle and Motorcycle Spares will be required over the 5years of the project. It is expected that up to a total of $25,000 may be required to purchase spares for the 23 vehicles and 15 motorcycles to be supplied by the project. Purchase of spare parts requires proprietary procurement and for these particular vehicles and motorcycles also requires a source/origin waiver since they will be from geographic code 935 countries.

PRIMARY JUSTIFICATION

These vehicles and motorcycles are essential to the operation of KARI and to the Project's stated purpose. Vehicles with right-hand steering is a necessity in Kenya for obvious safety reasons. They are not available from the authorized source. Proprietary procurement of the spare parts is obviously essential.

RECOMMENDATION

For the above reasons and in the event that the Blanket provisions expire during project implementation, it is recommended that you approve this request for a source/origin waiver to undertake proprietary procurement of vehicle and motorcycle spares during life of project in the amount of approximately $25,000 and also approve a source/origin waiver in the amount of approximately $315,000 to permit the procurement of vehicles and motorcycles from countries included in AID Geographic Code 935. Your approval of these waivers will be given by your signing of the Project Authorization.

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C.

FROM: Project Review Committee

TO: Mark Edelman, Assistant Administrator for Africa

PROBLEM: Your approval of a source and origin waiver from AID Geographic Code 000 (U.S. Only) to Code 935 (Special Free World) is requested to procure tractors, tractor implements, irrigation equipment and related spare parts valued at approximately $250,000. Your approval is also required to undertake proprietary procurement for some of these goods.

A. Cooperating Country	:	Kenya
B. Authorizing document	:	Project Authorization
C. Project	:	National Agricultural Research Project No. 615-0229
D. Nature of Funding	:	Grant
E. Description of Goods	:	65HP Tractors, disc harrows, disc plows, mowers, irrigation equipment and related spare parts
F. Approximate Value	:	$250,000
G. Probable Source	:	Kenya, Western Europe, United Kingdom
H. Probable Origin	:	Western Europe, United Kingdom

DISCUSSION:

Under the subject project AID is providing $16.5 million to strengthen the Kenya Agricultural Research Institute (KARI), to be able to carry on viable research to provide new technology to Kenya's farmers. KARI plans to utilize some of these funds to purchase field and irrigation equipment to supplement and/or replace existing machinery and a quantity of spares to repair and rehabilitate other machines and irrigation systems. This equipment will be used by KARI to carry on agricultural research field work, which is essential to meet the objectives of the project.

Under the subject project AID will assist in research activities at five different research stations which combined have a fleet of approximately 40 tractors and 120 miscellaneous implements. The majority of the most recently purchased equipment is manufactured by International Harvester and of Code 899 origin. The Government of Kenya wishes to standardize equipment at these research stations to the greatest extent possible. Spare parts and componentry for U.S.-manufactured Harvester equipment are not interchangeable with Code 899 equipment designed to meet "metric" standards.

This project is committed to assist KARI to begin central inventory of all equipment and to upgrade their service, maintenance and repair capabilities. Equipment and spare parts will be shared among research stations. To help KARI meet these goals, it is essential that this project has the authority and flexibility to purchase new equipment and spares to match existing equipment.

Furthermore, it is essential that these tractors and implements have replacement parts readily available within Kenya. U.S. and other Code 941 tractor and implement manufacturers have no active local dealers in Kenya for such equipment manufactured within the authorized geographic code. Therefore, equipment from eligible sources cannot be adequately serviced and repaired by KARI. Only tractor and implement equipment manufactured in Western Europe is commonly used in Kenya and spare parts are readily available from dealers in Nairobi for such equipment. Spare part availability is essential for KARI to avoid substantial downtime.

According to AID Handbook 11, Chapter 3, Section 2.2.5, proprietary procurement can be authorized when it is justified by substantial benefits, such as economies in maintenance of spare parts inventories, greater familiarity by operating personnel and compatibility with equipment on hand. In this case KARI research stations already operate a fleet of tractors limited mainly to one manufacturer, so that maintenance and repair personnel are familiar with its operation and maintenance and spare parts requirements. To reduce spare part inventories and to avoid introducing a different make of tractor or implement which would compound the maintenance and operational difficulties, KARI has decided to standardize to the extent possible. Therefore, proprietary procurement is justified for this equipment.

The project will purchase irrigation pipes, nozzles and occasional replacement pump and/or motor to supplement/replace existing equipment. Irrigation systems are additive and new prices must match existing pipe and connections. The Ministry of Agriculture has standardized its irrigation and has requested that replacement/supplimentary equipment be of the same type. The

irrigation piping is manufactured in Kenya but some of the standardized equipment such as pumps and motors is manufactured in Western Europe. Spare parts are readily available from dealers in Nairobi.

Proprietary procurement of the irrigation equipment is justified for the above reasons and since the pumps, motors and other selected equipment is not manufactured within the authorized geographic code, source and origin waiver to Code 935 is requested for those selected equipments.

PRIMARY JUSTIFICATION

The equipment is essential to the operation of successful research operations and to the Project's stated purpose. It is not available from the authorized source and non-AID funds are not available for the purpose. Proprietary procurement is justified based on KARI's intention to standardize their equipment in order to facilitate purchase of spare parts.

RECOMMENDATION

For the above reasons, it is recommended that you approve this request for a source and origin waiver and authorize proprietary procurement of tractors, implements, irrigation equipment and related spare parts in the amount of $250,000 from countries included in AID Geographic Code 935, and certify that "exclusion of procurement from Free World Countries other than the cooperating country and countries included in Code 941 would seriously impede attainment of U.S. foreign policy objectives and objectives of the foreign assistance program". Appropriate legal and technical clearances have been obtained. Your approval of this waiver will be given by your signing of the Project Authorization.

Annex F. Preliminary Scopes of Work for Principal Members of Technical Assistance Team

1. Research Counselor (Planning and Management Component):

Qualifications:

The individual will possess a Ph.D. in an agricultural discipline and have extensive experience (10-15 years) as a research organization administrator, experiment station director, or International Agricultural Research Center executive. The individual must have overseas experience in working with developing country agricultural research programs. Overseas work in more than one continent is highly desirable. The individual's professional experience will include executive level responsibilities for all aspects of managing an agricultural research organization including; program planning and budgeting, staff development and evaluation, fiscal administration, procurement, physical plant maintenance and liaison with extension services.

Duties and Responsibilites:

The counselor will assist the KARI Director in the following areas:

i.) serve as link between senior management and the systems design and testing process;

ii.) assist the Director identify areas of management weakness and implement corrective measures;

iii.) assure that appropriate short-term consultancies are effectively and efficiently used to strengthen KARI management;

iv.) provide assistance, as requested, to the KARI Director any managerial issue emerging during the implementation of the restructured organization.

2. Programming Economist (Planning and Management Component):

Qualifications:

The individual will possess a Ph.D. in agricultural economics or economics or possess an M.B.A. degree with a minimum of 10 years professional experience, at least 5 of which have been overseas. The individual must have a strong background in macro-economics, program planning and financial planning and administration. Relevant professional experience should include senior level

positions in agricultural research organizations, ministries of finance or the equivalent with responsibility for program development, management and evaluations. This individual will also serve as the Chief of Party of the technical assistance team and supverise the Project Administrative Unit.

Duties and Responsibilites:

This individual's primary responsibility will be to assist the senior staff of the Office of Planning and Manpower Development with the following tasks:

i.) determination of the national agricultural research program given GOK priorities, available funding, and research capabilities;

ii.) formation of close linkages with the Development Planning Unit of the MOALD, the Treasury and the Office of the President;

iii.) development of staff capability to evaluate current and proposed programs from economic and technical perspectives;

iv.) design, testing and implementation of management systems that result in a well-informed annual programming and budgeting decision-making process.

3. Breeder (3) (Maize and Sorghum/Millet Research Component):

Qualifications:

Ph.D. in plant breeding, preferably in maize or sorghum1/ with a minimum of 5 years experience in a tropical or subtropical region, Africa preferred or at an

International Agricultural Research Center or 5 years experience as an applied breeder. Field experience should include demonstrated ability to plan and execute a significant breeding program. Demonstrated appreciation of on-farm perspective to research is essential. Research project planning, management, and implementation experience are essential. Demonstrated ability and willingness to develop and implement interdisciplinary research team is essential. Willingness and demonstrated ability to live and perform in areas outside major metropolitan areas is necessary.

Duties and Responsibilities:

i) Prepare long-term and short-term breeding plans in consultation with the National Commodity Coordinators;

1/Sorghum specialization preferred for breeder stationed at Kakamega.

ii) To assist the national coordinators in developing an integrated multi-disciplinary improvement program where all the breeders, pathologists and entomologists will be working together on the same breeding populations so as to release high yielding, widely adapted, disease and insect resistant materials in the shortest possible time thus avoiding the use of separate disease and insect nurseries;

iii) Continue to implement current research during the absence from Kenya of GOK breeding professional research officers who are away for graduate training;

iv) Evaluate germplasm, conduct variety evaluation trials, develop new varieties and hybrids and recommend varieties and/or hybrids for release to small farmers in Kenya.

v) Assist with the preparation of research publications on plant breeding research.

vi) Ensure proper maintenance and use of equipment provided under the project.

vii) Respond to recommendations from agronomists on research priorities with a view to developing a breeding program relevant to the needs of small farmers;

viii) Maintain close linkages with the agronomists and assist than as appropriate in designing and implementing adaptive research and demonstration trials on farmers fields;

xi) Provide liaison between the special short-term consultants and the professional and administrative officers of the National Programs.

x) Assist in the identification and selection of Kenyan agricultural scientists for long-term training, in-country, or short-term training as appropriate.

xi) Assist in the selection and processing of Kenyan breeders for participant training and for in-country or other short term training and assist in selection of training institutions;

xii) Assist with short courses or other types of in-service training for counterparts, and extension workers and other GOK personnel in plant breeding, including development of curricula, course materials and presentation.

xiii) Where appropriate and desirable, serve a graduate committee/advisor capacity with MSc. and/or Ph.D. candidates who are conducting their thesis research within the national program.

4. Agronomist (2) (Maize and Sorghum/Millet Research Component):

Qualifications:

The individuals will possess Ph.D.s in Agronomy with emphasis on field crop production or field oriented soil science, with a minimum of 5 years experience. Research project planning, management and implementation experience are essential. Experience as an extension agronomist with a joint research appointment would be highly desirable.

The candidate must be committed to working in the developing world, with 5 years of field experience in Africa. Demonstrated ability and willingness to develop and work with scientists from other countries and with a multi-disciplinary team is essential. Willingness and demonstrated ability to live and perform in areas outside major metropolitan areas is necessary. Experience in farming systems research or as a member of multi-disciplinary tear carrying out on-farm research is essential.

Duties and Responsibilities:

i) Continue research in progress and assist with the implementation of new research activities designed to attack problems identified as being constraints to increased small farmer cereal production.

ii) Provide guidance for the conducting of field trials and tests.

iii) Maintain close linkages with the National Commodity Research teams and Regional Research teams.

iv) Advise the Research Extension Liaison Officers on matters relating to the extension of research findings and feedback.

v) Assist in the interpretation of results for administrators and policy makers through seminars, workshops and publications.

vi) Assist with the preparation of agronomic portion of research publications.

vii) Assure proper use and maintenance of equipment in the program.

viii) Provide liaison between the special short-term consultants and the professional and administrative officers of the National Program.

ix) Assist in the development of close linkages between the commodity and regional programs and assist as appropriate in designing and implementing adaptive research and demonstration trials on farmers fields.

x) Assist in the identification and selection of Kenya agricultural scientists for long-term training, in-country or short-term training as appropriate.

xi) Where desirable or appropriate serve in a graduate committee/advisor capacity for MSc. and/or Ph.D. candidates conducting their thesis research within the national program.

Annex G.1.(a): Technical Analysis - Planning and Management Component

1. Background: Kenya's Approach to Agricultural Research through 1986.

While the application of science and technology has played a major role in Kenya's development over the past sixty (60) years, the planning and management of scarce scientific and technological resources has been found seriously lacking. The "Rodenhiser Report" (1968) was the first critical review of agricultural research in independent Kenya. This study found inter alia that: 1) the organization was not geared to meet the current and projected needs of Kenya's agricultural industry; 2) too often there was a wasteful diversification and duplication of effort with total disregard of priorities in the light of economic justification; and 3) there was a lack of coordination and assessment of research priorities by both donors and the GOK and there seemed to be no clear-cut concept of the donors' role and place within the Kenyan development process.

In 1969, the Agricultural Research Advisory Council was established to advise the Ministry of Agriculture on a wide range of issues including: problems requiring research attention, evaluation of progress, identification of the means to strengthen and expand agricultural research, methods for effectively administering and coordinating agricultural research, adequacy and allocation of research resources, recruitment of competent personnel and working conditions requisite for their retention. Unfortunately, apart from the inaugural meeting in September 1969, the Council never became operational, and the agricultural research system continued to suffer the problems described within the Rodenhiser Report.

Several developments during the late 1970s compelled the GOK to critically review the management of scientific and technological institutions as a vital resource in national development. The Third (1974-78) and Fourth Five Year Development Plans recognized that the identification of scientific requirements, the use of technological advances, and the allocation and proper management of the attendant resources to promote cultural, social, and economic development are key elements for a sound national science policy.

In 1977, the GOK established the National Council of Science and Technology to advise the Government on all aspects of science and technology. The collapse of the East African Community in 1977 prompted the GOK to re-consider the role, structure, and mode of management of national research institutions. Accordingly, the Science and Technology (Amendment) Act of 1979 made provisions for the establishment of semi-autonomous research institutions.

In essence, the purpose of this legislation was to strengthen the management of Government funded research institutions by establishing a framework with the following five basic elements:

(a) A management body with the desirable independence and assured Government financial support for the execution of short and long range research in response to present and future needs.

(b) Continual improvement of the ways and means whereby scientific knowledge and results are promoted and applied for the benefit of the Kenyans.

(c) Establishment of an environment in which creative and imaginative research can be undertaken through an appropriate management structure.

(d) Ability to attract research managers of outstanding calibre who are sensitive to national needs relative to their own areas of specialization, and

(e) Establishment of a critical mass of scientists capable of a multi-disciplinary approach to problem solution, but flexible enough to be reorganized in accordance with program requirements.

Since 1977, the establishment of semi-autonomous institutes for medical, industrial, trypanosomiasis, and marine and fisheries research has succeeded beyond GOK expectations. It must be noted that these institutions all replaced ex-Community institutions dedicated to scientific research where national efforts were previously virtually non-existent in Kenya. National agricultural research in Kenya on the other hand was well established and there were no clear policy guidelines concerning the integration. Consequently, the Kenya Agricultural Research Institute (KARI), established at Muguga, has continued to operate in isolation with little or no effective coordination with the Ministry of Agriculture and Livestock Development's Research Division.

The Ministry of Agriculture and Livestock Development has stated its intent in the "National Agriculture Research Project Proposal" or Task Force Report (April 1986) to re-organize its research arm within the the semi-autonomous agency framework provided for in the Science and Technology (Amendment) Act of 1979. This entity will integrate the existing facilities at KARI - Muguga with those of the Ministry's Research Divisions under a single management structure that will be responsible and advisory to the Permanent Secretary on research matters and through him, to the Minister and ultimately to the Government. Considering that research services consume a significant portion of the

Ministry's financial and human resources (8.3%), the management of these resources is a tremendous responsibility in terms of research planning and execution as well as the accountability for public funds. This task can only be fulfilled if there is established a strong management and administrative base in which all parties have confidence. The proposed central executive structure and administrative units are presented on pages 5 and 6 in the institutional analyses.

It is USAID/Kenya's assessment that the reorganization proposed by the GOK meets the minimum requirements to assure a national agricultural research system which has the potential of providing effectively the agricultural sector with appropriate technologies which will increase productivity on a continuing basis. It is recognized, however, as was the case with the National Agricultural Research Council of 1969 and the National Council of Science and Technology that structures are not enough. Rather what is necessary are processes that enable the structure to function effectively. It is due to the GOK recognition of the importance of processes as well as the recognition that AID is committed to the long-term development of a research system which is capable of allocating scarce resources effectively and efficiently to meet national research priorities that has led the GOK to request AID assistance in the area of planning and management.

2. Rationale for USAID Assistance to Planning and Management.

As discussed in greater detail in the Institutional Analysis conducted for the development of this Project Paper, the lack of integration/coordination between agricultural research institutes has resulted in some unnecessary overlap of function as well as several voids. The six critical organizations examined were the National Council of Science and Technology (NCST) of the Ministry of Science and Technology, the "Specialist Committees on Commodities and Factors", the Kenya Agricultural Research Institute (KARI-Muguga), the MOALD/Scientific Research Division, the University Community and the Private Sector.

The Institutional Analysis found that there were a number of qualified researchers in the private sector. It noted however, that with few exceptions these persons were not effectively integrated within the national system. The NCST has made monies available for University Research. It was found however that poor monitoring resulted in a less than acceptable performance and that since the researcher was not compensated for his time there were not the incentives to conduct systematic research. It was also indicated that the lecture orientation of the University may result in faculty who do not have sufficient time to allocate to research or who have lost a portion of their research skills.

The Institutional Analysis found that the NCST is an agent through the Agricultural Department of NCST's Secretariat and the specialist committee on agriculture which is chaired by the Director of MOALD/SRD. The current organization has a proliferation of commodity and factor committees. Conceptually, these committees are very useful in that they encourage the exchange of information and facilitate decision-making. It was found however, that with the exception of the maize committee, which convenes annually, the committee structure is not currently functioning. As discussed above, KARI was established under the Science and Technology Act of 1977 but has to date acquired no role or status of a national body with responsibility for agricultural research. KARI therefore currently functions as an autonomous research station independent of the Ministry of Agriculture and Livestock Development.

The mandate of the MOALD/SRD is to serve as the national coordinating body of all MOALD agricultural research activities. In practice the SRD does not exercise this role with respect to the research stations under its auspices. Rather, it simply provides an administrative service for the stations budgeting, financing, recruitment, and promotions. Station Directors have remained largely autonomous in determining the nature and scope of their individual research programs within the constraints of their budgeting provisions.

A schematic illustration of the organizational arrangements and staffing at MOALD/SRD's headquarters is presented in the Institutional Analysis. Currently the total headquarters professional staff numbers ten (10). This number, the autonomy of the individual stations, and the relative lack of administrative experience by headquarters personnel has resulted in a situation where the SRD has neither the technical nor the administrative capacity to actively exercise the overall planning, monitoring, coordination, and control of the research stations under its auspices. In particular the institutional analysis found that:

the SRD headquarters has not had the staff resources to review and advise the research stations on the annual research programs and workplans;

it has not been directly involved in identifying research priorities, and directing or assisting in the planning and design of research programs by the stations;

the funding of research stations is currently left largely to the discretion of the Officers in Charge of the research stations who receive lump-sum budget disbursements from headquarters.

The SRD headquarters has no professional staff to attend to such matters as budgeting, financial management, procurement and staff development. Rather, like other divisions within the MOALD, the SRD relies on the general administrative facilities and services of the Ministry. While this arrangement is likely to be cost-effective for the Ministry as a whole, it severely constrains the capacity of the SRD Headquarters to provide the effective and efficient support required by the research stations. This lack of support capacity was one of the prime factors which led to the decision to integrate the public agricultural research sector within the semi-autonomous structure of KARI. As such the design, implementation, and follow-up training on those areas of support are a critical condition to assuring that the goal of a well-managed national agricultural research system.

II. Technical Feasibility of Expected Outputs

A. Statement of Component Purpose:

The purpose of this component of the National Agricultural Research Project is to improve the efficiency and effectiveness of Kenya's agricultural research system. As such this component relates directly to the greater project purpose of the development of a national agricultural research system which will increase productivity on a continuing basis.

The component purpose is also directly related to those of the other project components. In the case of the maize and sorghum/millet commodity component, the objective is to establish well-managed and coordinated national commodity programs which are able to develop and test improved plant varieties and supporting technological packages that are adapted for farmer use. This component is therefore concerned with the implementation of a cost-effective maize and sorghum/millet program which maximizes the economic return to research investment in the commodity given the funding constraint. The Planning and Management Component, on the other hand, is concerned with the allocation of scarce resources across commodities and factors to assure that the national priorities are maximized in light of potential technological breakthroughs, socio-economic returns, and the constraints of finance, material and human resources. The Planning and Management Component also addresses the provision of goods and services which are necessary to assure that the individual commodity programs are successful.

The Planning and Management Component is also closely associated with the Human Resources Development and Non-Governmental Research Components of the project. As discussed in both the Institutional and Training Analyses, human resources are a critical constraint within the Kenyan research setting. The

strengthening of this base as well as the definition of clearly stated terms of reference for individual positions are critical for the program to achieve its intended purpose. The relationship with the Research Fund is that, in view of the financial and human resource constraints facing the public research sector, it will become increasing important for Government to limit its research activities to those domains in which it has a comparative advantage while encouraging the University Community and Private Sector to engage in research in those areas in which they have a comparative advantage and are consistent with national priorities.

B. Identification of Expected Component Outputs

The principal expected output is a viable national agricultural research program including improved systems for commodity/factor programming, the allocation of resources, financial control, procurement of necessary goods and services, maintenance of the physical plant, manpower development, data processing, and the receipt and dissemination of relevant information. Secondary outputs subsumed by the principal output above include: 1.) the implementation of effective and efficient structures and processes across commodity specific programs within the national planning and management system; and 2.) specifically assuring that each commodity program focuses attention on those technical and economic considerations which are expected to realize the greatest return to research investment.

C. Discussion of Activities to Achieve the Output

As discussed in the Background Part of this Section and within the Institutional Analysis achievement of the expected outputs will require the design, trial, implementation and follow-up training for the critical planning and management systems. The critical issue is perceived however to be one of commitment by both the GOK and the donor community.

It is our assessment that in the process of development the Task Force Report, the GOK/MOALD has become keenly aware of the management issues and responsibilities entailed in the reorganization within a semi-autonomous structure. The intention of the GOK is that the reorganization represents a "new start" and that the lessons learned over the past 20 years should be incorporated into the new program. It is for this reason that management assistance has been requested of A.I.D. It should also be noted that the MOALD has been actively involved in the determination of management assistance requirements and has contributed recommendations which have been incorporated within this description.

While as indicated elsewhere, management systems within the National Agricultural Research System are virtually non-existent, this does not imply that systems need to be created from scratch. Rather the Ministry of Agriculture and Livestock Development and non-commercial parastatal institutions such as the semi-autonomous research institutes discussed above, have alternative management systems which function with varying degrees of success. It is our assessment that the semi-autonomous institutions are generally better managed due to the relatively more limited scope of interest as well as the greater flexibility to develop management systems which respond to the specific needs of the entity.

As shown in Figure 1 of the Institutional Analysis, the reorganized KARI includes three Division: (1) crops, soil and water; (2) Livestock, and (3) Planning, Finance and Administration. While Component 2 addresses the technical management of the maize and sorghum/millet commodity programs, this component addresses the management concerns of the Office of the Director and the Planning, Finance and Administration Division of the KARI Research Program.

1. Office of the Director

Technical assistance to the Director's office will be in three forms. These will include: (1) Short-term Assistance to assist with the immediate transition requirement of the re-organized KARI; (2) Long-term Assistance (3 person-years); and (3) Short-term follow-up consultations as assistance is required.

The Research Counselor to the Director is intended to serve as the Director's right hand person. While it would be theoretically preferable to stop all current activities until the new management program was firmly installed, such a scenario is not pragmatic in the Kenyan context. For this reason the Director of the National Agricultural Research Program must be managerially on top of the day-to-day situation while simultaneously guiding the implementation of the newly designed management systems. The role of the Counselor is to serve as the vital link between senior management and systems design/implementation. He/she must be sufficiently experienced that he/she can assist senior management in determining their managerial needs and able to clarify for the system design personnel any questions or issues which may develop. The counselor must also be able to assist senior management as a "watchdog" to assure that the systems designed not only meet the stated requirements of senior management, but are also as efficient and effective sources of information as possible within the context of the evolving National Agricultural Research System. In addition

to these specific responsibilities, the Research Counselor is expected to assist the Director with any managerial issue which may emerge during the implementation of day-to-day activities. For these reasons it is proposed that the Research Counselor serve initially for three years with funding provided for short-term assistance to review the system's progress and respond to specific requests for assistance during the second half of the current project.

2. Planning and Manpower Development Office

The second area of concern is the Planning and Manpower Development Office. This Office is assigned the function of determining the form of the National Agricultural Research Program in light of GOK priorities, available funding, result of previous research, and research potential. This Office is expected to form close linkages with the Development Planning Unit of the MOALD as well as with Treasury and the Office of the President. In addition the Office must have the capability to evaluate current program activities from both a financial and technical perspective in order to assure that beneficial programs are maximized while non-performers are not financed. This latter function will require inputs from the respective commodity/factor program as well as the financial data from the Office of Financial Management.

The April 1986 Task Force Report represents the initial effort to prioritize the Agricultural Research System. This document is remarkably well prepared given the lack of a programming base or clear-cut indications of probable funding levels. What is now necessary however is to develop the information systems and decision-making processes in order that the efficiency and effectiveness of the National Agricultural Research system may be improved. It is the joint MOALD-AID assessment that this is an evolutionary process which will not only require linkages with the Ministry, but the development of a sound internal evaluation/review system. Due to the evolutionary nature of this process, it is agreed that the Unit will require long-term assistance of up to 5 years as opposed to short-term assistance for the more mechanical systems to be developed. Additional funds have been budgeted for the provision of short-term assistance on specific areas during the latter years of the project as well as for prior to the arrival of the long-term person in order to assist with the rationalization of the 1987/88 research program.

Additional assistance is planned for the Data Processing Section in order to assure that reporting is completed in an efficient manner. Further consideration will be the development of analytical programs appropriate to the needs of management given the constraints of hardware.

3. Offices of Personnel Management and Manpower Development

The GOK-donor Pre-Appraisal Mission elected to sub-divide these offices due to the importance of manpower development (training) within the overall KARI Program and the close linkages required between the programming and budgeting office and the manpower development office. It is recognized, however, that there must also be a close relationship between the office of manpower development and personnel management in order to assure that there is a match between the proposed training and the projected manpower requirements of the system.

As discussed in the institutional analysis, currently the research program does not have clearly defined job descriptions, only a skeleton of minimal requirements for a position, and lacks a systematic personnel review system for promotion or termination of employment. The AID financed project will provide technical assistance, as well as on-the-job-training (total of 68 pm over the life of the project) to both offices. This assistance is intended to develop systems for the design and implementation of in-service seminars and workshops, recruitment of qualified research employees, review of employees performance, the assignment of personnel to a given position, the selection of candidates to be trained in areas of technical weakness, and eventually the placement within the appropriate institution.

With regard to University Placement, it is unrealistic to expect the Manpower Unit to have a good understanding of the alternatives proposed by the donor community. For this reason, it is expected that the Manpower Unit will work closely with the respective donor community training officers until such time as the Unit can evaluate the training provided by respective institutions.

It is proposed that the Manpower Development Unit be assisted by a combination of short-term assistance during the design and initial implementation of personnel systems. This person is expected to be complemented and replaced by Kenyan personnel experts who will continue to serve the Agricultural Research System on a consultative basis for the duration of the project.

4. Office of Finance and Administration

Within the administrative unit, the intention is to systematically design, test, implement and provide follow-up training for the managerial systems required to assure an effective and efficient organization. Such assistance is intended in some form for all divisions.

It is the joint MOALD and AID consensus that the greatest concerns lie in the areas of financial management, and station maintenance. While there is a need to strengthen procurement, transport, and the library information systems, there exist reasonably good models for these systems which may be adapted to the National Agricultural Research Program with relatively minor modifications.

In the area of financial management, it will be necessary to develop systems which account in relative detail for commitments, accruals, disbursements, and pipeline by individual research activity or project. The use of the research project as a common denominator will enable aggregates at either the station or commodity program level which will enable the individual station, the respective commodity program, and the unit of planning, programming, and evaluation too better determine the relative merit of the individual research activity. To date, the research accounting has focused on station accounting rather than the detail required for research project accounting or commodity aggregation. For this reason, as well as the lack of trained accountants within the system, we intend a major emphasis during the first years of the project to be the design, testing, and initial implementation of redesigned financial management and reporting systems. This initial period will be followed by intensive on-the-job training at both the Headquarter and Research Station levels as well as In-country seminars for new entrants and refresher courses as described in Component 3.

The second area of critical concern is station maintenance which is closely associated with the discussion of Recurrent Costs (See Financial Analysis.) It is the joint assessment that station maintenance needs to be improved in order to permit the efficient use of resources as well as develop an atmosphere condusive to professional performance. During the design of this project, we have had the opportunity to visit many research stations. While the conditions vary, the general finding has been one of deteriorating buildings, stockpiles of unrepaired equipment, and a demonstrated lack of concern regarding the physical appearance. It is therefore proposed that a person with U.S. experience in research station maintenance and upkeep provide short-term assistance in the design and implementation of a standardized maintenance program which will be integrated with the financial management and procurement systems to assure the availability of maintenance supplies and equipment. This short-term technical assistance is expected to make follow-up visits on a periodic basis and will be complemented by short-term Kenyan technical assistance which will provide the on-the-job training at the station level.

III. Appropriateness of USAID Assistance

A. Types and Levels of Inputs

Provision has been made within the budget for approximately six (6) months of technical assistance to be provided to the Offices of the Director and Planning and Manpower Development as a pre-implementation activity prior to the satisfaction of the condition to initial disbursement. This early assistance is intended to maintain the momentum that KARI's reorganization has gathered. This assistance will be limited to assuring that the 1986/87 year is one of transition, i.e. that the Specialist, Programming, and Center Committees meet and develop viable workplans that are consistent with the priorities established by the GOK Task Force.

It is expected that the Long-Term Counselor will begin his assignment for three years in mid-FY 1987, while the Long-Term Assistance to Planning and Manpower Development will begin his/her assignment at the same time for approximately five (5) years. An additional 26 person months have been budgeted for follow-up consultations from FY 1990 to the end of the project.

It is expected that in FY 1987 and 1988, a total of 70 person months will be required to design, test, and initially implement improved management systems in the areas of finance/accounting/audit personnel/manpower development, procurement, data processing, station maintenance, and library/information. These initial efforts will be followed by on-the-job-training at all appropriate research centers to assure that the systems are thoroughly implemented while permitting modification of the initial design to further encourage efficiency. It is expected, given the human resource base within Kenya, that with the exception of Station Maintenance and Manpower Development in which US expertise will be required, all other assistance will be provided by Kenyan firms and/or individual.

The USAID project will also provide commodities such as vehicles and office equipment to improve the efficiency of operation. Furthermore, due to the historic under-funding of recurrent costs by the GOK, in FY 87 USAID will finance 75% of the recurrent cost burden for vehicles, equipment maintenance, paper and photocopying. This percentage will decrease to 70% in FY 88, then by 10% per year.

B. Rationale for Types and Levels of Inputs

The size of the technical assistance team proposed for the Planning and Management Component is based on a number of factors: (1) the lack of existing management systems capable of

serving the total research institution; (2) the relative flexibility as a parastatal to develop/adopt/adapt management systems to meet its specific requirements; (3) the lack of managerial training and experience by those responsible for program implementation; and (4) the size of the program which demands maximum efficiency and prioritization in order to overcome the recurrent cost burden. Given these considerations it is clear that the initial investment must be extensive to assure that the reorganized KARI develops the institutional capacity to satisfactorily implement the research programs necessary to increase agricultural productivity. The levels of input are based on a joint KARI-USAID assessment verified by the management firm which completed the institutional analysis. To the extent possible, it has been agreed to utilize Kenyan specialists. This practice not only reduces the cost to the USG, but contributes to the growth of the Kenyan economy, and encouraged linkages between the public and private sector. The level of commodity support to planning and management is based upon an assessment of available equipment and the projected needs over the life of the project.

C. Role of Related Donors/Other Organizations

As evidenced by the interest in organization and management during the GOK-Donor Pre-Appraisal Mission, the areas of planning and management will directly affect the activities of other donors through the implementation of standardized program, and financial management procedures. It was found however, that at this time, no other donor is in a position to provide critical assistance in a timely fashion to the management.

The IBRD is the only other donor which has yet expressed a firm commitment to the reorganized KARI. The IBRD is quite limited, however, due to the fact that the GOK refuses to permit loan funds to finance technical assistance. While the IBRD program remains un-defined, it is our understanding that the IBRD's effort will be designed to complement those of AID. Areas of possible IBRD activities include: (1) construction; (2) costs associated with the re-location of researchers to areas or commodities which are given higher priority; and (3) linkages with international and regional centers including information banks.

Annex G.1. (b) Technical Analysis: Maize and Sorghum/Millet Component

I. Background

A. Kenya's Approach to Technology Development and Dissemination.

1. Analysis of past and current approaches

Kenya has been active in agricultural technology development since colonial times. During that period experiment stations focused their efforts primarily on those commercial crops important to the European and export sectors. Since independence the Government of Kenya has striven to expand its agricultural research activities to embrace the food crops grown by African cultivators. Research has primarily been based in research stations which have attempted to develop varieties (and other technologies) suitable to that geographic area. Once a promising variety has been developed and tested at the station, the Kenya Seed Company, a parastatal has grown and distributed the certified seed through its retail network. Kenya's extension service has then participated in the dissemination of information of new technology to farmers.

The Kenyan agricultural research program suffers from serious structural and programing weaknesses which limit the generation of farmer-usable technologies. These problems are discussed in detail in the Institutional Analysis and are summarized below:

- excessively decentralized decision-making;
- no system of allocating resources across stations based on research priorities;
- poor collaboration between stations;
- research programs largely determined by individual stations and without national focus;
- station directors have undue administrative burdens limiting their ability to direct, lead and coordinate programs;
- shortage of support staff;

- overabundance of BSc. staff and critical shortage of post-graduate trained scientists
- weak institutional linkages between research, extension and farmers.

2. Discussion of the proposed model for technology development and dissemination in Kenya.

In recent years the Government of Kenya has recognized that its customary method of developing and disseminating agricultural technologies was growing less successful of assisting farmers, particularly smallholders, to increase agricultural output. The first step was to introduce, with the assistance of the World Bank, the Training and Visitation Program (T&V) to the extension service. The second step was to critically examine the agricultural research institutions and programs of the MOALD. As a result of several thorough analyzes, both by ISNAR and the Ministry's own Task Force, a re-structured and reoriented research system has been proposed.

- Functions of the NRCs

The central feature of the reorganized research system is the identification of a series of high priority national commodity programs. These commodity programs rationalize research activities pertinent to a particular crop or research area and organize those activities to be conducted in appropriate stations and testing sites. Each program is to be managed by a national coordinator and operated out of one of the 16 National Research Centers, the most representative of the area where the problem oriented or commodity research is needed. KARI headquarters will provide overall management of the research system with Deputy Directors for Crops, Soil and Water, Livestock, and Planning, Finance and Administration responsible for the execution of national commodity programs. Within the latter's department the Planning and Manpower Development Office will have the primary responsibility in the evaluation and monitoring of these commodity research programs. An NRC will be expected to be the principal research organ for generating and testing improved technologies of a commodity, or a factor of production. Each NRC will have a multidisciplinary team composed of breeders, agronomists, plant pathologists, entomologists, etc., and its research program will be sharply focused on generating technologies that can be widely adapted in the commodity or factor problem area.

- Functions of the RRCs

Complementing and linked to the work of the NRCs will be the adaptive research performed at eight Regional Research Centers where the NRC more basic research will be modified to fit the local production system. At RRCs, the emphasis will be on adaptive and applied research, with the basic concepts and resource materials flowing from the National centers. Work will focus on the identification and diagnosis of production problems in that RRC's agro-ecological zone, adapting technologies for increasing productivity at the farm level and interacting with the extension service and farmers in on-farm research and testing of improved technologies. The staff of RRCs will be multi-disciplinary with the team composition reflecting overall problem-solving orientation by including agricultural economists, crop and animal production scientists, extension specialists and plant protection specialists.

Ancilliary research activities, primarily testing, will be conducted at subcenters and experimental sites. Technical Officers and Technical Assistants will conduct activities at these locations under the supervision of Station research officers.

- Linkages between NRCs and RRCs

Communication between the National and Regional Centers will not be one dimensional - National to Regional. While the flow of information from breeders to adaptive technicians is vital, the flow of ideas, insights and suggestions from the on-farm and RRC researchers is crucial to the success of technology development that is farmer acceptable. The individual centers cannot by themselves achieve much, unless they are knit together in a highly coordinated network with free flow of materials, information and ideas and with a great deal of collaboration. The NRCs, whose mandates transcend agro-ecological barriers, cannot generate technology for the whole country without organizing collaborative research program with the relevant RRCs. As the 1985 ISNAR report suggests, "the RRCs should join hands as equal partners in collaborative research with the NRCs in a series of nationally coordinated programs."

This integrated system will achieve three important objectives; 1.) RRCs will be active in conducting research which answers the needs of farmers in their regions; 2.) the national coordinators will assist in the improvement of the scientific competence and capabilities of Regional center staffs; and 3.) the coordinated approach will help generate

joint planning and evaluation of research programs and collective recommendations for the release of new technologies.

- Linkages between Research, Extension and Farmers

Previous reviews of Kenya's agricultural research system have consistently identified the linkages between research activities, the extension service and farmers as both critical to success and as very weak. The recently initiated T and V extension system (see below) has begun to address the extension/farmer part of this problem, and the reorganization of the research system proposes to strengthen the research/extension linkage. The major mechanism proposed is the creation of an Agricultural extension liaison division which will be directed from the national secretariat but function through research/extension liaison officers assigned to NRCs and RRCs. These station-based individuals are to assist with the "joint diagnosis and analysis of research problems, development of improved technologies, testing of technologies on farmers' fields, and feedback of field research experiences and lessons to the research system."

The Task Force recognizes that this pivotal function must be performed by individuals with specialized training embracing not only agriculture but also extension education, information systems and training. As the Task Force report states "this cadre of specialists will be a new cadre in the research and extension service of Kenya." The report proposes initially assigned MSc. - level subject matter specialists to the new liaison positions while a specialized training program is implemented.

A second means of sharpening the research focus on farmers' needs and constraints is the recommended establishment of a Research Advisory Committee at each Regional Station. Composed of station staff (Director, District Agriculture Officer, and commodity program leaders) and local farmer representatives, the committees will meet to "make recommendations on research, on proposals and review work progress."

Analysis of the Performance of Public and Private Extension Delivery Systems

The Government's main vehicle to stimulate agricultural production has been, along with the national research system, the MOALD's extension service. Despite significant numbers of staff and the large amounts of resources devoted to extension, the impact has been small. Several distinct problems have been identified.

- Agricultural "know-how" has been low among field staff both in technical matters and extension methods;
- Farm visits very limited in number and concentrated on male and progressive farmers;
- Lack of systematic management from headquarters and district officers;
- Over-emphasis of recommendation of "crop packages" heavily reliant on greater input use rather than crop husbandry - often unsuitable recommendations to small farmers;
- Weak linkages between research and extension have led to inappropriate extension recommendations;
- Staff morale has been low due to poor scheme of service and inadequate support services;
- Shortage of transport severely restricts effective extension and contributes to substantial under-utilization of staff;
- Administrative tasks extraneous to extension work has reduced agents' effective time in the field.

Agricultural extension was an important component of the two World Bank Funded Integrated Agricultural Development Projects (IADP I and IADP II). Under IADP I, support to MOA's extension services involved financing of vehicles, and equipment, staff salaries and allowances, vehicle maintenance, fuel, and demonstration materials. IADP's impact on smallholder production and incomes was very disappointing, primarily because of inappropriate crop technology, inadequate crop prices, lack of markets for IADP anchor crops, and, to a lesser extent, lack of implementation capacity in MOALD and late delivery of credit. Recognizing the severe implementation problems of IADP, the Government and the Bank agreed in September 1982 to disaggregate IADP into several projects, each based on a component of the original project (e.g., extension, livestock, credit). The first project to emerge from this restructuring was the National Extension Project. The project addresses many constraints in the present extension system through the introduction of the raining and visit (T&V) method of extension. The T&V system introduces a systematic method of extension management, with emphasis on regular staff visits to contact farmers, controlled selection of contact farmers (including less innovative and women farmers), and supervision of frontline staff by senior staff.

In late 1985 the World Bank reviewed the progress made to date by the National Extension Program preparatory to the design of a follow-on effort. In spite of the general satisfactory results of the fruit extension project, considerable progress is still needed in several critical and interrelated areas. The constraints to the implementation of the project can be summarized as follows:

i) weak management, leadership and supervision at Headquarters, Provincial and District levels (more critical with the termination of technical assistance terms);

ii) weak monitoring and evaluation;

iii) limited transport facilities and lack of overnight accommodations for front-line and supervisory staff;

iv) underfunding, reflected in (iii) and severe recurrent cost implications;

v) insufficiently specialized technical and managerial training for staff;

vi) continued "top-down" approach not responding to farmers' needs;

vii) bias in selection of contact farmers.

Any follow-on extension project would concentrate on these constraints. Developing more effective linkage with the research community will need to receive greater emphasis because this vital connection has become a weak point of the National Extension Project. This weakness cannot be blamed solely on the extension services. Participation of researchers in extension training and provincial specialization groups has been low due to, a.) lack of new research information; b.) lack of operating resources; and c.) lack of perceived benefits to the research establishment. A major focus of both the National Research Program and a continued National Extension Program must be strengthening and institutionalizing the research-extension linkage. The expanded role of Regional Research Centers and the re-vitalization of the Provincial Agricultural Research and Extension Advisory Committees (PAREAC) will be major steps in this process. The design of Phase II of the National Extension Project will be done in CY 1987.

- Role of and linkages with the Private Sector and University research system and International Agricultural Centers.

One of the expected results of the USAID supported National Agricultural Research Project is a enhanced role in agricultural research for both the private sector and the Kenyan university/community. At the present time, the linkages between the GOK research system and these actors are relatively weak. There is a growing awareness within the GOK research community that the private sector can and should play a greater role in the development of new agriculture technology. Research responsibility for a growing number of crops such as sunflower, tobacco, sesame, barley, tea and pineapple have devolved to private organizations.

Kenya's universities - Nairobi, Egerton, Kenyatta and Moi, have substantial manpower resources to contribute to the nation's agricultural progress. To date, however, productive linkages between these entities and the Ministry of Agriculture research establishment are poorly developed because the limited agricultural research undertaken at universities is underfunded and largely not integrated with Ministry priorities and programs. The proposed project will encourage greater integration of university research activities into the national system through the Agricultural Research Fund and through the Training Component.

Since the early 1980s the primary linkage between Kenya's agricultural research system and the international centers has been through CIMMYT. The Nairobi regional office of CIMMYT has two economists supporting training in on-farm research activities, plus a maize breeder and two maize agronomists contributing to the national maize program. These personnel, while regional, are expected to devote 20% or 25% of their effort in Kenya, primarily involved in providing limited commodities, training, acquisition of germplasm and consultation with Kenyan scientists.

The CIMMYT training provided to Kenyans regarding on-farm research methodology is expected to continue to assist in preparing the multi-disciplinary on-farm research teams to work in the Regional Research Centers. CIMMYT staff will continue to work with the reorganized National Maize Program in a planning and advisory capacity. When the USAID funded technical assistance team arrives, the MOALD will hold discussions with that team and the CIMMYT scientists to develop an integrated workplan.

In 1983 the OAU-SAFGRAD project posted a regional Sorghum/Millet coordinator in Nairobi who has been assisting the national program with sorghum/millet germplasm and in setting up experimental trials. Also the USAID centrally funded INTSORMIL project began collaboration in 1985 with the

Kenyan program. Improved germplasm is being introduced and limited training and advisory assistance is being planned. The National Sorghum/Millet Program will continue to have access to germplasm from ICRISAT through OAU-SAFGRAD and from the INTSORMIL program.

These existing and additional linkages with such IARCs as IITA, CIAT and ICIPE will be strengthened as a result of the research system's reorganization and as its capacity and level of trained research scientists improve. The World Bank will be providing assistance to the Government to accomplish this through international seminars, travel and funds for subscription services.

B. Rationale for USAID Assistance to the Maize and Sorghum/Millet Programs.

USAID assistance to specific commodity programs of the MOALD is predicated on the following actions:

- the commodity is given high priority by the GOK and MOALD/Research;
- the commodity program is consistent with USAID/K's Agricultural Development Strategy and is believed to contribute to Kenyan economic growth and development;
- the commodity program is consistent with the African Bureau Agricultural Research Strategy;
- the project component is justifiable on technical, economic, and financial grounds;
- the program promotes the central objectives of the National Agricultural Research Project, i.e. contributes to improved management including research prioritization; and
- the program does not pose an excessive management burden on either AID or the GOK.

Assistance to both maize and sorghum/millet is entirely consistent with these criteria.

1. High Priority: Both Kenya's 1986 Sessional Paper No. 1 "Economic Management For Renewed Growth" 1986 and the Task Force Report identify maize as Kenya's highest priority in agricultural research. The Task Force Report identified maize as the top priority in Priority Grouping Number One with maize to receive the largest proportion of the crop research budget (14%). The Report noted that maize "--is the most important

source of both income and subsistence for the rural poor and any changes in the level and efficiency of its output would inevitably have a major impact on several national development objectives." The Sessional Paper echoes this conclusion by stating that "a well-managed program of maize research, taking full advantage of both domestic and international resources, will be given highest priority."

The Task Force identified research in sorghum and millet to be of third highest priority, exceeded in importance by only maize and wheat. The Report states that "clearly, there is a vast potential for expanding production of these crops given the necessary comprehensive national cereals policy". Limited but consistent breeding and processing research over the past 20 years has indicated the potential of sorghum. The ongoing pilot project under the direction of the Kenya Industrial Research and Development (KIRDI)1/to develop and promote specially bred and processed sorghum to help fill the rice and wheat deficit is a convincing indicator.

Other opportunities include the role of sorghum and millet as an animal feed base. The Report concludes that "it must be accepted that cereals will continue to be the basis of energy supply for the foreseeable future, and high priority needs to be accorded to sorghum and millet. The payoff from biological research on these indigenous crops is likely to be large provided it is supported by industrial research and marketing, pricing and utilization policies." Sorghum and millet are primarily produced for home food consumption. The AID

1/ Kenya Industrial Research and Development Institute is a parastatal organization under the Ministry of Commerce and Industry. For years 1985-86 has been funded by the British Government ODA - Tropical Development Research Institute in a Project called Sorghum New Food Project.

They have been developing sorghum products like

1) Sorghum Flour for Uji (soft porridge) from dehulled red or brown varieties;

2) Supa Mtama - (rice like product) is a pearled (dehulled) sorghum produced from tannin free white sorghum mainly grown in Eastern Province.

KIRDI is part of the National Sorghum Working Group working on sorghum utilization and marketing. This effort is coordinated under the MOALD National Sorghum and Millet Improvement Program.

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agricultural strategy is to promote the gradual commercialization of Kenyan agriculture through crop diversification. Support to sorghum and millet research is intended to help the process already underway of developing more uses for these commodities. Private sector market development for these crops is addressed in a project covenant.

The Sessional Paper supports the increasingly important role sorghum and millet should play in Kenya's food security. It includes sorghum and millet within the second tier of priority commodities but recognizes the critical role these crops can play in satisfactorily meeting the objectives of intensified meat and milk production, permitting the shift of land resources to foreign exchange earning commodities, and saving the country scarce foreign exchange through wheat blending.

The importance of maize and sorghum/millet in Kenya's agricultural production and food consumption is indicated in the table below.

Coarse Grain Production and Consumption Facts

	Maize	Sorghum/Millet
Area in production (000 HA)	1,650	353
Average annual output (000 MT)	2,265	325
Absolute Consumption (000 MT)	2,285	335
Per Capita Consumption (Kg/yr.)	111.3	16.5
% of Cereal Diet	74.3%	10.9%
Expected Consumption in 2000	4,155	558
Wheat Blend 10% (MT)	-	97
50% Substitution of Maize in Animal Feed	-	185
Total Demand in 2000	4,155	830

2. Consistent with USAID/Kenya Agricultural Development Strategy:

The objective of USAID/Kenya's Agricultural Development Strategy is food security through self-reliance and enhanced foreign exchange earnings/savings. These objectives focus on long-term food security, with comparative advantage in production and trade (both domestic and international) perceived as the means of assuring adequate food supply and economic growth. In order to meet these objectives within the Kenyan context, the strategy is national in scope, focuses on land intensification and has a small-farmer emphasis.

Support to Kenya's National Maize and National Sorghum/Millet Programs is consistent with the USAID/Kenya strategy. Under the reorganized research system, the national perspective and capacity of both commodity programs will be greatly strengthened. The maize program is headquartered at Kitale research station. The breeding research program will be conducted at four sites - Kitale, Embu, Katumani and Mtwapa, catering to all the major maize production zones. Adaptive trials are to be performed in several RRCs, ranging from the western region to the coast. The Sorghum/Millet Program is headquartered in the west (Kakamega) but will conduct breeding research and on-farm and adaptive research in both the western and eastern regions.

Greater nation-wide productivity of maize, sorghum and millet is the central objective of both programs. Research efforts will focus on improved yields through the development and introduction of new varieties, improved agronomic techniques and better management of soil and water resources. The smallholder focus is important because not only do they represent 90% of farm households, but also because the potential of raising yields is great. Currently smallholders realize only a fraction (approximately 15% for maize) of the yields experienced by large-holders. The integration into the national commodity programs of on-farm trials and the bottom-up flow of researchable issues will enable the maize and sorghum/millet programs to orient their attention to small-holder and large farms production problems.

4. Promotes management objective of National Agricultural Research Project.

The purpose of USAID's project is to develop a well-managed agricultural research system capable of providing the agricultural sector with appropriate technologies which will increase productivity on a continuing basis. A central feature of the restructured research system will be the nationally-based commodity programs, integrated with regional-based adaptive researcher linked with the extension service. The integration of these national commodity - specific programs within the new research system and the rationalization of national programs based on technical and economic considerations will be a major output of the project. USAID involvement with the Maize and Sorghum/Millet Programs afford the opportunity to assist KARI develop the prioritization and management systems both within the central secretariat (refer to discussion on Planning and Management Component) and within two major national commodity programs.

5. Minimal Management burden.

The Maize and Sorghum/Millet Programs will not pose an excessive management burden on USAID or the GOK. These programs, although of limited vigor, have been underway for some time and already engage local scientific and management staff. The Task Force proposes devoting 14.1% and 3.4% of the research budget, respectively, to these commodities. The addition of USAID resources, both human and material, to these research activities can be expected to significantly supplement the Government's resources, strengthening each program both scientifically and managerially, and contributing to accelerated development of technology in both programs.

The National Agricultural Research Project as outlined in the PID proposed limiting commodity research intervention to "maize and other commodity programs." Sorghum and millet research has been selected as the second area of concentration primarily due to its high priority within Kenya's research agenda. A secondary but important reason for including sorghum and millet in the Commodity Component is its complementarity with maize and thus relative ease of management for the GOK and USAID. Sorghum and millet, along with maize, are coarse grains and as such share certain biological and agronomic features. The only additional project inputs to support sorghum research will be one breeder and proportional increases in testing equipment and operating costs. An additional reason for expanding this Component to include sorghum and millet is to facilitate GOK coarse grain program management, in that coarse grains will have one source of procurement and one donor to whom to report.

C. Status of Research on Maize and Sorghum/Millet.

1. Brief discussion of past accomplishments and deficiencies.

Accomplishments:

a. Maize:

Kenya's systematic maize improvement efforts began with the establishment in 1956 of breeding programs in Kitale, for late maturing maize, and in Katumani for early maturity maize. Additional programs were began in the mid-1960s at Embu in the mid-season highlands and at the Coast. In the earlier phase of these programs some impressive maize improvements were made. The Kitale program has been the most productive with release of

Kitale Synthetic II in 1961 and the high yielding hybrids H632 and H622 in the early seventies. Additional varietal hybrids, improving on earlier releases, appeared during the mid-1970s. A 1981 hybrid, H625, is the latest Kitale product and genetically has a higher potential of productivity when grown under intensive management and with high level of inputs. Overall, the 600 series has been weakened by repeated in-breeding which results in increased vulnerability to disease.

The Embu station has developed maize varieties H511 and H512 for medium maturity areas and continues to make improvements on these. The H511 and H512 varieties are basically of the same parental stock at the 600 series. Because of this, the 500 series are still 150-180 day varieties, not appropriate to the Embu region which has a 120-125 day maize growing season. Insufficient rainfall after pollination is common and substantially reduces yield. Earlier maturing maize varieties compatible with lower and irregular rainfall were released by the Katumani program in the mid-1960s - Katumani Synthetic II and IV in 1963 and 1965, and Katumani Composites A and B in 1966 and 1968. To date returns to the research investment in Katumani have been low due to the fundamental difficulty of growing maize successfully with less than 350mm of rainfall during growing season. Recent program emphasis has been on developing an even earlier variety, Makueni Composite which is still in the testing stage. No significant output has been registered since 1975. The coastal program at Mtwapa released a rust-resistant variety in 1966 and a high-yielding Coast Composite in 1974. The latter has yellow kernels which remains the focus of breeding efforts.

Maize agronomy research has been centered at Kitale. Between 1972 and 1977 the U.K. operated a Maize Agronomy Research Project there focusing on the effects on yield of planting dates, weed control and the use of improved seed and fertilizers. The project generated a good agronomic understanding of maize production factors in the high potential Kitale area but since that project terminated the agronomic research effort has been curtailed to low priority given in terms of financial and staff resources.

Other maize research activities have been present in Kenya. The Kenya Seed Company along with seed production activities, operates a small but important research program in maize breeding and improvement which supplements the MOALD program. Its research program has introduced new germplasm from CIMMYT and U.S. sources

which have been incorporated into Kenyan material. Also KSC efforts have selections from the Ministry's program and considerable effort has been devoted to developing maize varieties for the coastal and early-maturity programs.

The USAID Drylands Cropping System Project, which terminates in December 1986, supports a senior maize breeder working at the Muguga and Embu station on hybrids adapted to the mid-season region and resistant to streak virus disease. Under the new project this maize breeding work will be incorporated into the Embu program. The present USAID breeder has developed two new populations which will provide the parent stock for a new series of hybrids adopted to the mid-altitude, mid-maturity areas of Kenya. These various efforts will be tied together through the national maize program to be developed by these projects. Lastly, the University of Nairobi, Egerton College and ICIPE conduct a limited amount of independent maize research.

b. Sorghum/Millet

Kenya's sorghum improvement program dates from the FAO/UNDP National Program for Research and Improvement of Sorghum and Millets which operated from 1977 - 1981. That program focused originally on development of cold tolerant, drought-resistant sorghum for stock feed, with a subsequent focus on development of human food varieties in both the Lake basin and the semi-arid regions. Within a year of the termination of the FAO-supported programs, all but the dryland research had been terminated.

Recently there has been a resurgence of interest in sorghum and millet research but the current research program is still modest. Headquartered at the Kakamega Research Station, the National Sorghum and Millet Program supports sorghum breeding at Alupe and Katumani and pearl millet breeding at Katumani. Limited agronomic research is being undertaken at both Kakamega and Katumani, primarily on finger millet at the former and sorghum at the latter. Results from these programs in the form of new varieties or technologies adopted by farmers have been very minimal.

Deficiencies

The lack of success in both the maize and the sorghum/millet programs can be attributed primarily to systemic management problems in the research system and

secondarily to specific shortcomings of each commodity program. The underlying problems of the system, which have been discussed in other sections, include under-funding of research programs, inadequately trained scientific staff (and insufficient numbers of scientists), inadequate operating expenses and administrative support, and the lack of well-targeted, coordinated research programs.

Specific shortcomings in the maize program center on the narrow (most germplasm in use evolved from the Ecuadorian variety and indigenous Kenya variety that was the parent stock for Kitale maize) germplasm base which is vulnerable to a major disease outbreak, limited geographic scope of research, weak agronomic programs, and continued orientation to large scale farmers with limited focus on smallholder production systems.

The sorghum and millet program is largely one of germplasm selection efforts with no real breeding work underway. This program is limited in its understanding of farm-based problems due to the lack of adequate manpower and funding. Breeding and agronomic work take insufficient account of actual farm practices, for example the extent of intercropping, food quality, or farmer preference for particular varieties. In western Kenya, the home of very long maturity maize hybrids, smallholders need a shorter maturity maize which would allow two plantings during the long growing season. As yet the Kitale program has not responded to this opportunity. Furthermore, the staffing of the sorghum program and the available financing severely limits the extent of research that can be conducted. Despite these resource limitations, both programs include some capable scientist and have potential for productive research.

2. Analysis of future priorities for these commodities.

<u>Maize</u>

It is clear from recent GOK analyzes that productive research in maize is seen as vital to the national economic health of Kenya. Increases in yield of at least 4% per annum are called for in the Sessional Paper No. 1 with the geographic focus to be on high potential areas. Research must concentrate new parent stock and new varieties for each of the four main agroclimatic zones served by the stations at Kitale, Embu, Katumani and Mtwapa, respectively. Agronomic research will likewise be conducted in each station, focussing on farm production problems specific to cultivators in the respective zones. The plant breeding and agronomic research must be thoroughly integrated with farm-level production concerns through the adaptive research conducted by the Regional Research Centers, including on-farm tests.

Sorghum/Millet

Research on sorghum and millet will likewise concentrate on breeding and agronomic improvements in the two primary growin areas, Western and Eastern Kenya. As with the maize program, agronomic and adaptive research are critical. In the area of sorghum and millet, it is equally important for the national program to address research issues concerned with processing and marketing of the cereal. An expanded role in the economy for sorghum and millet, a goal identified in recent GOK policy documents, is dependent on consumer acceptance of sorghum and millet products. As stated in the MOALD Task Force Report, "the payoff from biological research on these crops is likely to be large provided it is supported by industrial research and marketing, pricing and utilization policies".

The GOK has made a good beginning in this regard with the work underway by the Kenya Industrial Research and Development Institute. Although the assistance to be given to National Sorghum and Millet Program will not directly support the food technology efforts of KIRDI, it should encourage the Government to intensify this area of inquiry. The project's Agricultural Research Fund however will make grants available to explore issues involving sorghum/millet processing and product use.

Agronomic research, including variety adaptation, cultural practices, intercropping, pest control, fertility management water management and tillage among others is essential to ensure that the biological potential of improved varieties is realized. Breeding and agronomy programs will closely coordinate activities to achieve this goal.

All area-specific work of the research programs must address the needs of the farming communities taking into account the variability between and within agro-ecological zones, farm sizes, rainfall levels and distribution, soil types and paying particular attention to the existing and potential cropping patterns. Sociological and economic differences reflected in available capital and management resource preferences should also be addressed.

Past production recommendations were based on results obtained largely from researcher managed trials on-station. It is now recognized and proposed that, all promising research findings will be tested jointly with the active participation of both the farmers and the extension agents (on-farm experimentation) before final recommendations are made for farmer's adaption. This means the total program will be comprised of two components - a core program of on-station managed experiments and on-farm experimentation.

3. Constraints that need to be addressed to achieve potentials of maize and sorghum/millet.

The factors that frustrate the conduct of successful public sector maize and sorghum research efforts are threefold; overall management and coordination; scientific staff quality; and logistic support. The lack of management hinders research at several levels. First, the national research system has, to date, not operated on the basis of nationally-based commodity programs founded upon prioritization of research needs nor has it been supported by appropriate budget levels. Rather, commodity programs have been essentially free-standing local specific operations based on individual station agendas and dependent on station funding. The regretable result has been commodity programs struggling without adequate funding or proper integration into a national scheme. Second, management at the station level has had to juggle limited resources (financial and human) among numerous and competing programs without the ability to prioritize those programs, strengthening some and terminating others. Finally, commodity research efforts conducted at multiple stations have lacked central leadership and direction and budget rationalizations. This has inevitably led to an uneven distribution of research resources, uncoordinated research focus and limited research results. No one has been in charge.

The research system suffers from a serious lack of adequately trained scientific, technical and managerial staff. This constraint is reviewed in detail under the Human Resources Component discussion. It represents, along with the overarching management issue, the most critical problem facing Kenya's national agricultural system.

The final research constraint is the serious lack of basic administrative support in the form of operating expenses, vehicles, physical plant and equipment maintenance and financial management necessary to support the scientific activities of research stations. The dimensions of this problem and the means of remedying it are described in the Management and Planning Component section.

II. Technical Feasibility of Expected Outputs

A. Statement of Component Purpose (relate to overall Project Purpose)

The overall Project Purpose is to develop a well-managed national agricultural research system capable of providing the agricultural sector with appropriate technologies which will increase productivity on a continuing basis. The objective of the Maize

and Sorghum/Millet Component has two dimensions; first, to improve the management and research efficiency and effectiveness of these commodity programs; and second, to develop technologies resulting in increased productivity of maize, sorghum and millet. The first dimension is a means to achieving the second, larger goal of greater cereal yields.

B. Identification of Expected Outputs (relate to constraints identified in I.C.3.)

The output of this project component will be a National Maize Improvement Program and a National Sorghum and Millet Improvement Program that are well-managed and able to develop and test improved plant varieties and supporting technologies that are adapted by farmers in various production zones of Kenya.

C. Discussion of Activities to Achieve the Output

Long-term technical assistance will be in the form of cereal breeders and agronomists. Kenya is characterized by vast variability in elevation and rainfall creating many micro-environments in each region. This naturally complicates and multiplies the task of plant breeding and development of appropriate agronomic technologies, requiring commodity programs which are flexible enough to address many area-specific problems. The Kitale National Research Station is designated as the national headquarters of the maize program and will be the duty post of one breeder. The breeder's primary responsibility will be to assist the Kenyan staff in the planning and execution of the national maize improvement program.

Specific breeding research conducted at Kitale will focus on the need for improved varieties for the late maturity, high potential areas of Western Kenya. The breeder will not have a technical program of his or her own but will help the Maize Program Coordinator implement the Kitale portion of the national plan, in the design and execution of the program for long season high potential areas of Kenya. This individual will serve another important purpose by assisting newly-trained Kenyan scientists transfer and adapt their academic training to the research station environment i.e., make the transition from student to scientist.

A second long-term breeder will be stationed at the Embu Regional Research Station. As with the Kitale breeder, this scientist will assist the Maize Program Coordinator with the design and execution of the breeding program for the medium-maturing mid-altitude Central Highlands region. Assistance will also be given as needed to the early maize program based in Katumani and the coastal program in Mtwapa. Again, the on-the-job training function by this senior scientist will be important, not only for returned

trainees, but also for existing staff technicians. A third breeder (sorghum and millet) will be stationed at Kakamega, the headquarters of the National Sorghum and Millet Improvement Program. He will assist the Sorghum/Millet Coordinator with the national program which is primarily conducted out of Kakamega and Katumani and will assist with breeding work at the Alupe Sub-station. His job responsibilities will be similar to those of the Kitale-based maize breeder in regard to providing a scientific strengthening to program design and execution and guidance of younger researchers.

The expatriate agronomists will be stationed at Kakamega and Embu. The Kakamega-based agronomist will support the national maize program's agronomic research, parallel to the Kitale-based breeder. In addition, a large proportion of time will be devoted to the regional maize and sorghum adaptive testing and trials conducted at the Kakamega Regional Station. The maize regional programs will execute a large part of their research trials on farmers' fields in collaboration with extension staff. The proper interpretation of these on-farm results and their integration with the on-going breeding programs will be a major responsibility of this scientist. In this capacity he will work closely with the research/extension liaison staff. A second agronomist specializing in maize will be posted at Embu. Embu is both a major national and regional site for maize research. The agronomist's primary function will be to assist with adaptive research for the Central Highlands. Guidance and assistance with agronomic research at the Katumani and Mtwapa station will also be provided. The agronomists, like the breeders, will also provide appropriate levels of on-the-job training and scientific guidance to Kenyan technicians at their duty stations.

Commodities

A second direct input of their component will be physical plant and commodity assistance to both the national maize and sorghum/millet programs. Renovation of office space and augmentation of equipment, scientific and laboratory facilities, test plots and field equipment will be provided to the national research stations conducting maize and sorghum work and to the major regional stations. It is anticipated to the World Bank in its support for the national agricultural research system will provide considerable assistance in the general upgrading of physical facilities throughout the system.

D. Relationship with other components of the Project

As stated above, the Management, Training and Maize and Sorghum Components are mutually reinforcing. The success of the Maize/Sorghum Component is clearly dependent upon the development

of research management systems that allow for effective administration of budgets, research priorities, programs, facilities and personnel. This improved management system is not only needed in the central secretariat, but also at each station. The management component of the project includes training for station managers and station technical and support staff in such areas as financial management and accounting, procurement and physical plant and field equipment maintenance. The reorganization of research along commodity lines rather than the station focus will evolve over time. The USAID project will assist the GOK accomplish this important task through the Management Component and the Maize and Sorghum/Millet Component Program which will serve as prototypes for national commodity programs, fully integrated into the reorganized national system.

The capacity of both commodity programs to generate farmer-ready technologies on a continuing basis is also dependent on upgrading the technical quality of the Kenyan research staff. The Training Component discussion provides details on this effort. It is important to integrate the training with the commodity research work. This will occur in three ways. First, Kenyans now working in the research field will be selected for degree work in Kenya, the U.S., or third countries. Thesis and dissertation work of these students will be performed in Kenya on problems related to on-going station and on-farm research programs. Second, when these students complete their studies and are assigned various responsibilities, the technical assistance team members will make their expertise available to the new staff, assisting them to initiate their own problem-oriented research work. Also periodic short-term visits from the new scientists' former academic mentor will serve to reinforce their training. Lastly, in-country seminars, workshops and training sessions will be provided to assist the technical staff to maintain and upgrade their scientific sketch (refer to Training Component.)

III. Appropriateness of USAID Assistance

A. Lessons Learned from Previous Projects

AID experience with the implementation of agriculture research projects in Kenya has shown that the long-term success of a project is dependent on three closely-related factors; the degree of institution-building intrinsic to the project, the ability of AID to maintain project priorities, and the depth of GOK commitment to the project as demonstrated by allocation of sufficient human and financial resources.

AID's earliest maize research programs in Kenya did not include training or institution-building as significant objectives. Projects which began in the early 1970s did have as an explicit goal the development of Kenyan research capacity primarily through

academic training. The quality of AID's efforts at institution-building has been limited because of the changing research priorities imposed by successive projects. Also reducing the effect of AID's attempts at building indigenous maize research capacity has been the shifting of focus from region to region and from technique to technique; AID's maize focus has gone from Kitale to Muguga to Katumani, and from high and medium altitude to low altitude and semi-arid.

The design of the new project takes these lessons into account and places primary emphasis on institutional development of a permanent Kenyan capacity to plan and execute a research program.

B. Types and Levels of Inputs

It is anticipated that the two maize breeders, the sorghum breeder and the Kakamega-based agronomist will begin their assignments in mid-FY 1987, with the sorghum breeder and Embu-based agronomist arriving at the same time. All long-term technical assistance positions will be for seven years. Short-term technical assistance assignments ranging from one to three months per year will occur throughout the life of the project. These specialists will be called on to assist with particularly difficult or key phases of commodity research and to provide temporary expertise in speciality areas where Kenyan staff is thin. Illustrative examples of short-term scientists are plant protection specialists, virologists, soil chemists, and agricultural economists.

The USAID project will also provide commodities such as vehicles, research supplies, casual labor as needed, and fertilizer to both research programs. Some on-station construction will be done, generally limited to housing construction where necessary for the technical assistance team and some research facilities such as cold storage.

C. Rationale for Types and Levels of Inputs

The size of the technical assistance team proposed for the maize and sorghum programs is based on a number of factors; the importance of both crops in the Kenyan agricultural economy and the need for tangible research results; the scientific and managerial weaknesses of the current research programs; and the great range of agroclimatic zones and farming systems in which these commodities are grown. It is believed that a two-person team of breeder and agronomist is the minimum level of technical support needed to bolster the research effort in Kenya's two areas of greatest maize production potential, that is, the western and central provinces. Virtually all of whom currently lack Ph.D. training, in the exacting and lengthy process of selecting, crossing, testing and modifying plant varieties for different

areas and growing conditions. The two agronomists are essential to complement the research efforts of the breeders in developing proper recommendations for a full range of production problems. The agronomists will assist their Kenyan counterparts in performing the important role of developing the necessary knowledge of current farm problems and integrating these insights into the research process. The agronomists will work very closely with the Kenyans responsible for the on-station and on-farm testing using new varieties and technologies and will actively participate in the evolution of improved research/ extension linkages. The agronomists and breeders will be expected to provide the benefit of their expertise beyond their duty posts. Important maize research for the early maturity and coastal programs will be underway at the Katumani and Mtwapa stations, respectively. Testing will be conducted at various sub-locations such as Njoro. Although no technical assistance team members will be stationed at these sites, the research efforts undertaken there will receive the full support of the USAID project.

One individual, a breeder, is designated to assist with the sorghum and millet program. He will be stationed at the Kakamega Research Station, the headquarters of the National Sorghum and Millet Improvement Program. His responsibilities however will include guiding the work conducted there and at the Alupe sub-station (western program) and assisting as necessary with the eastern sorghum/millet work conducted at Katumani. Because the sorghum and millet program is small relative to that for maize and is concentrated in only two locales, it is judged that the presence of one expatriate scientist will be a sufficient technical resource to the Kenyan research staff.

The level of commodity support to these programs is based on detailed site visits and evaluations by USAID and MOALD staff. (Details are shown in the equipment list of the Procurement Plan, Annex E.)

D. Role of Related Donors/Other Organizations Activities

Under the Government's proposed reorganization of the research program donors will provide assistance to commodity programs, or elements thereof, rather than to individual stations. USAID is assisting with the maize program and it is not anticipated that any other donor nation will participate directly in that activity.

CIMMYT has an established maize program in east Africa and Kenya and can be anticipated to continue providing various types of assistance. CIMMYT's current regional program based in Nairobi has three components - breeding, agronomy and economics (on-farm research) with a total staff of eight. The program is based in Kenya but has a regional mandate. Around 20% of their time is scheduled to work with the Kenyan research program.

The two agronomists and the senior maize breeder work only with the National Maize program. Their activities in Kenya include the following:

a) germplasm development through introduction of CIMMYT maize varieties and population;

b) manpower training offered to 4 Kenyans per year. These are 6 month courses in maize production at CIMMYT headquarters. In-country training activities include training workshops for technical assistants in maize production (2 scheduled for 1986);

c) limited material/commodity assistance is granted to strengthen research stations ability to carry on their research;

d) Consultancy services are available during site visits from the breeder and agronomists.

The two agronomists joined the program in late 1985 and have only begun field work in April 1986. This season eight research stations are cooperating each with 3-4 on-farm maize experiments. The stations involved this 1986 long rains are at Kitale, Kakamega, Alupe Kibos, Tigoni, Embu, Mtwapa and Njoro. This activity involves both research officers and extension personnel and represents for most of these research stations the only off-station research. Since their arrival the agronomists are cooperating with the training program which has been conducted by the two economist working out of the economic program. During the past two years a series of training sessions have been offered to selected research and extension personnel in the general area of theory and methodology of on-farm research. As part of the training exercise small groups of Kenyan research and extension officers have conducted farmer surveys for better understanding of their constraints and problems.

CIMMYT's input by way of their three programs is breeding, agronomy, and economics is an important asset to the Kenyan National Maize program. The on-farm research training has largely been responsible for an increased awareness and acceptance by MOALD of the importance of adaptive research and the need for greater farmer-extension-research linkages.

USAID is also assisting with the sorghum and millet program which previously has benefited from the involvement of FAO. At this time, no other donor has expressed interest in contributing to

sorghum and millet research. Additional involvement in the sorghum and millet program will be provided by the OAU-SAFGRAD operation. Since 1982 the AID-funded OAU-SAFGRAD project has been funding a regional coordinator for sorghum and millet experimental trials. This scientist seconded from ICRISAT located in Nairobi has assisted the Kenyan National Sorghum and Millet Program with germplasm and limited resources to help carry out the evaluation research trials in Kenya.

Plans for a Phase II SAFGRAD will expand the staff to include both a breeder and an agronomist located in Nairobi and continuing with regional responsibilities. The inputs to the Kenya program will continue to be in terms of access to ICRISAT sorghum and millet germplasm with limited material assistance for operation of trials. SAFGRAD sponsors several Kenyans per year to 5 month training courses at ICRISAT. There is a proposal to set up germplasm evaluation sites in 3 locations in Kenya. Selected material would then be sent out to other countries in the region for more site specific appraisals.

Annex G.2 Economic Analysis

A. Background

Efforts to quantify the economic rate of return for institution-building projects present special difficulties. In agricultural research it is nearly impossible to predict the timing of technological breakthrough, the magnitude of impact a given innovation will have on production potential, the lag between technology and farmer adoption, and the level of technology adoption. It is also difficult to quantify the results of "failed" experiments, i.e. those which do not directly yield productivity increasing technologies, but which may yield critical information for subsequent research and/or cost-savings as a result of abandoning an unfruitful approach. Finally, the process of disaggregating the impact of agricultural research from other factors such as input availability, input and output pricing, and the IBRD financed extension program proved difficult.

For these reasons we have determined that conventional ex ante analysis is not appropriate and have instead conducted an indicative break-even analysis for the AID financed project as a part of the overall Kenyan Agricultural Research Program. It is the intention of KARI and the IBRD sponsored Pre-Assessment Mission that once sufficient data has been gathered then ex post facto economic analyses will be used to establish and/or modify research priorities across commodities and within individual commodity programs. Much of the initial work in this area was conducted by MOALD, University of Nairobi, and USAID/Kenya staff in an effort to determine the GOK and AID's priority areas for investment.

The indicative break-even analyses presented in Table 1 below involves estimating a stream of benefits whose present value at least equals the present value of project-related incremental costs over the same time frame. In order to be as location-specific as possible the initial estimates of benefits were calculated at the regional level and then aggregated into a national Kenya model. Finally, specific measures to ensure the cost-effectiveness of project design and less quantifiable benefits are discussed.

This analysis examines only the incremental costs and expected benefits of AID-financed NAR Project and the increased costs associated with improving research-extension linkages. Due to the fact that the IBRD financed National Extension Project is on-going the benefit stream is included in the baseline 'No Additional Investment Model'. The future IBRD-financed research project is approximately a year from final design and cannot be accurately costed. We have therefore estimated the expected costs of improved research-extension linkages based on the findings of the multi-donor Pre-Appraisal Mission.

B. Potential Sources of Economic Gains

Significant economic benefits are expected to be realized if the achievements are sustained over the long-term in the areas of, 1) research planning and management, 2) technological development and adaptation for maize, sorghum and millet, and 3) improved research-extension linkages which are to be initiated by the AID and IBRD financed projects.

The potential economic gains are expected to be realized from both increases in agricultural productivity and the improved efficiency/effectiveness of the agricultural research-extension system.

1. Increases in Agricultural Productivity

While the central thrust of the AID financed project is increased productivity in coarse grains, the planning and management component will cross commodity limitations and have a direct impact on commodity research beyond coarse grains. With regard to coarse grains it is found that in the 1986/87 crop year,1.65 million ha. are allocated to maize production while an additional 350,000 ha. are allocated to the production of sorghum and millet. Together these commodities represent 23% of arable land and approximately 17% of Agricultural GDP. Given the population growth rate of 4.1% per year, limited possibilities of area expansion and the limited supply of white maize and sorghum on the international market it is imperative that productivity increase in order to provide sufficient supplies for domestic food consumption the rapidly growing feed industry, and potentially serve to reduce the wheat importation bill via blending.

While it is recognized that Kenya has favorable environmental and ecological conditions for agricultural production, it is found that since the mid-1970s Agricultural GDP excluding coffee has been increasing by approximately 1.8% per year. For maize and sorghum, yields are low (1.373 MT/Ha and 0.918 MT/Ha) have been increasing at only 0.9% and 1.85% respectively. Currently yields for maize and other small-holder crops are therefore well below

those of comparable nations such as Zimbabwe and are believed to have the potential to increase significantly. Currently traditional maize varieties which occupy about 60% of the total maize area yield on average 950 kg/ha., while hybrids currently average about 2 MT per hectare in spite of the fact that large-scale operators average more than 6 MT/Ha. The Project expects to increase small holder yields, at a minimum, from 1 to 1.6 MT/Ha and large holder yields from 6 to 7 MT/Ha.

The disparity between actual and potential yields is attributed to a number of factors associated with the research and extension processes as well as input supply. With regards to research, the current maize has three fundamental problems: 1) the late maturity genetic bias, 2) the large-holder bias, and 3) the lack of a coordinated program across stations which is capable of establishing research priorities and serving as a reservoir for knowledge gained.

First with regards to the late-maturing genetic bias, the initial developments of hybrids at Kitale proved unusually successful in the high altitude growing environment and a still significant improvement over traditional varieties in medium altitudes. It was decided therefore that the GOK would rely on this initial parent stock as the basis for its hybrid program. Unfortunately varieties have not evolved which maximize the potential of the coastal lowlands, the Central Highlands or the lower altitude

regions of Western Kenya. An initial focus on the AID financed project will be follow-up efforts of the Dryland Cropping Project to develop agro-climatically appropriate varieties for these regions. In Kitale, the effort will in part be to reinforce the genetic stream of varieties against potential yield reduction as a result of excessive in-breeding.

The second factor is the large farmer-bias. Traditionally Kenyan agriculture research has focused on the large-scale farmer. Until recently small-scale producers were perceived as having sufficient land resources to produce at a subsistence level and were not considered an important source of national supply. Given the rapid population growth and consequent sub-division of land, it is now estimated that 95% of maize acreage and 75% of national production is on small-holdings. Therefore there is a need to develop and adopt technologies which are consistent with the small-holder resource base and compatible with his/her desire to minimize risk while maximizing the returns per unit of capital or labor invested.

The third factor is the lack of a coordinated program across stations. Under the previous institutional arrangements, each Station Manager was responsible for developing and implementing the research agenda at his station. As a result much of the research conducted did not reflect either national priorities or avenues of potential technological breakthrough. Furthermore, due to the lack of a formal relationship between scientists at different research sites, there was often an unnecessary duplication of research efforts and the failure to develop resource saving externalities which reduced research productivity.

2. Savings from Improved Institutional Efficiencies

As discussed in Chapter 5 of the MOALD's National Agricultural Research Project Proposal (Task Force Report) the total GOK budget commitment to agricultural research in 1985/86 was KShs 183.3 million ($ 11.45 million) of which salaries represented 61%, other personnel and office costs totalled 25%, and operation and maintenance only 14% of the total budget. The Task Force noted that actual expenditure levels have been less than reported in the budget due to GOK funding shortages in the second half of the year. In the Task Force Report it was estimated that total incremental costs over the first five years to fully implement the research program for which it is mandated would be KShs 439.5 million approximately $ 5.5 million per year. It must be noted however that these estimates were prepared by individual station managers to fully fund the current research portfolio. Due to the efforts to restructure the program and the lack of adequate central planning and financial management, the GOK proposal is believed to exceed the ability of the GOK and donors to finance the total program over the long-term. It is for this reason that Component 1 of the AID project emphasizes the planning and management functions and that CPs are included for subsequent year obligations.

The proposed reorganization of KARI is expected to result in savings to the GOK in three complementary fashions: 1) the reduction in research stations from 43 to 24; 2) the prioritization of GOK supported research with the termination of research activities which are either of low national priority or in which the GOK does not have a

comparative advantage; and 3) the integration of commodity, factor programs across stations which should result in greater returns per unit of investment. Each of these areas are discussed below.

Prior to the re-organization of KARI, there exist 43 semi-autonomous research stations. The proposed re-organization calls for the reduction to 16 National and 8 Regional/Adaptive Research Centers. This reduction is expected to begin to consolidate the KARI infrastructure and increase the percentage of funds allocated to actual research activities. It is intended that the research officers in low priority programs/stations will be transferred to other posts in order that there be a critical mass of scientists and that there be improved efficiencies as a result of shared overhead. While it is recognized that many of the national stations may further be consolidated to promote increased economies of scale, these decisions must await the development of the improved management system during the initial years of the AID Project.

The prioritization of programs is the second area of potential savings. The Task Force lists nineteen commodity programs, three factor programs, seven livestock production programs and the veterinary services. While USAID/Kenya believes the ranking process is reasonably good, the number of proposed programs indicates the difficulty of fully-funding all of them. It is further noted that the proposed list includes many commodities such as oilseeds, nuts, horticultural products, etc. which should appropriately be researched by the private sector. The

funding of these programs then represent an unnecessary duplication of efforts. The proposed Research Fund, especially the window for Contract Research, is expected to reduce the costs by permitting the funding for discrete research activities while removing the burden of long-term research personnel support.

The final area of potential savings in the integration of commodity/factor programs across stations. As discussed in the Institutional Analysis, prior to the re-organization of KARI, each research station controlled its own resources and had little contact with professionals in other stations. The result has been that the individual commodity programs suffered from the lack of internal prioritization as well as the occasional duplication of research. Under the proposed planning and budgeting system each piece of research will be approved and monitored by the Commodity Coordinator. While this process will increase the amount of travel costs, it is expected that the efficiencies introduced will ultimately reduce the total program cost per unit of output.

C. Indicative Break-Even Analysis. - Various combinations of increases in the productivity of the major crops by Kenyan farmers, improvements in the adoption rates for improved technologies, and estimated efficiency savings in KARI's operations were tested to determine the level of incremental benefits needed to justify investment in the proposed AID-financed project.

The model presented in Tables 1 through 7 shows that the increased production of maize alone will pay for the AID and GOK investment in the total project by the year 2007

given the following assumptions: (1) a technology generation process which improves the yield of adopted acreage by 2.75% in the initial years increasing progressively to 3.5% in 2002; (2) an adoption rate which increases from 0.8% in 1992 to 25% in 2007; (3) and incremental cost savings to KARI as a result of improved planning and management systems beginning at 0.5% of the cost of the KARI proposed program in 1990 and increasing to 5% in 1999, Alternative models including that of the USAID/Kenya and GOK expectations are presented in the Unattached Annex. These tables show that assuming our "best estimates" the benefit/cost ratio over 20 years is 1.60 or that the project is expected to more than pay for itself in maize production increases by the year 2003.

1. Estimation of Costs

The costs included in the analysis are the investment of AID, the incremental cost to the GOK of implementing the project, the incremental cost of strengthening research-extension linkages, and additional costs to the farmer of adopting improved technologies. Estimating the level of incremental on-farm costs that will not slow down adoption of improved technologies proved impossible at this time. The information produced by the Farm Management officers at the district level is for the recommended rather than actual levels, the Central Bureau of Statistics produces data for the household rather than the crop area, and the CIMMYT-supported farming system trials are only now generating reliable information. Consequently, it was not possible to determine with confidence the correlation

between levels of adoption and the return per unit of farmer investment. This information will be more rigorously developed and analyzed by the adaptive research program within the eight Regional Research Centers. For the purpose of this analysis, it was assumed that for maize, incremental on-farm costs will not exceed 30% of incremental gross revenues.

2. Estimation of Benefits

In estimating a stream of benefits from crop production gains, the scenario presented in this analysis considers increases only in maize production. This is not to imply that improvements in the performance of other commodities are not expected. Rather, the intention is to demonstrate that even with very conservative assumptions, increases in maize productivity alone can generate a significant impact which will cover the costs associated with the total planning and management of the KARI program, the Maize and Sorghum/Millet programs, the AID-financed Human Resources Development Component, the Non-governmental Research Component, Project Administration and the incremental cost of research-extension linkages.

As shown in Tables 2 and 3 an increase in maize production directly attributable to the project's research is not expected to occur until five years after project start-up in 1992. The model assumes a conservative initial yield improvement of 2.75% per year in the initial years increasing progressively to 3.5% in year 15 of the proposed project. The total increase in average yield is only

required to be 35.5% (from 1.373 MT/Ha in 1987 to 1.861 MT/Ha in 2007) given the relatively conservative adoption rates employed, i.e. 0.8% in year 5, 5% in year 10, 15% in year 15, and 25% in year 20. In estimating the value of incremental maize production the farmgate parity price of maize was used. Due to uncertainties with regard to future price trends, the 1981-85 average f.o.b. Gulf Port Price for U.S. #3 was used as the base price. The parity price of $180/MT may be high for the initial years of the project when there is little return to investment but is believed a reasonable average over the 20 years included within the analysis.

In addition to maize productivity increases, the stream of benefits presented in this analysis includes savings resulting from operating costs reductions and improved institutional efficiencies. Inclusion of these benefits is necessary to consider the merit of significant amount of AID investment in the planning and management component. While these estimates remain preliminary given the lack of a definite research program, it is conservatively estimated that by year 4 of the project, KARI will be able to save 0.5% of its base budget through improved institutional efficiencies. This figure increases to 5.0% by year 12 of the project. Even this conservative savings estimate it offsets 80% of the incremental cost increase to Government that is expected to result from the AID project and the strengthened research-extension linkages. The actual cost savings will probably be significantly higher due to the probable termination of low priority programs which has not yet been undertaken. If one assumed 6.25% cost savings which we believe to be well within the realm of possibility, the savings would completely offset the increased costs.

The incremental costs and benefits were discounted at 12%. This rate is believed to reflect the average expected opportunity cost of capital in Kenya over the life of the project.

D. Feasibility of Achieving the Projected Economic Benefits. Throughout this analysis, very conservative estimates were employed in estimating project-related benefits. Conservative estimates were made to a) ensure that only realistically achievable targets are set for those responsible for project implementation; and b) avoid inflating the value of expected gains vis-a-vis project investments.

1. Maize Production Gains - The targets set for increases in maize productivity are well within the limits of the proven yield potential of maize and are 15% below the USAID/Kenya and MOALD estimated probable yield effect. The estimated maximum adoption growth rate of 2% per year is believed to be well within the potential of the current public and private sector research-extension network. Experience with the initial hybrid maize program of the 1960s showed a rapid expansion of area once the farmers become aware of the yield effect in spite of a weak contemporary public extension system. It is expected that the CIMMYT and project supported farming systems research approach and the IBRD effort to strengthen research-extension linkages will further increase the attainable adoption rates.

The difference in economic returns between improved and traditional technologies is sufficiently great to encourage initial adoption as well as additional improvements e.g. better cultural practices, once the initial decision to adopt has been made. While it is impossible to calculate the micro-level benefits at this time, this analysis will be conducted during the development of specific technologies at the adaptive regional centers. See the detailed financial analyses (Unattached Annex).

2. Estimated Cost Savings. - The MOALD prepared National Agricultural Research Project Proposal (Task Force Report) the ISNAR studies, AID financed Institutional Analyses and the recently concluded multi-donor Pre-Appraisal Mission all confirm the need for and feasibility of consolidating the GOK's research network within the reorganized KARI. It has also been agreed that while there would be the opportunity for individual researchers to propose research projects, all research activities must be approved by the Commodity/Factor Program Committee chaired by the Commodity/Factor Coordinator taking account of the overall funding levels approved by KARI management for the commodity/factor research program and the expected returns of the research activity.

While the precise figures of cost savings cannot be generated at this stage of institutional development, it is the intent of the Planning and Management Component that achievable benchmarks be established as part of KARI's programming and management processes and be assessed both within KARI's monitoring plan as well as during external

evaluations. Due to the level of uncertainty regarding the exact levels of savings possible, the estimates (a maximum of 5% of the base budget level) were calculated conservatively. Thus, if the actual levels fall below those of the projections, a compensation of increased production is easily attainable.

E. Cost-Effectiveness Analysis. The project's central element is one of planning and management. This will be stressed both within KARI headquarters with the focus on researching national priorities and in incorporating the university community and private sector within the national research system as well as within the Maize and Sorghum/Millet commodity programs. Therefore measures will be taken to reduce the costs of KARI's operations and assure that a greater share of allocated funds go to productive research. Specific measures will be to reduce the cost of station overhead, general administration, and transport levels to those consistent with the minimum necessary to assure an effective research organization. Simultaneously AID will assist KARI to develop a system of prioritization which will enable it to operate more effectively and efficiently within the limits of available resources.

As discussed in the Institutional Analysis (Annex G.5) research in Kenyan agriculture has not always reflected either national priorities or the constraints encountered by the farm household. Consequently, investments in research and extension programs to date have generated only a marginal impact on productivity and the Agricultural GDP. It is in part for this reason that the GOK and donors have reduced the funding allocated to agricultural research until such time as a viable structure which had the

authority and responsibility for managing the research process was established. The AID financed project is therefore intended to improve the capability of the KARI system to assess priorities across regions and commodities as well as assure that adaptive research is conducted which responds to the expressed need of the farm household. Linkages will be developed among basic researchers, adaptive researchers, and the extension staff to ensure that programs are focused on on-farm constraints. The relevance, quality, and impact of the research program will be evaluated on an annual basis as part of KARI's Annual Program and Budget exercise. In addition to this annual exercise larger-scale assessments are intended as part of the periodic review of donor-financed projects.

In an effort to strengthen the capacity of KARI staff to utilize available resources more effectively, a substantial amount of managerial and technical training is to be financed by AID. A peculiar advantage of the proposed program is that a virtually new institution is being created which does not have a legacy of inappropriate management systems, and as a semi-autonomous parastatal has the relative freedom to design systems which respond to its specific requirements. As a result, AID has been requested to provide assistance in the design, testing, and implementation of the relevant management systems in order to improve the cost effectiveness of the total program. Since a system is only as good as those persons responsible for implementation, a significant portion of AID funding is earmarked to on-the-job training of managerial personnel. Additionally, to the extent possible, academic trainees who

are being considered for managerial assignments will take managerial courses in addition to the more technical classes required for the degree.

While Kenya is considered a 'Technology Producing Country" in the AID Plan for Supporting Agricultural Research and Faculties of Agriculture in Africa, it is recognized that most of the actual research conducted in the project will be adaptive. International and regional research centers conduct research on nearly all of the agricultural commodities produced in Kenya. In addition to these IARCs, many neighboring countries including Malawi and Zimbabwe are undertaking research which may contribute to the effectiveness of the Kenyan program. Thus, collaboration will be fostered between KARI and appropriate international and national research programs. Funds have been made available in Component 3, Human Resource Development, to permit internships for mid-level staff as well as short-term visits for senior program officials. These visits are expected to strengthen KARI's managerial perspective as well as encourage the sharing of technical information, expertise and materials.

F. Other Less Easily-Quantified Benefits - Additional benefits which are less easily quantified are expected by the AID financed project. These include: (a) improved income distribution between producers and consumers; (b) positive effects on employment generation and nutrition; (c) additional farm incomes and foreign exchange earnings (savings) through: the shift of coarse grain acreage to higher valued commodities (coffee, tea, horticultural crops); the development of a relatively cheap feed-grain industry; and the development of wheat-blending operations.

1. Increases in the production and productivity of food crops, especially of maize, could have widespread benefits for both producers and consumers. Improved technologies that reduce unit cost of production and increase returns per unit of labor and other capital invested should receive wide acceptance by farmers. High adoption rates should result in increased production. Significant increases in total production, in turn, should lead to lower consumer prices. Because the lower-income groups tend to spend a larger proportion of their budget on food, the effect of lower food prices should significantly benefit these groups.

2. Improved technologies that increase farm incomes will result in an increase in farm household demand for agricultural (e.g., seeds, fertilizers and chemicals) and non-agricultural products. This demand for goods could generate additional off-farm employment opportunities.

3. Priority will be given to the development of technologies for food crops. The combined effects of increased food production and increased incomes due to improved technologies could result in improved nutritional status. However, widespread nutrition education may be necessary to achieve this impact in Kenya.

4. Finally, as improved technologies raise the productivity of maize and sorghum/millet, a lesser proportion of total cropped land will be necessary to meet local demand for this food crop. Farmer diversification into other non-traditional cash crops could result, thereby

increasing farm incomes and generating additional foreign exchange revenues for Kenya. Additionally, the GOK estimates that the demand for meat will triple in the next 15 years. Such an increase exceeds the carrying capacity of Kenya's rangelands and implicity will require the development of feed-lot enterprices. An indirect benefit of the project is therefore the production of sufficient supplies of sorghum, millet, and maize for the animal feed industry. This therefore is expected to free land for more productive uses and expand the potential meat supply. Finally, the GOK estimates that the wheat deficit in the year 2000 will be 600,000 MT valued at $100 million. The Government has proposed that this deficit can be reduced by as much as 200,000 MT throught the implementation of programs to encourage the blending of wheat with domestically produced sorghum and triticale. The magnitude of these revenues/savings is difficult to predict at this time, because it is highly dependent on the successful development of coarse grain technologies that are acceptable to the farmers.

TABLE I

INDICATIVE BREAK-EVEN ANALYSIS OF AID FINANCED

NATIONAL AGRICULTURAL RESEARCH PROJECT

(000 US$)

	INCREMENTAL PROJECT COSTS				INCREMENTAL PROJECT BENEFITS		
Year	AID	GOK	ON-FARM	TOTAL	COST SAVINGS	INC. PRODUCTION	TOTAL
1987	5,478.7	740.4	0.0	6,219.1	0.0	0.0	0.0
1988	4,681.6	681.9	0.0	5,363.5	0.0	0.0	0.0
1989	4,906.6	859.2	0.0	5,765.8	0.0	0.0	0.0
1990	4,733.5	934.9	0.0	5,668.5	102.3	0.0	102.3
1991	4,352.8	1,003.4	0.0	5,356.3	192.6	0.0	192.6
1992	5,360.5	1,064.9	42.3	6,487.7	287.9	209.6	497.4
1993	3,969.7	1,091.3	140.4	5,221.4	368.2	467.9	856.1
1994	2,984.3	1,315.5	197.8	4,497.6	483.4	659.4	1,142.8
1995	2,018.1	960.3	321.7	3,300.1	589.8	1,072.5	1,662.3
1996	1,159.8	899.9	455.6	2,514.9	690.6	1,518.6	2,209.2
1997	0.0	1,234.2	593.1	1,827.3	790.0	1,976.9	2,766.9
1998	0.0	1,234.2	852.8	2,087.0	888.8	2,842.5	3,731.3
1999	0.0	1,564.2	1,119.6	2,683.8	987.5	3,731.9	4,719.4
2000	0.0	1,234.2	1,378.8	2,613.0	987.5	4,596.1	5,583.6
2001	0.0	1,564.2	1,644.1	3,208.3	987.5	5,480.4	6,467.9
2002	0.0	1,234.2	1,902.6	3,136.8	987.5	6,342.2	7,329.7
2003	0.0	1,234.2	2,143.6	3,377.8	987.5	7,145.5	8,133.0
2004	0.0	1,234.2	2,381.7	3,615.9	987.5	7,939.1	8,926.6
2005	0.0	1,234.2	2,586.4	3,820.6	987.5	8,621.3	9,608.8
2006	0.0	1,234.2	2,777.2	4,011.3	987.5	9,257.2	10,244.7
2007	0.0	1,234.2	2,963.5	4,197.7	987.5	9,878.5	10,866.0

PRESENT VALUE AT 12%

PRESENT VALUE OF INCREMENTAL COSTS: $4,974.3

PRESENT VALUE OF INCREMENTAL BENEFITS: $5,040.5

BENEFIT/COST RATIO: 1.001

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TABLE 2: ECONOMIC ANALYSES

Commodity: Maize

Model: No Additional Investment

Nationwide

Year	Area ('HA)	% Area Change	Yield (MT/HA)	% Yield Change	Production (MT)	% Production Change
1987	1,650,000.0	-8.33	1.373	-7.59	2,266,000.0	-15.29
1988	1,682,185.8	1.95	1.386	0.90	2,331,094.9	2.87
1989	1,714,226.5	1.90	1.398	0.90	2,396,961.8	2.83
1990	1,746,895.0	1.86	1.411	0.90	2,463,561.6	2.78
1991	1,777,550.0	1.80	1.424	0.90	2,530,464.6	2.72
1992	1,808,771.8	1.76	1.436	0.87	2,597,612.0	2.65
1993	1,839,736.2	1.71	1.449	0.87	2,664,921.2	2.60
1994	1,869,215.2	1.60	1.461	0.85	2,730,682.8	2.47
1995	1,898,336.8	1.56	1.473	0.84	2,796,647.6	2.42
1996	1,927,078.7	1.51	1.485	0.82	2,862,266.4	2.35
1997	1,956,957.3	1.55	1.498	0.83	2,927,806.6	2.29
1998	1,987,344.8	1.40	1.510	0.83	2,993,504.6	2.24
1999	2,009,301.8	1.36	1.522	0.82	3,059,108.9	2.19
2000	2,035,008.9	1.28	1.534	0.79	3,122,611.3	2.08
2001	2,059,816.5	1.20	1.547	0.81	3,185,733.3	2.02
2002	2,083,329.0	1.16	1.559	0.79	3,248,119.0	1.96
2003	2,106,736.7	1.12	1.571	0.79	3,310,613.3	1.92
2004	2,129,623.9	1.09	1.584	0.78	3,372,349.3	1.87
2005	2,150,290.7	0.97	1.596	0.77	3,431,205.4	1.75
2006	2,170,667.3	0.95	1.608	0.77	3,490,118.1	1.72
2007	2,190,421.5	0.92	1.620	0.74	3,548,118.9	1.66

TABLE 3: ECONOMIC ANALYSES

Commodity: Maize

Model: Research With Institution Building

Nationwide

		Area						Yield						Production					
Year	Adoption Rate (%)	Non-Adopt Area (Ha)	% Non-Ad Area Change	Adoption Area (Ha)	% Adopt Area Change	Total Area (Ha)	% Total Area Change	Non-Adopt Yield (MT/Ha)	% Non-Adop Yield Change	Adopt Yield (MT/Ha)	% Adopt Yield Change	Average Yield (MT/Ha)	% Average Yield Change	Non-Adopt Production (MT)	% Non-Adopt Production Change	Adopt Production (MT)	% Adopt Production Change	Total Production (MT)	% Total Production Change
1987	0.0	1,650,000.0	-8.33	0.0	0.00	1,650,000.0	-8.33	1.373	-7.59	0.000	0.00	1.373	-7.59	2,266,000.0	-15.29	0.0	0.00	2,266,000.0	-15.29
1988	0.0	1,682,185.8	1.95	0.0	0.00	1,682,185.8	1.95	1.386	0.90	0.000	0.00	1.386	0.90	2,331,094.9	2.87	0.0	0.00	2,331,094.9	2.87
1989	0.0	1,714,226.5	1.90	0.0	0.00	1,714,226.5	1.90	1.398	0.90	1.454	**********	1.398	0.90	2,396,961.8	2.83	0.0	0.00	2,396,961.8	2.83
1990	0.0	1,746,095.0	1.86	0.0	0.00	1,746,095.0	1.86	1.411	0.90	1.494	2.75	1.411	0.90	2,463,561.4	2.78	0.0	0.00	2,463,561.4	2.78
1991	0.8	1,794,778.6	0.97	13,993.3	********	1,808,771.8	1.76	1.424	0.90	1.535	2.75	1.424	0.90	2,530,464.4	2.72	0.0	0.00	2,530,464.4	2.72
1993	1.5	1,811,293.9	0.92	28,442.3	103.26	1,839,736.2	1.71	1.449	0.87	1.581	3.00	1.437	0.95	2,577,317.5	1.85	22,128.2	**********	2,599,445.8	2.73
1994	2.0	1,831,830.9	1.13	37,386.3	31.46	1,869,215.2	1.60	1.461	0.85	1.678	3.00	1.451	0.99	2,623,721.6	1.80	46,326.5	109.35	2,670,048.0	2.72
1995	3.0	1,841,386.7	0.52	56,950.1	52.34	1,898,336.8	1.56	1.473	0.84	1.732	3.25	1.481	1.08	2,676,069.1	2.00	62,717.8	35.38	2,738,786.9	2.57
1996	4.0	1,849,995.5	0.47	77,083.1	35.35	1,927,078.7	1.51	1.485	0.82	1.788	3.25	1.497	1.11	2,747,775.7	1.29	137,869.9	39.75	2,885,636.6	2.64
1998	7.0	1,843,580.7	-0.73	138,764.1	41.96	1,982,344.8	1.40	1.510	0.83	1.907	3.25	1.538	1.50	2,783,959.3	0.09	264,569.1	46.58	3,048,528.4	2.92
1999	9.0	1,828,444.6	-0.82	180,857.2	30.32	2,009,301.8	1.36	1.522	0.82	1.969	3.25	1.563	1.61	2,783,789.1	-0.01	355,991.5	34.56	3,139,780.6	2.99
2000	11.0	1,811,157.9	-0.95	223,851.0	23.79	2,035,008.9	1.28	1.534	0.79	2.033	3.25	1.589	1.70	2,779,128.0	-0.17	454,989.1	27.81	3,234,113.1	3.00
2001	13.0	1,791,692.4	-1.07	267,724.1	19.60	2,059,416.5	1.20	1.547	0.81	2.102	3.40	1.619	1.87	2,771,588.0	-0.27	562,685.2	23.67	3,334,253.2	3.10
2002	15.0	1,770,829.6	-1.16	312,499.3	16.72	2,083,329.0	1.16	1.559	0.79	2.175	3.50	1.652	2.01	2,760,991.1	-0.39	679,754.3	20.81	3,440,655.4	3.19
2003	17.0	1,748,589.8	-1.26	357,144.9	14.61	2,106,734.7	1.12	1.571	0.79	2.251	3.50	1.687	2.15	2,747,643.0	-0.48	806,309.8	18.62	3,553,952.9	3.29
2004	19.0	1,724,995.4	-1.35	404,628.6	12.98	2,129,623.9	1.09	1.584	0.78	2.330	3.50	1.725	2.28	2,731,602.9	-0.58	942,844.5	16.93	3,674,447.4	3.39
2005	21.0	1,698,658.6	-1.53	451,542.2	11.59	2,150,200.7	0.97	1.596	0.77	2.412	3.50	1.767	2.42	2,710,652.2	-0.77	1,088,985.7	15.50	3,799,638.0	3.41
2006	23.0	1,671,259.8	-1.61	499,207.5	10.56	2,170,467.3	0.94	1.608	0.77	2.496	3.50	1.812	2.56	2,687,391.0	-0.86	1,246,078.3	14.43	3,933,469.3	3.52
2007	25.0	1,642,816.1	-1.70	547,605.6	9.69	2,190,421.5	0.92	1.620	0.74	2.583	3.50	1.851	2.67	2,661,089.2	-0.98	1,414,725.8	13.53	4,075,815.0	3.62

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TABLE 6: ECONOMIC ANALYSES

Commodity: Maize

Calculation of Present Value of Increased Production

Nationwide

Year	Production (MT)		Net Benefits of Research (MT)	Economic Value Per MT (US$)	Economic Benefits (US$)	Present Value of Economic Benefits (US$)
	No Additional Investment	With Research				
1987	2,266,000.0	2,266,000.0	0.0	180.00	0	0
1988	2,331,694.9	2,331,694.9	0.0	180.00	0	0
1989	2,396,961.8	2,396,961.8	0.0	180.00	0	0
1990	2,463,561.8	2,463,561.8	0.0	180.00	0	0
1991	2,530,464.4	2,530,464.4	0.0	180.00	0	0
1992	2,597,412.0	2,599,445.8	2,033.8	180.00	366,076	287,563
1993	2,664,921.2	2,670,048.0	5,126.8	180.00	922,825	467,872
1994	2,730,682.8	2,738,786.9	8,104.2	180.00	1,458,748	659,354
1995	2,796,647.6	2,811,395.7	14,748.1	180.00	2,654,656	1,072,481
1996	2,862,266.4	2,885,638.6	23,370.3	180.00	4,206,646	1,518,599
1997	2,927,806.6	2,961,914.7	34,108.0	180.00	6,139,446	1,976,962
1998	2,993,506.6	3,048,528.4	55,023.7	180.00	9,904,275	2,862,527
1999	3,059,198.9	3,139,780.6	80,671.6	180.00	14,520,897	3,731,870
2000	3,122,611.3	3,234,113.1	111,501.8	180.00	20,070,328	4,596,105
2001	3,185,733.3	3,334,253.2	148,519.8	180.00	26,733,570	5,480,382
2002	3,246,119.0	3,440,655.0	192,536.0	180.00	34,656,558	6,342,150
2003	3,310,413.3	3,553,952.9	243,539.6	180.00	43,837,123	7,145,451
2004	3,372,349.3	3,674,447.4	302,098.1	180.00	54,377,660	7,939,138
2005	3,431,205.4	3,799,638.0	368,432.6	180.00	66,317,849	8,621,323
2006	3,490,118.1	3,933,469.3	443,351.1	180.00	79,803,201	9,257,171
2007	3,548,188.9	4,075,815.0	527,696.1	180.00	94,985,302	9,878,471
Total (000)			2,560.9		365,969.9	71,737.0

TABLE 5

CALCULATION OF INCREMENTAL COST TO GOK

(000 US$)

Year	Component 1					Component 2				
	Technical Assistance	Commodities	O & M	Local Personnel	Total	Technical Assistance	Commodities	O & M	Local Personnel	Total
1987	0.0	338.2	85.0	0.0	423.2	0.0	19.3	29.0	0.0	48.3
1988	0.0	20.0	136.8	0.0	156.8	0.0	0.0	74.0	94.3	168.3
1989	0.0	22.5	130.4	0.0	152.9	0.0	2.0	119.0	159.0	280.0
1990	0.0	20.0	123.0	0.0	143.0	0.0	0.0	150.0	185.6	335.6
1991	0.0	20.0	123.6	0.0	143.6	0.0	0.0	193.0	198.9	391.9
1992	0.0	26.1	117.2	0.0	143.3	0.0	5.0	216.0	205.7	426.7
1993	0.0	29.5	123.8	0.0	153.3	0.0	0.0	243.0	205.7	448.7
1994	0.0	305.1	140.4	0.0	445.5	0.0	10.5	240.0	205.7	456.2
1995	0.0	20.0	151.2	0.0	171.2	0.0	0.0	250.0	205.7	455.7
1996	0.0	20.0	157.0	0.0	177.0	0.0	0.0	254.0	205.7	459.7
1997	0.0	25.0	148.0	0.0	173.0	0.0	20.0	254.0	205.7	479.7
1998	0.0	25.0	148.0	0.0	173.0	0.0	20.0	254.0	205.7	479.7
1999	0.0	25.0	148.0	0.0	173.0	0.0	350.0	254.0	205.7	809.7
2000	0.0	25.0	148.0	0.0	173.0	0.0	20.0	254.0	205.7	479.7
2001	0.0	25.0	148.0	0.0	173.0	0.0	350.0	254.0	205.7	809.7
2002	0.0	25.0	148.0	0.0	173.0	0.0	20.0	254.0	205.7	479.7
2003	0.0	25.0	148.0	0.0	173.0	0.0	20.0	254.0	205.7	479.7
2004	0.0	25.0	148.0	0.0	173.0	0.0	20.0	254.0	205.7	479.7
2005	0.0	25.0	148.0	0.0	173.0	0.0	20.0	254.0	205.7	479.7
2006	0.0	25.0	148.0	0.0	173.0	0.0	20.0	254.0	205.7	479.7
2007	0.0	25.0	148.0	0.0	173.0	0.0	20.0	254.0	205.7	479.7

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TABLE 5

CALCULATION OF INCREMENTAL COST TO ESK

(000 US$)

Year	Component 3	Component 4					Gain.	Research Extension Linkages	Grand Total
	Training	Technical Assistance	Commodities	O & M	Research Fund	Total			
1987	158.3	0.0	5.0	14.4	75.0	94.4	16.2	0.0	740.4
1988	224.3	0.0	0.0	27.3	75.0	102.3	24.0	6.3	681.9
1989	284.8	0.0	1.0	28.0	75.0	104.0	25.0	12.5	859.2
1990	361.8	0.0	0.0	28.7	75.0	103.7	24.0	25.0	934.9
1991	324.5	0.0	0.0	29.4	75.0	104.4	24.0	25.0	1,003.4
1992	325.3	0.0	1.6	30.1	75.0	106.7	25.0	37.5	1,048.0
1993	320.5	0.0	1.5	30.0	75.0	107.3	24.0	37.5	1,091.3
1994	229.3	0.0	3.0	31.5	75.0	109.5	25.0	50.0	1,315.5
1995	152.5	0.0	0.0	31.9	75.0	106.9	24.0	50.0	930.3
1996	85.3	0.0	0.0	28.0	75.0	103.0	12.0	62.5	899.5
1997	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,236.2
1998	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,236.2
1999	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,236.2
2000	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,236.2
2001	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,236.2
2002	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,236.2
2003	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,236.2
2004	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,236.2
2005	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,236.2
2006	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,236.2
2007	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,236.2

TABLE 6

CALCULATION OF INCREMENTAL SAVINGS TO BOA

Year	Proposed Total Local Research Program Costs (1986 000 K Ehs)	Proposed Total Local Research Program Costs (1986 000 $US)	Conservative Model		Expected Model	
			% Saved	Potential Savings (000 $US)	% Saved	Potential Savings (000 $US)
1987	242,611.0	15,163.2	0.0	0.0	0.5	75.8
1988	317,064.0	19,816.5	0.0	0.0	1.0	198.2
1989	348,479.0	21,779.9	0.0	0.0	1.5	326.7
1990	327,219.0	20,451.2	0.5	102.3	2.0	409.0
1991	308,196.0	19,262.3	1.0	192.6	2.5	481.6
1992	309,197.0	19,324.8	1.5	289.9	3.0	579.7
1993	310,593.0	19,412.1	2.0	388.2	3.5	679.4
1994	309,407.0	19,337.9	2.5	483.4	4.0	773.5
1995	314,562.0	19,660.1	3.0	589.8	4.5	884.7
1996	315,715.0	19,732.2	3.5	690.6	5.0	986.6
1997	316,000.0	19,750.0	4.0	790.0	6.0	1,185.0
1998	316,000.0	19,750.0	4.5	888.8	7.0	1,382.5
1999	316,000.0	19,750.0	5.0	987.5	8.0	1,580.0
2000	316,000.0	19,750.0	5.0	987.5	9.0	1,777.5
2001	316,000.0	19,750.0	5.0	987.5	10.0	1,975.0
2002	316,000.0	19,750.0	5.0	987.5	10.0	1,975.0
2003	316,000.0	19,750.0	5.0	987.5	10.0	1,975.0
2004	316,000.0	19,750.0	5.0	987.5	10.0	1,975.0
2005	316,000.0	19,750.0	5.0	987.5	10.0	1,975.0
2006	316,000.0	19,750.0	5.0	987.5	10.0	1,975.0
2007	316,000.0	19,750.0	5.0	987.5	10.0	1,975.0

Economic Analyses TABLE 7

LENYA
National Agricultural Research Project
Calculation of Economic Prices
(in 1986 constant US$ and K Shs)

Maize	1986
Fob US Gulf Port (US$) 1/	126
Quality Adjustment 2/	13
International Transport	39
C & F Landed Costs, Mombasa (US$)	178
C & F Landed Costs, Mombasa (K Shs) 3/	3,218
NCPB handling and distribution 4/	905
Average ex-depot Cost	4,116
Less NCPB handling cost in average area 4/	(874)
Average Economic Price per MT (K Shs)	3,242
Average Economic Price per MT (US $)	180

Notes:

1/ 1981-85 Average Gulf Port Price for U.S. #3
2/ 10 % value differential
3/ Exchange Rate includes a 12.5% adjustment
4/ NCPB Reports

Annex G. 3 Recurrent Cost Analysis

A. GOK Public Finance

The public sector in Kenya consists of the central government; city, municipal, and district councils, 19 major non-financial parastatals and 7 major financial intermediaries. The central government's budgetary system consists of the recurrent and development accounts. While in principle the recurrent account covers the expenditures for on-going government operations and the development account is the avenue for capital expenditures, in practice the development budget is more akin to project budgetS which include both "capital" and "revenue" expenditures.

B. The Central Government's Budgetary Performance (Tables 1 and 2)

The GOK's budgetary performance improved significantly from 1980/81 through 1984/85. During this period the government deficit was reduced from 9.5% in 1980/81 to an average of 4.1%. (The deficit in 1984/85 increased to 5.0% in part due to drought-related expenses). During this time, the overall cash deficit was reduced from K Pounds 246 million to K Pounds 139 million in 1982/83 before increasing to K Pound 216 million in 1985/86. The rate of inflation was also reduced from more than 20% in 1981/82 to less than 10% per year during the past three years.

In the paper "Budget Rationalization Program: Background and Mechanisms for Implementation" presented at the Mini-Donor Consultation (April 1986) the GOK restated its commitment to continue to control the budget deficit and reduce the level over the next 3 years to 3.4% of the GDP. The challenge for the GOK in the near future is therefore to continue to exercise restraint in public expenditure and money supply while continuing to fuel economic growth. In order to achieve this objective the GOK has developed the Budget Rationalization Program which is intended to stabilize the economy and promote growth through improvements in the allocation of public financial resources. It is expected that this program will address the following major problems in the current composition of Government expenditures: (1) ceilings in many sectors are spread too thinly across a large number of underfunded projects leading to cost escalation and postponement of probable benefits to the economy; (2) the present portfolio contains a number of projects, including those financed by donors, which do not reflect priorities and which represent an inefficient use of scarce resources; (3) the identification of adequate financial resources within the expenditure limits for the operation and maintenance of existing capacity; (4)

many of the ongoing activities do not adequately reflect the priorities identified at the district level; and (5) a considerable volume of budgetary resources are being used by parastatals on activities which are not currently of a high priority.

The Budgetary Rationalization Program addresses these problems through the budgetary process. Under the program the following steps are to be implemented: (1) the number of projects will be reduced in order to assure that priority programs are fully funded and speedily implemented; (2) projects financed in the development vote will be more carefully selected for efficiency and for potential growth and to be consistent with the Development Plan; (3) in the recurrent vote, more funds will be allocated for operating expenses of completed project, and for improving the utilization of existing capacity and physical infrastructure; (4) Ministries will be required to ensure that district priorities are taken into account and that districts are given adequate technical and financial guidelines to be better integrated within the budgetary process; and (5) financial resources being allocated to parastatals will be confined to high priority projects and activities of national importance, through the establishment of a forward budget system for parastatals and integration within the national budget.

C. GOK Budget to Support to Agriculture

The MOALD budget as a share of the total GOK Budget has averaged 7.88% for the period 1981-85. The average of the Development Vote has been 13.4% while the recurrent vote has averaged 5.75%. A summary of the performance is presented in Table 3. This table shows that the MOALD budget was significantly reduced during the fiscal compression of 1981/82 and 1982/83. During this period, the recurrent budget fell in real terms from K Pounds 43.7 million to K Pounds 31.2 million which represented 4.4% of the total recurrent budget in 1982/83. The MOALD recurrent budget increased slightly in real terms in 1983/84 and significantly in 1984/85 partially as belated compensation for previous underfunding.

Table 4 also shows the budget allocations to agricultural research. In current terms the recurrent budget has increased by 38% over the five year period from K Pound 5.4 million to K Pound 7.5 million ($ US 9,375.) In real terms, however the recurrent budget has fallen by 5% over the period. A note of caution should be acknowledged. The figures presented here represent the budgeted amounts as an indication of Central Government's intent. It is found, however, that due to continuing cash flow problems, the funds actually received during the second semi-annual appropriation are often reduced by 50%, or

approximately a 25% reduction of the printed estimates. This practice effectively eliminates on-going research for the second half of the year as funding is only sufficient to pay the personal emoluments.

While the stated intention of Government in both the paper on the Budget Rationalization Program and Sessional Paper No. 1 of 1986 is to give priority funding to areas that show the greatest growth potential, the track record in this regard remains untested. Sessional Paper No. 1 states that as a priority activity, agricultural research will receive recurrent cost support of KPounds 10 million/year in constant 1986 terms and is sufficient to cover the existing research system and the incrimental Ramtu Commission pay increases. The figure of KPounds 10 million is expected to be sufficient to fully fund the current program and the incremental Ramtu Commission Civil Service Pay Increases. Given the decision to upgrade the KARI scheme of service to levels comparable to those of other semi-autonomous research institutes, it is expected that the recurrent cost burden will increase by an additional 12% (KPounds 1.2 million). This increase, however, may be largely offset by decisions to reduce the scope of research to areas of national importance in which the public sector has a comparative advantage. Future decisions regarding the appropriate level of recurrent cost funding are to be determined as a result of the planning and management component of this project in interaction with the Treasury. This represent a 33% increase above 1985 levels. However, when one acknowledges that government revenues are expected to increase by 3.8% per year, it is apparent that the primary source of revenues will have to come from transfers from parastatals and other lower priority activities, once the budget rationalization process has been implemented.

A further concern is the rapidly escalating recurrent costs associated with an enlarging extension service which is expected to increase by 59.1% in 1986/87 to KPounds 14.4 million (USD 18 million). This increase is almost entirely due to the increase in personnel from 2,353 to 8,257. It is our understanding that the extension program is be evaluated in mid-1987 with a view to establishing cost-savings while improving the dissemination of appropriate practices.

It is clear therefore, that in the near-term the Agricultural Research Program cannot reasonably expect to receive the neccessary recurrent cost support to implement the complete program proposed by MOALD. It is for this reason that external funding, including recurrent cost support is required. In the medium to long-term however, as the Ministry of Finance's Budget Rationalization Program is implemented and as KARI begins to rationalize its program and achieve economies in operation, it is expected that recurrent costs will not be an excessive burden.

D. Recurrent Cost Implication of the AID Financed Projects

The financial position of the GOK and the Budget Rationalization Program were given special consideration in the design of the AID financed project. Due to the historic funding shortfall, particularly in the areas of operation and maintenance, the proposed project fall within the MOALD proposed "National Agricultural Research Project". The decision to finance the planning and management component was based on the need to extend the budget rationalization process to field agencies. The decision to finance the maize program was based on the importance of maize within the national economy, while the decision to finance sorghum/millet was based on future benefits expected for sorghum as a substitute for wheat imports (blending) and the further development of an animal feed industry. With the exception of increased professional staff in the maize and sorghum/millet programs proposed by the MOALD, no additional costs are directly attributable to the AID Program. Rather the incremental costs (See Table 5) are those estimated to fully fund the existing programs at the national and regional research centres including vehicle, and station maintenance as well as office supplies.

The training costs attributed to the program are in addition to those included within the GOK Budget (NB. There is not a separate line item for training). As such training costs are considered fully as an incremental increase. However, it must be emphasized that the return to investment in undertrained KARI personnel is marginal. Therefore the actual incremental cost to the GOK in terms of salary and airfare is minimal. A research fund for contract research of KPound 100,000 ($125,000 per year) is included within the Task Force Report, but not the GOK Forward Budget. It is proposed that AID finance 40% of this amount during the life of project, while the GOK will finance 60%. The grant window of the Research Fund was not included within either the GOK Forward Budget or the Task Force Report. The purpose of this project activity however is to encourage university and private sector research in areas of national priority in which they have a comparative advantage. Due to the experimental nature of this concept within Kenya, AID has agreed to fully fund this activity for the life of the project. Should the program succeed, it will not only improve public-private linkages but also contribute to GOK cost-savings as monies are able to be reallocated to areas of greater return and/or national importance. Project Administration increases costs incrementally, however, this cost is entirely the attribution of office space and furniture.

The principal cost-saving activities are: (1) the development of the capacity within KARI central management to evaluate on-going research projects from a technical, economic, and financial perspective with

the ability to modify research design and implementation to assure maximum effectiveness and efficiency; (2) the rationalization of KARI research programs to assure that commodities/factors which have a high probability of return or are of national importance are fully funded; (3) research in which KARI does not have a comparative advantage or which is not of sufficiently high priority to warrant inclusion within the KARI program will be deleted or conducted via the contract or grant window of the research fund; (4) the integration of research within commodity/factor programs as a means of eliminating the current overlap in research programs; and (5) the consolidation of the research system which should reduce significantly both the station overhead and need to expand the research staff. A final potential cost-saving is the reduction of non-professional staff. As shown in the Supplementary Budget Table Annex, KARI headquarters is currently projected to have 206 persons including 40 untrained subordinate staff. It must be noted that this represents a significant reduction from the 295 currently employed at MOALD/SRD and KARI-Muguga. Similarly the maize and sorghum/millet programs currently employ 251 subordinate staff who are costing Government approximately $340,000/year. Given the findings, it is expected that as researchers become accustomed to doing their own field work and as analysis becomes easier with data processing equipment, KARI has the opportunity to increase its efficiency well beyond the 5% conservatively anticipated.

The project incremental cost-savings are presented in Table 6 of this analysis. Under the conservative model, it is assumed that there are no additional savings attributable to the project during the first three years of implementation beyond those associated with the initial reorganization. The model assumes modest incremental savings of the projected total budget of 0.5% per year beginning in 1990 and leveling off at 5% in 1999. The second model, which is the expected and should be perceived as the target figure estimates savings of 0.5% beginning in year 1. This model includes increments of 0.5% per year through year 10 when the AID financed project is fully developed. Additional increments of 1.0% per year are expected for the following five years to allow savings of 10% on the projected costs beginning in the year 2001.

The net effect of the incremental costs and benefits is presented in Table 7. This table shows that when conservative estimates are made with regard to KARI's ability to implement cost-saving measures the project will result in a net incremental cost increase of approximately $250,000/year to the GOK. If, however, cost-saving measures are implemented as expected, the project may be expected to result in a net cost-savings to the GOK of $740,000 per year.

E. Conclusion

In the design of the AID project, every effort was made to minimize the recurrent cost burden to the GOK. It is expected that the cost savings of the project due to prioritized research activities, effective monitoring of project activities, the use of the contract/grant research mechanism, the consolidation of research stations, and the integration of research within commodity/factor programs should exceed incremental costs. Due to the underfunding of the current research program's recurrent costs and the expected difficulty in allocating additional funds during the initial years of the project, funds have been budgeted from the AID account to permit the funding of operation and maintenance for central management and the maize and sorghum/millet programs. The proposed formula is that AID assumes 75% share of these costs in FY 1987. This share will decrease to 70% in FY 1988 and by 10% per year until the end of the project. It is believed that this plan of recurrent cost support will enable the project to achieve its stated objectives while allowing the GOK to increase the recurrent cost levels and/or implement cost-saving procedures. This plan is complemented by a Covenant which requires the GOK provide an annual minimum of KPounds (10 million) (1986) recurrent cost support to KARI by the year 1991/92. It has also been agreed that the recurrent cost support of AID financed projects is the highest priority use of counterpart funds generated by the PL480 and ESF Programs.

Financial Analysis

TABLE 1

SUMMARY OF CENTRAL GOVERNMENT FINANCE
(K Pound Million)

	Actual					Revised Budget
	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86
Revenue and Grants	739	831	895	982	1,101	1,277
Revenue	717	787	838	932	1,022	1,165
Foreign Grants	22	44	56	50	79	112
Expenditure and Net Lending	986	1,069	1,034	1,168	1,259	1,494
Recurrent Expenditure	699	752	808	857	957	1,105
Recurrent expenditure of ministies	690	691	627	647	743	851
Export Compensation	10	14	10	12	13	20
Consolidated Fund Service	60	137	171	198	201	229
(Interest payments)	(68)	(123)	(159)	174	(180)	(192)
(Pensions and other)	(12)	(14)	(21)	(25)	(21)	(37)
Development Expenditures and Net Lending	287	317	226	311	332	389
Overall Deficit (Treasury Accounts)	-246	-238	-139	-185	-188	-216
Adjustment to Financing Basis	-22	23	27	14	-44	-
Overall Cash Deficit	-268	-215	-122	-172	-232	-216
Financing	268	215	112	172	232	216
Foreign financing (net)	138	55	62	36	47	36
Gross Disbursements	175	112	136	124	158	167
Repayments	37	57	74	88	111	130
Domestic financing (net)	130	159	50	136	185	180
Memorandum items (as % of GDP)						
Revenue and grants	26.1	26.0	24.7	24.1	23.8	24.0
Revenue	25.3	24.6	23.2	22.9	22.1	21.9
Grants	0.8	1.4	1.5	1.2	1.7	2.1
Expenditure	34.8	33.4	28.4	28.6	27.9	28.0
Recurrent	24.7	23.5	22.3	21.6	20.7	20.7
Development	10.1	10.0	6.2	7.6	7.2	7.3
Cash Deficit	9.5	6.7	3.1	4.2	5.0	4.1
Nominal GDP	2820	3200	3620	4080	4620	5330

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TABLE 2
SUMMARY OF CENTRAL GOVERNMENT FINANCE
(Forward Budget Projection)

(K Pound Million)

	Printed Budget 1985/86	Forward Budget 1986/87	1987/88	1988/89
	(at Constant 1986 Prices)			
Revenue and Grants	1250	1265	1307	1354
Revenue	1138	1191	1245	1296
Grants	112	74	62	67
Expenditure	1469	1478	1519	1576
Recurrent expenditure (Ministries)	851	839	850	844
Development expenditure	389	399	424	440
Consolidated Fund Service	229	240	246	251
Deficit	219	213	212	212
Financing	219	213	212	212
External financing (net)	14	85	85	85
Domestic financing (net)	205	128	127	127
Memorandum Items:				
Real GDP (1985/86 Prices)	5335	5601	5700	6237
Real GDP Growth Rate (%)	4.3	5.0	5.4	5.7
Revenue and Grants/GDP (%)	24.0	22.6	22.1	21.9
Revenue/GDP (%)	21.9	21.3	21.1	20.8
Expenditure/GDP (%)	28.0	26.4	25.7	25.3
Deficit/GDP (%)	4.1	3.8	3.6	3.4

Source: Ministry of Finance

Financial Analysis

TABLE 3
MOALD BUDGET AS A SHARE of GOK TOTAL BUDGET
(1980/81 -- 1984/85)

Category	1980/81			1981/82			1982/83			1983/84			1984/85		
	Development	Recurrent	Total	Development	Recurrent	Total	Development	Recurrent	Total	Development	Recurrent	Total	Development	Recurrent	Total
A. Current K Pounds (000)															
1. GOK Total Budget	303,725.6	648,980.3	952,705.9	324,479.8	798,105.9	1,122,585.7	356,691.9	955,061.9	1,311,753.8	300,342.7	1,030,147.7	1,330,490.4	436,471.6	1,125,816.7	1,562,288.
2. MOALD Budget	43,295.5	43,704.8	87,000.3	44,927.8	38,006.0	82,933.8	52,356.3	42,399.5	94,755.8	37,122.8	47,956.2	85,079.0	52,372.7	92,121.9	144,494.
B. Constant 1980 K Pounds (000)															
1. GOK Total Budget	303,725.6	648,980.3	952,705.9	272,159.1	669,413.1	941,571.2	262,601.1	703,128.9	965,730.0	211,589.8	725,654.9	937,234.7	299,613.2	772,672.5	1,072,285.
2. MOALD Budget	43,295.5	43,704.8	87,000.3	37,685.3	31,873.1	69,558.4	38,545.3	31,215.0	69,760.3	26,150.3	33,781.7	59,932.0	35,950.9	63,226.5	99,177.
C. MOALD as a % of Total	14.25	6.73	9.13	13.85	4.76	7.39	14.68	4.44	7.22	12.36	4.66	6.39	12.00	8.18	9.2

Source: USAID/Kenya derived from GOK Forward Budgets

TABLE 6

AGRICULTURAL RESEARCH BUDGET AS A SHARE OF MOALD TOTAL BUDGET
(1980/81 -- 1984/85)

Category	1980/81			1981/82			1982/83			1983/84			1984/85		
	Development	Recurrent	Total	Development	Recurrent	Total	Development	Recurrent	Total	Development	Recurrent	Total	Development	Recurrent	Total
A. Current K Pounds (000)															
1. MOALD Budget	43,295.5	43,704.8	87,000.3	44,927.8	39,006.0	83,933.8	52,356.3	42,399.5	94,755.8	37,122.8	47,956.2	85,079.0	52,372.7	92,121.9	144.4
2. Agricultural Research Budget	1,673.2	5,436.1	7,109.3	2,085.9	4,417.4	6,493.3	1,612.7	4,759.2	6,370.9	2,297.6	7,340.9	9,638.5	2,678.7	7,556.2	10.1
B. Constant 1980 K Pounds (000)															
1. MOALD Budget	43,295.5	43,704.8	87,000.3	37,683.3	31,873.1	69,556.4	38,545.3	31,215.0	69,760.3	26,150.3	33,781.7	59,932.0	35,659.9	62,735.5	98.3
2. Agricultural Research Budget	1,673.2	5,436.1	7,109.3	1,732.8	3,703.1	5,435.9	1,187.3	3,503.1	4,690.4	1,618.5	5,171.1	6,789.6	1,838.8	5,185.5	6.5
C. MOALD as a % of Total	3.86	12.44	8.17	4.69	11.62	7.82	3.09	11.22	6.72	6.19	15.31	11.33	5.11	8.52	

Sources USAID/Kenya derived from GOK Forward Budgets

TABLE 5

CALCULATION OF INCREMENTAL COST TO GOK

(000 US$)

Year	Component 1					Component 2				
	Technical Assistance	Commodities	O & M	Local Personnel	Total	Technical Assistance	Commodities	O & M	Local Personnel	Total
1987	0.0	338.2	85.0	0.0	423.2	0.0	19.3	29.0	0.0	48.3
1988	0.0	20.0	136.8	0.0	156.8	0.0	0.0	74.0	94.3	168.3
1989	0.0	22.5	130.4	0.0	152.9	0.0	2.0	119.0	159.0	280.0
1990	0.0	20.0	123.0	0.0	143.0	0.0	0.0	150.0	185.4	335.4
1991	0.0	20.0	123.6	0.0	143.6	0.0	0.0	183.0	198.9	381.9
1992	0.0	26.1	117.2	0.0	143.3	0.0	5.0	216.0	205.7	426.7
1993	0.0	29.5	123.8	0.0	153.3	0.0	0.0	243.0	205.7	448.7
1994	0.0	305.1	140.4	0.0	445.5	0.0	10.5	240.0	205.7	456.2
1995	0.0	20.0	151.2	0.0	171.2	0.0	0.0	250.0	205.7	455.7
1996	0.0	20.0	157.0	0.0	177.0	0.0	0.0	254.0	205.7	459.7
1997	0.0	25.0	148.0	0.0	173.0	0.0	20.0	254.0	205.7	479.7
1998	0.0	25.0	148.0	0.0	173.0	0.0	20.0	254.0	205.7	479.7
1999	0.0	25.0	148.0	0.0	173.0	0.0	350.0	254.0	205.7	809.7
2000	0.0	25.0	148.0	0.0	173.0	0.0	20.0	254.0	205.7	479.7
2001	0.0	25.0	148.0	0.0	173.0	0.0	350.0	254.0	205.7	809.7
2002	0.0	25.0	148.0	0.0	173.0	0.0	20.0	254.0	205.7	479.7
2003	0.0	25.0	148.0	0.0	173.0	0.0	20.0	254.0	205.7	479.7
2004	0.0	25.0	148.0	0.0	173.0	0.0	20.0	254.0	205.7	479.7
2005	0.0	25.0	148.0	0.0	173.0	0.0	20.0	254.0	205.7	479.7
2006	0.0	25.0	148.0	0.0	173.0	0.0	20.0	254.0	205.7	479.7
2007	0.0	25.0	148.0	0.0	173.0	0.0	20.0	254.0	205.7	479.7

TABLE 5

CALCULATION OF INCREMENTAL COST TO GOK

(000 US$)

Year	Component 3	Component 4								
	Training	Technical Assistance	Commodities	O & M	Research Fund	Total	Admin.	Research Extension Linkages	Grand Total
1987	158.3	0.0	5.0	14.4	75.0	94.4	16.2	0.0	268.9
1988	224.3	0.0	0.0	27.3	75.0	102.3	24.0	6.3	356.9
1989	284.8	0.0	1.0	26.0	75.0	104.0	25.0	12.5	425.2
1990	303.8	0.0	0.0	28.7	75.0	103.7	24.0	25.0	456.9
1991	324.5	0.0	0.0	29.4	75.0	104.4	24.0	25.0	477.9
1992	325.3	0.0	1.6	30.1	75.0	106.7	25.4	37.5	495.4
1993	320.5	0.0	1.5	30.8	75.0	107.3	24.0	37.5	489.3
1994	229.3	0.0	3.0	31.5	75.0	109.5	25.0	50.0	413.8
1995	152.5	0.0	0.0	31.9	75.0	106.9	24.0	50.0	333.4
1996	65.3	0.0	0.0	28.0	75.0	103.0	12.0	62.5	242.8
1997	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	581.5
1998	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	581.5
1999	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	581.5
2000	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	581.5
2001	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	581.5
2002	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	581.5
2003	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	581.5
2004	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	581.5
2005	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	581.5
2006	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	581.5
2007	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	581.5

TABLE 5

CALCULATION OF INCREMENTAL COST TO GOK

(000 US$)

Year	Component 3	Component 4								
	Training	Technical Assistance	Commodities	O & M	Research Fund	Total	Admin.	Research Extension Linkages	Grand Total
1987	158.3	0.0	5.0	14.4	75.0	94.4	16.2	0.0	740.4
1988	224.3	0.0	0.0	27.3	75.0	102.3	24.0	6.3	681.9
1989	284.8	0.0	1.0	26.0	75.0	104.0	25.0	12.5	859.2
1990	303.8	0.0	0.0	28.7	75.0	103.7	24.0	25.0	934.9
1991	324.5	0.0	0.0	29.4	75.0	104.4	24.0	25.0	1,003.4
1992	325.3	0.0	1.6	30.1	75.0	106.7	25.4	37.5	1,064.9
1993	320.5	0.0	1.5	30.8	75.0	107.3	24.0	37.5	1,091.3
1994	229.3	0.0	3.0	31.5	75.0	109.5	25.0	50.0	1,315.5
1995	152.5	0.0	0.0	31.9	75.0	106.9	24.0	50.0	960.3
1996	85.3	0.0	0.0	28.0	75.0	103.0	12.0	62.5	899.5
1997	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,234.2
1998	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,234.2
1999	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,234.2
2000	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,564.2
2001	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,234.2
2002	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,564.2
2003	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,234.2
2004	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,234.2
2005	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,234.2
2006	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,234.2
2007	0.0	0.0	2.0	22.0	495.0	519.0	0.0	62.5	1,234.2

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TABLE 6

CALCULATION OF INCREMENTAL SAVINGS TO EGK

Year	Proposed Total Local Research Program Costs (1986 000 K Shs).	Proposed Total Local Research Program Costs (1986 000 $US)	Conservative Model		Expected Model	
			% Saved	Potential Savings (000 $US)	% Saved	Potential Savings (000 $US)
1987	242,611.0	15,163.2	0.0	0.0	0.5	75.8
1988	317,064.0	19,816.5	0.0	0.0	1.0	198.2
1989	348,479.0	21,779.9	0.0	0.0	1.5	326.7
1990	327,219.0	20,451.2	0.5	102.3	2.0	409.0
1991	308,196.0	19,262.3	1.0	192.6	2.5	481.6
1992	309,197.0	19,324.8	1.5	289.9	3.0	579.7
1993	310,595.0	19,412.1	2.0	388.2	3.5	679.4
1994	309,407.0	19,337.9	2.5	483.4	4.0	773.5
1995	314,562.0	19,660.1	3.0	589.8	4.5	884.7
1996	315,715.0	19,732.2	3.5	690.6	5.0	986.6
1997	316,000.0	19,750.0	4.0	790.0	6.0	1,185.0
1998	316,000.0	19,750.0	4.5	888.8	7.0	1,382.5
1999	316,000.0	19,750.0	5.0	987.5	8.0	1,580.0
2000	316,000.0	19,750.0	5.0	987.5	9.0	1,777.5
2001	316,000.0	19,750.0	5.0	987.5	10.0	1,975.0
2002	316,000.0	19,750.0	5.0	987.5	10.0	1,975.0
2003	316,000.0	19,750.0	5.0	987.5	10.0	1,975.0
2004	316,000.0	19,750.0	5.0	987.5	10.0	1,975.0
2005	316,000.0	19,750.0	5.0	987.5	10.0	1,975.0
2006	316,000.0	19,750.0	5.0	987.5	10.0	1,975.0
2007	316,000.0	19,750.0	5.0	987.5	10.0	1,975.0

Financial Analysis

TABLE 7

CALCULATION OF NET SAVINGS/COSTS TO GOK

Year	Conservative Model			Conservative Model		
	Incremental Costs to GOK	Incremental Savings to GOK	Net Savings/Costs to GOK	Incremental Costs to GOK	Incremental Savings to GOK	Net Savings/Costs to GOK
1987	740.4	0.0	(740.4)	740.4	75.8	(664.6)
1988	681.9	0.0	(681.9)	681.9	198.2	(483.8)
1989	859.2	0.0	(859.2)	859.2	326.7	(532.5)
1990	934.9	102.3	(832.7)	934.9	409.0	(525.9)
1991	1,003.4	192.6	(810.8)	1,003.4	481.6	(521.9)
1992	1,064.9	289.9	(775.0)	1,064.9	579.7	(485.1)
1993	1,091.3	388.2	(703.1)	1,091.3	679.4	(411.9)
1994	1,315.5	483.4	(832.0)	1,315.5	773.5	(542.0)
1995	960.3	589.8	(370.5)	960.3	884.7	(75.6)
1996	899.5	690.6	(208.9)	899.5	986.6	87.1
1997	1,234.2	790.0	(444.2)	1,234.2	1,185.0	(49.2)
1998	1,234.2	888.8	(345.4)	1,234.2	1,382.5	148.3
1999	1,564.2	987.5	(576.7)	1,564.2	1,580.0	15.8
2000	1,234.2	987.5	(246.7)	1,234.2	1,777.5	543.3
2001	1,564.2	987.5	(576.7)	1,564.2	1,975.0	410.8
2002	1,234.2	987.5	(246.7)	1,234.2	1,975.0	740.8
2003	1,234.2	987.5	(246.7)	1,234.2	1,975.0	740.8
2004	1,234.2	987.5	(246.7)	1,234.2	1,975.0	740.8
2005	1,234.2	987.5	(246.7)	1,234.2	1,975.0	740.8
2006	1,234.2	987.5	(246.7)	1,234.2	1,975.0	740.8
2007	1,234.2	987.5	(246.7)	1,234.2	1,975.0	740.8
Cumulative	23,787.6	13,303.1	(10,484.4)	23,787.6	25,145.3	1,357.7

Annex G.4 Agricultural Policy Environment

A. The Role of Agriculture and Research - Extension in GOK Policy and Programs

1. GOK Development Strategy

The most recent statement of GOK Policy is found in Sessional Paper No. 1 of 1986, Economic Management for Renewed Growth. This paper, which presents the GOK's Strategy for Economic Growth to the year 2000, indentifies the means of the GOK strategy for renewed growth to be:

a.) job creation sufficient to absorb the labor force of 14 million in the year 2000;

b.) increased productivity in agriculture to feed the nation, increase rural incomes, and provide export earnings;

c.) expand of rural non-farm activities;

d.) the encouragement of a dynamic informal sector that creates employment and provides goods and services to the population at all income levels; and

e.) a restructured industry capable of employing more workers at levels of higher productivity and developing export markets for Kenya's manufactures.

The strategy states that that Kenya's farmers "must continue to lead the country in economic development for the rest of the century."

The goals for the agricultural sector are to:

a.) provide food security for a population of 35 million in the year 2000;

b.) generate farm family incomes that grow by at least 5% a year for the next 15 years;

c.) absorb farm labor at the rate of over 3% per year while increasing labor productivity;

d.) supply export crops sufficient for a 150% increase in agricultural export earnings by 2000; and

e.) stimulate the growth of productive off-farm (agricultural) activity in rural areas to expand off-farm employment by 3.5 - 5.0% per year.

The strategy notes that there are few effective policy tools to stimulate rural non-farm economic activity other than to ensure a prosperous agricultural sector. In order to achieve the goals the paper notes there must be an improved market structure for inputs, especially fertilizer. As output increases, the localized processing and marketing of agricultural commodities will have to expand.

2. GOK Agricultural Development Strategy

On page 62 of the Sessional Paper, the GOK presents its strategy for agricultural development . It notes that three change factors must operate within a constraint of limited high potential land, because no easy means to exist to bring significant amounts of new land into productive use. These factors are as follows:

First, within existing crop patterns, farmers will be encouraged to adopt more productive practices, especially the wider use of improved varieties, fertilizer, and disease and pest control. Pricing policies, marketing policies and institutions, and the extension service will be the main instruments in obtaining much higher yields through known techniques. Second, research into new varieties, especially of maize and other grains, will be reorganized and accelerated to generate the new, high-yielding varieties that will be essential to keep pace with consumption. Third, to a limited extent the production pattern will be diversified in favor of crops such as tea, coffee, and vegetables that produce much higher incomes and generate considerably more employment per hectare than other crops and livestock activities. Small shifts in land use can yield relatively large gains in income, employment and export revenue when these crops are involved.

3. GOK Agricultural Research Policy

The GOK assessment is that the country can remain self-sufficient in food commodities through improved husbandry and increased inputs. However, by the mid-1990s, it will be essential to have developed a new generation of high-yielding varieties of maize and other food crops. The GOK believes that "for this to happen, a major effort in agricultural and livestock research must get underway immediately"

The specifics of the government's research policy are as follows:

First and foremost, research must be concentrated on those crops and those kinds of farms on which the strategy depends most heavily. The first priority is maize and especially maize grown by smallholders.

Although maize accounts for 23% of the total farmland and 13% or the value of marketed output, it only receives 8% of the research funding. This share will be increased. Another high priority is dairy production, which must more than double on existing land in order to maintain self-sufficiency to the end of of the century.

Research needs for these products plus wheat, horticultural crops and beef production must be fully funded before other research programs are pursued. To maintain Kenya's healthy competitive position in world tea and coffee markets, continuing research on these crops will have a priority equal to that on maize and dairy production. However, coffee and tea research are conducted by the independent Coffee and Tea Research Foundations and will continue to be funded by cesses on producers.

Research suffers from a number of structural problems that will be corrected as a matter of urgency:

(a) It will be necessary to raise total funding for research from Pounds 6.9 million in the 1984/5 recurrent estimates to Pounds 10 million. This estimate allow for 1985/6 recruitment, but for no more hiring beyond that, and for non-salary expenditures of 45% of the total; all based on 1984/5 prices.

(b) Increased support from the beneficiaries of research, especially growers or wheat and maize, will be employed to help fund this increased outlay. Charges may take the form of a levy on improved seeds or on produce sold to the NCPB.

(c) Research suffers from excessive salary costs relative to complementary expenditures. Generally, staff costs should not exceed 60% of the total expenditures to permit researchers to do effective work. In Kenya today staff costs range from 60% to over 80% and if hiring trends continue, they will soon claim virtually all available expenditure. Consequently, Government will base its hiring policy on the need for additional personnel to carry out well-defined research and on the resources available to support productive research work.

(d) Research efforts are spread over too many stations and projects. These will be concentrated on the activities of highest priority. The existing network of research stations will be rationalized.

(e) More research effort will be devoted to problems of smallholders, especially to issues of labor productivity and farmer risk.

(f) A program of training and upgrading research staff will be undertaken and the terms of service modified to promote the best researchers and retain them in Government service.

(g) Private research efforts will be encouraged by a combination of private and Government.

4. Extension Service

The GOK perceives the extension service as a critical means, along with pricing and input market development, to achieving increased agricultural productivity in the near-term. The GOK intends to promote both the Extension and Agricultural Services Division of the MOALD and the private sector extension activities, e.g. Agro-chemicals, seed companies, specialized processors of agricultural products.

Concerning public sector extension, the GOK intends to evaluate the IBRD financed T & V System and develop an appropriate follow-up version which will be absorbed into the regular activities and budget of the MOALD, and to be funded "with the highest of priorities". Funding the T & V system and other improvements in extension will require a reorientation of budgeting expenditures. It is estimated that to absorb the 1985/86 recruits into the service (no further expansion of staff) and bring non-salary expenditures up to 30% total outlays will require a 142% increase in recurrent expenditures over the 1984/85 estimates to KPound 11.1 million in 1984/85 prices.

B. Agricultural Policies which Complement and are Critical to a Strong National Agricultural Research

1. Budget Rationalization

A problem facing public investment in agriculture is the relative weakness in the budgeting process. The stated policy of the GOK is one of economic growth in which public investments are made in those areas of highest probable return. Unfortunately, this sound policy is modified by political realities, previous long-term capital intensive investments, and the proliferation of donor activities which often overlap, work at cross purposes, fit donor rather than GOK priorities and significantly increase recurrent costs with little chance of increased savings as a result of improved management.

A review of past budgets shows that agriculture has declined slightly in terms of the development estimates from 14.25% of the total in 1980/81 to 12.00% in 1984//85, while the recurrent estimate dropped from 6.7% in 1980/81 to 4.4%in 1982/83, but has rebounded to 8.2% in 1984/85.

In constant 1980 Kenya Pounds, it is found that the Ministry of Agriculture's total budget increased by 13.6% from KPounds 87 million in 1980/81 to KPounds 99.2 million in 1984/85. This trend indicates that while agriculture is not receiving the share of funds it deserves as the leading economic sector, it has received a relatively greater share in the mid 1980s than during the earlier part of the decade.

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When Agricultural Research is examined as a share of the MOALD's budget, one finds the same trends. In 1980/81 the agricultural research budget was KPounds 7.1 million or 8.2% of the Ministry's budget. The budget then fell to KPounds 4.7 million (1980) in 1982/83 before improving to KPounds 7.0 million in 1984/85 which was 7.04% the budget.

In 1984/85 the budget in current pounds was 2.68 million for development and 7.5 million for recurrent. It is USAID/Kenya's assessment that the historically apparent underfunding of agricultural research should not be interpreted as a lack of commitment by the GOK. Rather, it has been recognized by both the GOK and the Donor Community, that incremental investments in agricultural research were unlikely to yield significant returns until such time as the organizational structure and management process had been strengthened. We therefore believe that given the reorganization of the research structure and the improved management system to be developed with AID assistance, the expected returns to agricultural research will increase overtime which should assure KARI of appropriate and adequate funding levels. Indeed, Sessional Paper Number 1 directly states the GOK intention to increase budget allocations to agriculture and agricultural research in particular.

2. Agricultural Inputs Marketing.

Agricultural inputs may be broken down into; mechanical inputs, seeds, agro-chemicals including fertilizer, and labor. USAID/Kenya has found that the markets for all with the exception of fertilizer are relatively free and do not pose a constraint to project success. While the seed market is dominated by the mixed capital Kenya Seed Company, there is ample room for the private sector to participate in the market at acceptable margins. Within the coarse grain component of the project efforts will be made to incorporate trials of international companies to determine the viability within the Kenyan environment. Similar conditions apply to the pesticide market which is somewhat limited by; 1) the relatively cheaper substitute of labor, and 2) the scarcity of foreign exchange. There is free movement a labor, which is only limited by socio-cultural factors.

Concerning fertilizer, which was historically monopolized by the Kenya Farmers' Association (KFA), recent years have shown significant progress in the areas of liberalization, market development and extension. Among these reforms are an allocation process, open to any firm, based on ability to pay via a bank guarantee, past performance, and expanded geographical coverage. In addition to this measure, the GOK with donor assistance has developed import planning procedures, increased importation, and began to bag and sell fertilizer in 10 and 25 kg units which are more appropriate to the smallholder.

3. Agricultural Credit

Closely related to agricultural inputs is the area of credit. The Fifth Development Plan identified agricultural finance as one of the major areas requiring policy and institutional reforms during the 1984-88 period. This concern is explained in part due to the amount of public money that has been pumped into agricultural credit in recent years and the persistent problem of arrears (40% of New Seasonal Credit remains unrepaid).

Credit markets in Kenya are relatively well developed and provide ample opportunities for the promotion of development. The role currently played by private banks and financial institutions needs to be expanded, particularly in the agricultural smallholder sector.

While the numbers of farmers utilizing agricultural credit has increased substantially, the capacity of financial institutions to train farmers in proper utilization, evaluate, service, and supervise loans, and to provide credit in a timely fashion has not. The multiplicity of existing funding sources and lending criteria for public sector credit has led to duplication and inefficiency on the part of lenders and borrowers alike. This has led many borrowers to accept credit for inappropriate purposes, obtain credit from more than one source for the same purpose and play one source of credit against another as they have borrowed beyond their repayment capacity.

It is the GOK's objective to make the agricultural credit system more efficient by: (1) increasing availability; (2) promoting credit supply to smallholders; and (3) improving the financial discipline of public sector credit schemes.

It is the intent of the IBRD's Agricultural Sector Adjustment Agreement to assist the GOK Agricultural Finance Corporation with the rationalization of its loan portfolio. In this process, AFC will determine its optimum target population and lending levels to individual customers and review its administration of development and seasonal credit. This program in coordination with the IBRD financed national extension project will assure that smallholders receive appropriate credit information. Finally, the GOK will encourage donors to increasingly channel funds to commercial banks at concessional rates of interest for lending to the agricultural sector, especially smallholders.

4. Agricultural Output Marketing

Currently, it is estimated that more than 50% of maize and 90% of sorghum/millet produced is consumed on-farm. Of the marketed output, NCPB has an average (1981-85) market share of nearly 50% for maize and 8% for sorghum/millet. It is evident that for this project to achieve its goal of increased productivity, there must be price incentives for increased production and a market structure capable of the re-distribution process.

Output marketing may be divided into pricing policy and market structure policy. With regard to pricing policy, the GOK establishes gazetted prices for the food commodities of maize, beans, wheat, meat, and dairy products. For maize and wheat, this price is calculated as the expected mean of the import and export parity prices which is reviewed annually except when there is exceptional movement in terms of commercial imports or rates of foreign exchange. While the method of determining the gazetted price results in a price less than import parity to the farmer, and the policy of a single national price results in micro distortions, the trend during the 1980s has been one of increasing real prices. Assuming a continuation of this trend, we do not anticipate price disincentives to increased maize productivity made possible by the AID financed project. The pricing policy for horticultural products, oilseeds, and roots and tubers is based on market principles which should encourage the rational allocation of resources.

The area of market structure policy is more complex. Historically, Kenya has a market structure which has been dominated by parastatal marketing boards and cooperatives. This trend is in large part due to the legacy of the colonial economy which was based on providing inputs and serving as a market outlet for a relatively limited number of large farmers. In the 23 years since independence, however, the GOK has felt obligated to attempt to extend these same services to the general agricultural sector. Unfortunately, the result has been less than successful.

The official marketing agencies have a continuing record of late payments (often 18 months after receipt of the commodity), as well as a fundamental failure to assure the small farmer of a market for his produce. The implications of this policy have been reinforced by close enforcement of regulations limiting the inter-district movement of grain. These factors are believed to have resulted in strong disincentives to production by small-holders above subsistence requirements.

The policy in this area has begun to change, however, in part due to the IBRD Structural Adjustment Program as well as AID's ESF and PL 480 Programs. The Sessional Paper on National Food Policy (1981) laid the foundation by assigning NCPB the role of a buyer and seller of last resort. This paper was followed by the GOK-commissioned Booker Study to develop a strategy for the transition of the cereals economy. Many of the management reforms recommended by the Booker Study have been implemented and the GOK has requested further assistance from the EEC and IBRD in this regard. The GOK also began to permit the right of first refusal by private sector millers under the FY 1985 PL 480 Title I Program and intends to expand this effort in FY 1986. Most significantly, in March 1986, the GOK announced that effective immediately the legally monopsonistic position of NCPB was broken with respect to domestic grains enabling producers to sell to the 13 private millers.

C. USAID/Kenya Assessment

It is USAID/Kenya's assessment that the GOK agricultural development strategy and policy guidelines represent a rational and viable course for long-term development. In particular the overall strategy for agricultural research which includes: the reorganization of the research structure, the prioritization of research activities, the focus on small-holder constraints, and a commitment to increase recurrent cost financing to K Pounds 10 million per year must be implemented for the national research program to be revitalized and are consistent with the concerns of the research community. To assure that these policy statements are realized AID has included as a CP to initial disbursement that the reorganization of the agricultural research structure per the recommendations of the GOK/donor Pre-Appraisal Mission. The AID-financed project will also directly assist KARI develop the management systems necessary to prioritize the national program both across commodities/factors and within the maize, sorghum/millet and other commodity programs. The project will provide commodities and short-term technical assistance as necessary to reinforce the CIMMYT farming system research and IBRD adaptive research programs.

The project addressed the commitment on recurrent cost financing by the covenant which assures that a minimum of K Pounds 10 million, including available PL 480 Counterpart Funds will be committed to the National Agricultural Research Program for the first three years of the program with the provision that thereafter the basis for future recurrent cost support will be determined by the analyses of expected returns to investment. It is USAID/Kenya's assessment that this procedure is consistent with the GOK objective of budget rationalization and will serve as an incentive for improved planning and management systems within KARI. USAID/Kenya is not requiring that incremental savings attributed to the project be returned to research due to the fact that savings to the system should be re-allocated to investment of greatest probable return.

As discussed in the previous section, there have been historic problems in terms of agricultural input (including credit) availabilities and output market structure. While these policies have served as a disincentive to productivity increases, in the past, we are confident that the recent policy reforms reflect the commitment to increased agricultural productivity expressed in the the Sessional Papers of 1981 and 1986. USAID/Kenya will continue to work within the multi-donor forum as well as through the ESF and PL 480 programs to encourage policies which will not limit the potential project environment. In addition to these efforts USAID/Kenya proposes to use the covenant mechanism to assure that the GOK will continue the liberal market structure for sorghum/millet and assure the development of private sector markets for wheat blending and animal feed industries as stated in Sessional Paper No. 1 of 1986.

Annex: G.5 Institutional Analysis

A. Background

As discussed in the Technical Analysis of the Planning and Management Component (See Annex: E.1(a)), Kenya has been engaged in agricultural research for more than sixty (60) years. However, it was noted as early as 1968 in the Rodenhiser Report that Kenya did not have an agricultural research institutional capacity to meet the current and projected needs of Kenya's agricultural industry. In the eighteen (18) years since the "Rodenhiser Report", the GOK has initiated improvement, but as the GOK Task Force Report recognizes the underlying impediments in terms of structure and process had not been significantly altered until the recent decision to reorganize to Kenyan agricultural research.

The Ministry of Agriculture and Livestock Development has stated its intent in the "National Agriculture Research Project Proposal" or Task Force Report (April 1986) to re-organize its research arm within the the semi-autonomous agency framework provided for in the Science and Technology (Amendment) Act of 1979. This entity will integrate the existing facilities at KARI - Muguga with those of the Ministry's Research Divisions under a single management structure that will be responsible and advisory to the Permanent Secretary on research matters and through him, to the Minister and ultimately to the Government. Considering that research services consume a significant portion of the Ministry's financial and human resources (8.3%), the management of these resources is a tremendous responsibility in terms of research planning and execution as well as the accountability for public funds. This task can only be fulfilled if there is established a strong management and administrative base in which all parties have confidence.

In order to assess the redefined GOK institutional capacity, USAID first contracted with a local management firm for an assessment of strengths and weaknesses within the existing and proposed system. USAID then presented the recommendations to the GOK and Donor community within the IBRD Pre-Appraisal Mission. While some modifications were made to account for GOK concerns, it is USAID's assessment that the proposed organizational structure and processes enable the GOK to KARI to improve the efficiency and effectiveness of agricultural research. The following sections present a summary of the assessment of the current situation, the Donor-GOK recommendations of the Pre-Appraisal Mission, and USAID/Kenya's assessment of those recommendations.

B. The Institutional Analysis Completed by Coopers and Lybrand (Unattached Annex H. 3)

In order to assess the GOK proposed reorganization, USAID contracted with the management firm of Coopers & Lybrand Associates to: 1) assess the institutional changes included within the ISNAR and GOK Proposals; 2) determine the organization and management implications of AID project; and 3) make recommendations for strengthening the agricultural research system. The approach taken by the contract team was to first analyze existing research system's strength and weakness followed by recommendations to facilitate the re-organization and implementation of efficient and effective research programs.

1. Existing Management Deficiencies

The institutional analysis found that the existing research system suffered from excessive decentralization of research programs which resulted in an inefficient/ineffective national system. In particular it was found that MOALD/SRD headquarters did not exercise effective direction, leadership, or control over the programs of research stations. Rather, its primary role was that of an administrative coordinator for the station's budgets, training needs, recruitment, funds release, etc.

The assessment found that as a result of the decentralized research structure, collaboration between stations was poor. Specifically, it was found that collaboration was frequently restricted to the provision of testing sites which remained under the control of the national station and received low priority with the regional station's programs.

Finally, it was found that station managers had an undue administrative burden which limits their ability to direct, lead, and coordinate the various research programs being implemented on their station.

2. Existing Manpower Deficiencies

The general finding was that while research stations had virtual control of the design and implementation of research programs, they had limited control over their manpower resources. Specifically station directors did not have a knowledge of the number and type of established positions at their stations. Similarly recruitment or selection of staff is determined by central government without consideration of the specific manpower requirements of effective implementation.

In addition to the lack of control over manpower resources, the assessment found a number of substantive issues which constrained the effectiveness of agricultural research. In particular it was

found that : (1) there was a shortage of technical staff in support categories due to the insufficiency of established positions; (2) BScs require further training before they can become effective in a research capacity; (3) qualified researchers frequently leave to take up better remunerated or professionally satisfying positions in the private and parastatal sectors; and (4) recommendations for further training and promotion tend to be based on length of service rather than merit. The program to address human resource deficiencies is discussed within the Technical Analysis of the Human Resources Development Component.

3. Existing Planning and Budgeting Deficiencies

The assessment found that planning has been conducted exclusively at the research station level without consideration to planning on a national scale. It was further found that the design of research programs has been driven by existing programs and the interests of individual researchers (usually station managers) rather than national priorities or farm level constraints. The analysis also found that there was: (1) no mechanism to link the planning of agricultural research to the MOALD's sectoral plans; (2) no criteria in operation for allocating financial or human resources between stations or programs; (3) no system of program budgeting for research stations; and (4) rarely an evaluation of on-going research activities.

4. Existing Farming Systems Research Deficiencies

Farming Systems Research has not yet been extensively developed within Kenya and has tended to be viewed separately from the main stream of research as a "program" rather than as a method. As a result, there is limited capacity within the research system to conduct farmer-responsive research. In part, because of the 'newness' of the farming system approach, the research has tended to be mechanistic, socio-economic surveys, rather than a multi-disciplinary approach capable of responding to farm-level constraints.

5. Existing Research-Extension Deficiencies

The institutional analysis found it impossible to determine the effectiveness of the T & V Extension system within the time frame permitted. A formal evaluation is planned for 1987. The linkage between research and extension is being strengthened by the participation of research officers as trainers in the monthly workshop of subject specialists who in turn train the front-line extension workers. The analysis noted that the T & V approach has improved the effectiveness of the extension system. However, there are grounds for asking whether (1) the organization of the current program is within the organizational and resource capabilities of the MOALD; (2) the "top-down" bias of the current system adequately responds to farm household needs; and (3) there

exists bias in the selection of the contact farmer which impedes the spread of new technologies among all farmers. In sum, then it is our assessment that there are serious problems with the implementation of the current extension program. It is our understanding that these problems especially cost-effectiveness and greater responsiveness to farm-level constraints, are to be addressed in Phase II of the IBRD financed project.

In addition to the public sector linkages, the private sector agricultural input sector has an active extension function. To date there has been little linkage between these agents and the research system. Finally, the Provincial Agricultural Research and Extension Advisory Committee (PAREAC) represents a forum in which researchers, extension agents, agri-business and farmers have been able to meet to discuss research-extension priorities at the local levels.

6. Existing Public-Private Sector Research Deficiencies

As discussed above, the linkages within the public sector research program have been relatively ineffective due to excessive decentralization. It should not be surprising therefore that the linkages between the public and private sectors is virtually non-existant. The institutional linkages are the Commodity Specialist Committees, the Research Fund administered by the National Council of Science and Technology, (NCST) and occasional collaboration in speciality research, e.g. the Njoro Barley Program and Kenya Breweries. With regards to the Specialist Committees, it is found that these offer an excellent opportunity for the public and private sector to discuss production constraints, research priorities, and comparative advantage. Yet due to the Station Orientation of the existing system, such dialogue has been infrequent. The NCST administered research fund has met with universal dissatisfaction. Researchers complain about poor supervision, late payment, and the fact that the researcher is not compensated for his time. The MOALD/SRD likewise complains that money is given out, but that due to poor supervision and monitoring, the system has nothing to show for its investment. The limits of effective public-private linkages is therefore currently limited to areas of complementary research where the private sector has the means and incentive to be an active partner. It was found that the poor public-private linkages resulted in a significant waste of both the country's human and financial resources.

C. The Donor/GOK Pre-Appraisal Mission

In May-June 1986, representatives of AID, IBRD, CIDA, EEC, FAO, SIDA, ISNAR, the Swiss Cooperation, and GOK participated in a joint assessment of the GOK's proposed National Research Program. In

addition to the Institutional Analysis, this Mission also examined Finance, Manpower Development, Crops/Soil and Water, and Livestock/Veterinary (See Unattached Annex H. 4). The USAID financed Institutional Analysis served as a basis for the agreed upon institutional procedures below.

1. Research Organization

The multi-donor/GOK mission endorsed the proposal to consolidate the KARI (Muguga), the MOALD/SRD, and the Veterinary Research Division of the MOALD into the reorganized Kenya Agricultural Research Institute. (NB: While the AID financed assessment recommended that Veterinary Research not be included in part due to the lack of an adequate proposal, the GOK prefers inclusion in order to have linkage between animal production and animal health research.) The existing legislation which legally created and defined a unified agricultural research institute is adequate to carry out the proposed reorganization. KARI will be funded primarily by Government grants through the MOALD, KARI is also empowered to solicit and receive grants from outside donors.

The mission considers implementation of the proposed organization to be critical and that it should be initiated immediately and in place by September 1, 1986. The formal establishment including the naming of Directors and Board of Management is included as the CP for initial disbursement of the AID financed project.

The organizational structure proposed by the GOK's Task Force report has been modified as shown in Figure 1. There are a number of significant changes which are believed to improve the efficiency and effectiveness of the organization. First, the inclusion of Veterinary Research which had previously been excluded increases the scope of KARI and also the administrative units. Second, the Planning Unit has been upgraded to a major line office within the Planning, Finance, and Administration Division. A further modification is the incorporation of the regional research centers (adaptive research/research-extension linkages) within the main body of the Crops, Soils and Water Division as opposed to the previously loose affiliation. Finally, it was agreed that the number of committees should be minimized with direct lines of authority and responsibility. As a result the Finance and Administration Committee and the Research and Technical Committee which were previously above the Director have been deleted. While there undoubtedly will be modifications as the organizational reform is implemented, it is our assessment that the proposed organizational structure is consistent with efficient management and represents a marked improvement over the structure proposed by the Task Force which itself was significantly better than the existing organization.

While the organogram in Figure 1 presents the formal structure, it cannot present the nature of the processes which will enable the system to perform. This critical function is to be performed by 3 sets of committees which are intended to strengthen the linkages with extension, the University Community, and the private sector as well as promote efficient internal management of the public research system.

(a) Specialist Committees

Specialist committees would be established for major commodity and factor research programs at the national level (such as for soil and water research, maize research, veterinary research, etc.). These would be led by a program coordinator appointed by KARI. The specialist committees would include all researchers in Kenya working on the commodity or factor, including both KARI scientists and scientists working in other organizations (University, private sector, international centers, parastatals extension service, etc.). The specialist committees would develop a strategy for long-term research programs for the particular commodity or factor. They would meet periodically to review research results and recommend changes in direction or new strategy.

(b) KARI Program Review and Planning Committee

The commodity and factor program coordinators would also organize and lead annual program review and planning meetings consisting of all KARI researchers working on each commodity or factor. These meetings would chart annual commodity and factor programs to be undertaken by KARI's entire research establishment.

Figures 2 and 3 present the composition of the Maize and Sorghum/Millet Program Review and Planning Committees respectively.

(c) The Research Center (Station) Committee

A Center committee would be established at each research center for the purpose of reviewing ongoing center research programs and developing new research program proposals at the beginning of each year. These center committees would maintain close contact with the KARI commodity and factor groups, and the specialist committees so that center programs reflect the aggregate of relevant national commodity and factor research programs as well as the needs of the regions in which each center is located. Center committees would include several extension service staff, farmers, and representatives of local parastatal and private enterprises working in agriculture or agro-industry, in order to facilitate the input of such people and organizations into center research programing. This is particularly important for the RRC's which will research agricultural issues relevant to the region's

in which they are located, as well as part of the national commodity and factor research programs. In the RRC commodities meetings, strategies for the identification of production constraints at the farm level would be developed, followed by development of strategies for researching these problems. The RRC's would also work out priorities for adaptive research based on the ecological and socio-economic conditions of their respective mandated regions.

The way in which the above committees and organization would plan and supervise research is described below.

2. Research Program Formulation

The year 1986/87 will be a year of transition to a new system. The research program is largely defined for this first year already, and research is ongoing. The fiscal year begins July 1, 1986, and funds have already been budgetted through June 30, 1987. The agricultural research centers will receive these funds as has been the case in the past. However, KARI Headquarters would receive its funds for 1986/87 from a reallocation of the existing research budget.

Beginning in July 1986, preparation of KARI's Forward Budget will begin for the period 1987/88 onwards. This will be based on Forward Budget guidelines issued by Treasury, combined with the content of the Government's research program preparation report which sets out an agricultural research strategy.

1. During the period September to December, 1986, and February to June 1987, KARI will initiate meetings of individual research centers and the commodity and factor programming committees. Several specialist committee meetings might also be called to chart long-term research programs for critically important commodities or factors. The initial meetings foreseen during the above period would review ongoing research and develop detailed recommendations for changes in research programs at the station and national levels. This activity would be facilitated by the early development of model RRC, NRC, and commodity/factor research programs. To accomplish this, MOALD/KARI would, by October 1, 1986 complete detailed research programs for 1987/88 for maize (at the national level),and for the Kitale NRC, Katumani NRC, veterinary research, and Embu RRC. These would serve as models, for use by other stations and commodity groups, as well as by donors appraising the research program in October.

In January 1987, the process of preparation of the draft budget estimates for 1987/88 will be undertaken. Based on the circular from MOALD, KARI Management will prepare budget guidelines for each research center, and each commodity/factor program. These

will be forwarded to the Research Center Directors and Commodity Program Coordinators. Subsequently, Research Center Directors and Program Coordinators will meet with station staff and commodity/factor group members. Program groups will have to respond first, and submit their research programs and commodity/factor budgets to the relevant research centers. The Station Directors will consolidate these program proposals. Consolidated programs and budgets per station will then be submitted to KARI headquarters, by January 24, 1987. These budgets and programs will be consolidated with the headquarters budget and presented by KARI to MOALD.

KARI management would make the initial determination of station and commodity funding levels, on the basis of national prioritie results of previous year research, suggestions made by each RRC and NRC (both derived in part from station and commodity program annual reports) internal monitoring and evaluation reports, and both KARI Board and MOALD guidelines. This would be done in the third week of July in each year, in order to be consistent with Government's forward budget process.

This initial draft research program and budget, allocated by commodity and factor program and by station, would be submitted to KARI management for approval. Once approvals are obtained, KARI submits the national commodity, factor and station programs to the national commodity coordinators and Center Directors. Meetings of the senior scientists of the NRC's, the RRC's and the commodity/factor groups would take place to discuss these plans. These meetings would flesh out the details of the next year commodity and factor research programs. Each center will then prepare its own budget for all its activities including those proposed in the national commodity and factor programs. This should be completed by mid August in order to fit into the forward budget process. The national commodity programs and the programs for the national and regional centers must be then submitted to KARI for approval. These would, when consolidated, represent the national agricultural research program.

Repetition of this sequence over time is expected to improve research programing. Programs which are of high priority, consistent with national needs, and effective will tend to be retained and expanded. The initial years will be the most difficult since new procedures and practices must be created.

3. Supervision, Monitoring and Evaluation

Supervisory roles are explicit in the organization proposed for KARI. The Director will supervise the Deputy Directors. The Deputy Directors will supervise the Assistant Directors. The Assistant Directors will supervise the stations. This will

require frequent visits to the stations by management staff to evaluate work and to give guidance. The Planning Section of the Department of Planning, Finance and Administration will provide KARI management with systematically analyzed information to carry out their supervisory activities. The annual reports and other written work coming out of the stations will be a major source of information used by KARI management in supervising the stations. The National Commodity and Factor Program coordinators will also have a technical supervision function. Finally, each Center Director must supervise both the research of the center, and the staff undertaking the research. Supervisory techniques and procedures, as well as reporting formats should be developed immediately after the establishment of KARI.

4. Financial Management

It was agreed that the Office of Financial Management within the Department of Planning, Finance and Administration would assume responsibility for financial management across stations. It was further agreed that each financial entry would be coded by commodity/factor program, station, and funding source which would permit relevant analyses of commodity programs as well as individual station operations, while giving donors and the GOK the assurances of an audit trail.

5. Research-Extension Linkages

The Pre-Appraisal Mission recognized the high priority KARI will give to research-extension linkages. It was agreed that agricultural research should begin and end with the farmer. It was determined that given the adaptive research mandate of the Regional Research Centers that it was inappropriate and counter-productive to have a separate research-extension liaison office. The Mission recommended that liaison officers stationed at research centers should confine their activities to organizational aspects and work with the Provincial and District Extension Coordinators. The purpose of this finding was to minimize the dilution of the research message due to generalist intermediaries.

Other specific institutional/procedural recommendations are as follows:

a) Research center liaison officers would liaise with specialized researchers and arrange for their participation in workshops and other extension activities.

b) Researchers from RRCs should be appointed as members of the various provincial professional specialization groups (of the Extension Service) consisting of extension subject matter

specialists. These small groups of specialists would carry out joint visits to field experiments on NRCs and RRCs to on-farm trials and farmers' fields in general. They would prepare a detailed seasonal program for on-farm trials. The groups would be responsible for gathering and documenting data relating to farmers rate of adoption of new recommendations. They would also prepare recommendations for the RRC's advisory committees on the research program to be undertaken. A permanent joint working group would in effect also be a sub-committee of the PAREAC (Provincial Agricultural Research and Extension Advisory Committee).

c) The annual or seasonal PAREAC meetings chaired by the PDA should be jointly organized by the research liaison officers and the provincial extension coordinators. The combined output of the professional groups, in the form of a "status report" could provide a basis for the PAREAC agenda. The PAREAC would have the participation of farmers in addition to researchers and extension staff. It would decide on local priorities for extension and be a guiding factor in formulating the regional research program. It would also be a connecting link with the PAB and the Administration.

d) The joint research-extension diagnostic teams for on-farm research with farming systems perspective (OFR/FSP) should be expanded to cover all RRCs. The socio economic aspect of this activity should be expanded and a more in-depth study should be made. The joint on-farm research activity should be supervised from the office of the Assistant Director for RRC's by a senior officer.

e) As stated in the draft project document and endorsed by the group, the Agricultural Information Center should be used more intensively for the publication of extension handbooks and handouts after their joint preparation by relevant research and extension staff within the duties of the provincial professional specialization groups.

f) The group recommends increasing the number of technical courses conducted by research officers for extension subject matter specialists at research centers.

g) The group also recommends that a relevant senior extension subject matter specialist be a member of the commodity/factor specialist committee.

h) It is recommended that the monitoring and evaluation units of KARI and MOALD include their plans of work the implementation of the linkage between research and extension.

5. KARI Linkages with the University Community

The Mission shared the assessment that linkages between KARI and the University Community are unsatisfactory. Given the highly trained and qualified human resource base at the University of Nairobi, Moi University, Egerton College, etc., these scientists are to be encouraged to participate more actively in the national agricultural research effect. Specifically it was agreed that the University Community would be incorporated within the Specialist Committees to participate in the development of national (beyond KARI) commodity/factor strategies. It was also recognized that research activities, undertaken by the University Community at the request of KARI (Contract Research) should be funded by KARI. The AID financed project takes this one step further by establishing a Grant Mechanism to fund research initiated by the University Community or Private Sector which is consistent with national priorities.

6. KARI's Linkages with IARCs

The group noted that the international agricultural research institutions and regional projects and networks are making important impacts in strengthening Kenya's agricultural research system, both in generating technologies and training scientific manpower.

The efficiency of such collaboration is related to the capacity of the national research system to adapt to the local environment the technologies which evolve from these research organizations and to retain the scientists trained by them. The group is of the opinion that the proposed reorganization of the whole agricultural research system in providing a unique framework and clearly defined priority areas of research will enhance the effectiveness of these international and regional organizations in their assistance for the agricultural development of Kenya. Therefore, it endorses the role given to them in the draft project document. Nonetheless, the group proposes that the new KARI pays particular attention to the international organizations like ILRAD, ICIPE and ICRAF which are headquarters in Kenya and are addressing problems of particular concern for the country and the technologies developed can be applied locally and generally with little adaptation.

To achieve a better coordination of the involvement of these organizations in the future and to ensure that they address priority areas defined in the national program the group proposes that:

a) at the managerial level a senior advisor be appointed in the Director's office for international relations with the mandate to

ensure that these different organizations contribute to the execution of the national program and who will be the focal point for the coordination of the cooperation with the international scientific community,

b) they participate in the specialist committees, as appropriate. In the spirit of regional and technical cooperations among developing countries to which Kenya firmly adheres, the group proposes that the new KARI participates actively and takes leadership role in the regional research projects and networks which operate in the region.

7.. KARI's Linkage with Foundations and Private Sector Research:

Foundations:

Since both the commodity research foundations (Coffee Research Foundation and Tea Research Foundations) and KARI are working principally with the majority small holder farmers, there is need for these organizations to interact at farmer level to ensure efficient utilization of the resources available to the farmer. The group notes that such an interaction is presently lacking. It is therefore suggested that:-

a) the research officers participate in the on-farm research teams in the agro-ecological zones relevant to their commodities,

b) the research staff be invited to participate in the specialist committees dealing with factor/discipline research.

Private Sector:

Private sector research is in effect being paid for by the producers (partially for pyrethrum). At present the laboratories and some field stations of the national agricultural research system are being utilized by them. Professional linkage is lacking. The group notes increasing demand by the private sector in some research areas e.g. new barley and pyrethrum varieties, which KARI should undertake. It is therefore recommended that KARI should sit together with each private sector research unit, assess their research needs, and work out areas of strengthening research cooperation including the kind of linkage required.

8. Linkages with NGO Research:

Currently Non-Government Organizations (NGOs), such as Kenya Woodfuel Development Program, are not involved in much basic research. They mainly undertake demonstrations and multiplication of germplasm on MOALD research stations, Farmers Training Centers and in farmers' fields. Some of the NGOs are experimenting in

these testing sites on different extension methodologies, on plant configurations, spacing and biomass in the farming systems. The group notes the importance of this activity and recommends that, to ensure a more efficient resource utilization at farm level, KARI should be involved in more basic research in the development of appropriate woodfuel to generate adaptable recommendations. Since technology being tested will be applied on farms commonly approached by MOALD and NGOs, it is further recommended that the relevant NGO officers should closely work with the KARI researchers on agro-forestry, other relevant subjects and farming systems, to enable NGOs to transfer appropriate technology with a whole farm approach to the target farmers.

D. USAID/Kenya Assessment

USAID/Kenya is confident that the institutional measures adopted by the joint Donor-GOK Pre-Appraisal Mission provide KARI with a viable structure which will assure the potential of an effective and efficient national research system. The implementation of the reforms discussed above will require a significant amount of input from both the GOK and the Donor Community. USAID/Kenya input will consist of the following project components:

Component 1: Planning and Management - USAID will provide the necessary technical assistance to enable KARI to design, test, and implement the necessary managerial systems, i.e. programming, planning, and evaluation; financial management; manpower development/personnel, commodity procurement audit; station maintenance; library/information systems, etc. The initial design assistance will be followed by on-the-job training and consultation to assure proper implementation and the possibility of cost-saving modifications. This component will also address the research-extension linkages/adaptive research program to assure that there is a thorough understanding of farmer experienced constraints to be addressed in the research program; appropriate and effective research is conducted to overcome these constraints; and that extension messages will be targetted to accommodate the diversity in farming practices within a region. Each of these activities will be supported with commodities and a decreasing amount of recurrent costs support over the life of the project.

Component 2: Maize and Sorghum/Millet Commodity Program - USAID will provide managerial as well as technical assistance to assure that the procedures discussed above are implemented in an effective manner for these commodity programs. It is the intent of this project that maize program management and coordination be an example for other commodities to follow. There may be a tendency for researchers to perceive, however, that the maize programs success or failure is due to its size rather than management principles. Therefore the sorghum/millet program, which is a small fraction of the maize

program, must be implemented with the same level of effort on planning and management. The geographic location of the technical assistance team members is designed to assure that farmer-oriented adaptive research is conducted as an objective of the commodity programs and that complementarities between the two coarse grain programs are maximized.

Component 3: Human Resource Development - This component is designed to assure a stream of returnees who have gained technical and managerial experience which will permit them to conduct more effective research. This component is directly related to manpower development and personnel in Component 1 which will be responsible for developing position descriptions, matching positions and personnel, targetting training needs and qualified candidates, etc.

Component 4: Agricultural Research Fund - This component addresses the institutionalization of linkages between the public and private sector. In addition to the Contract and Grant Windows of the Research Fund itself, this component will assist the monitoring and evaluation unit to follow the research conducted by the private sector and University Community. It will also work with financial management to design the accounting systems necessary for successful implementation and assure that these become incorporated within the KARI system.

The ultimate success of this program rests with the commitment of KARI personnel. It is our assessment that given the sweeping nature of the reforms proposed by KARI, and the relative speed with which reorganization is occurring, there is a high probability that the re-organization will be implemented in a reasonably effective fashion and that the institution will be capable of administering commodity/factor research. This finding, however should be re-examined as an element of the evaluation process in order to determine necessary modifications in design and implementation.

FIGURE 1: ORGANOGRAM OF RESTRUCTED KARI

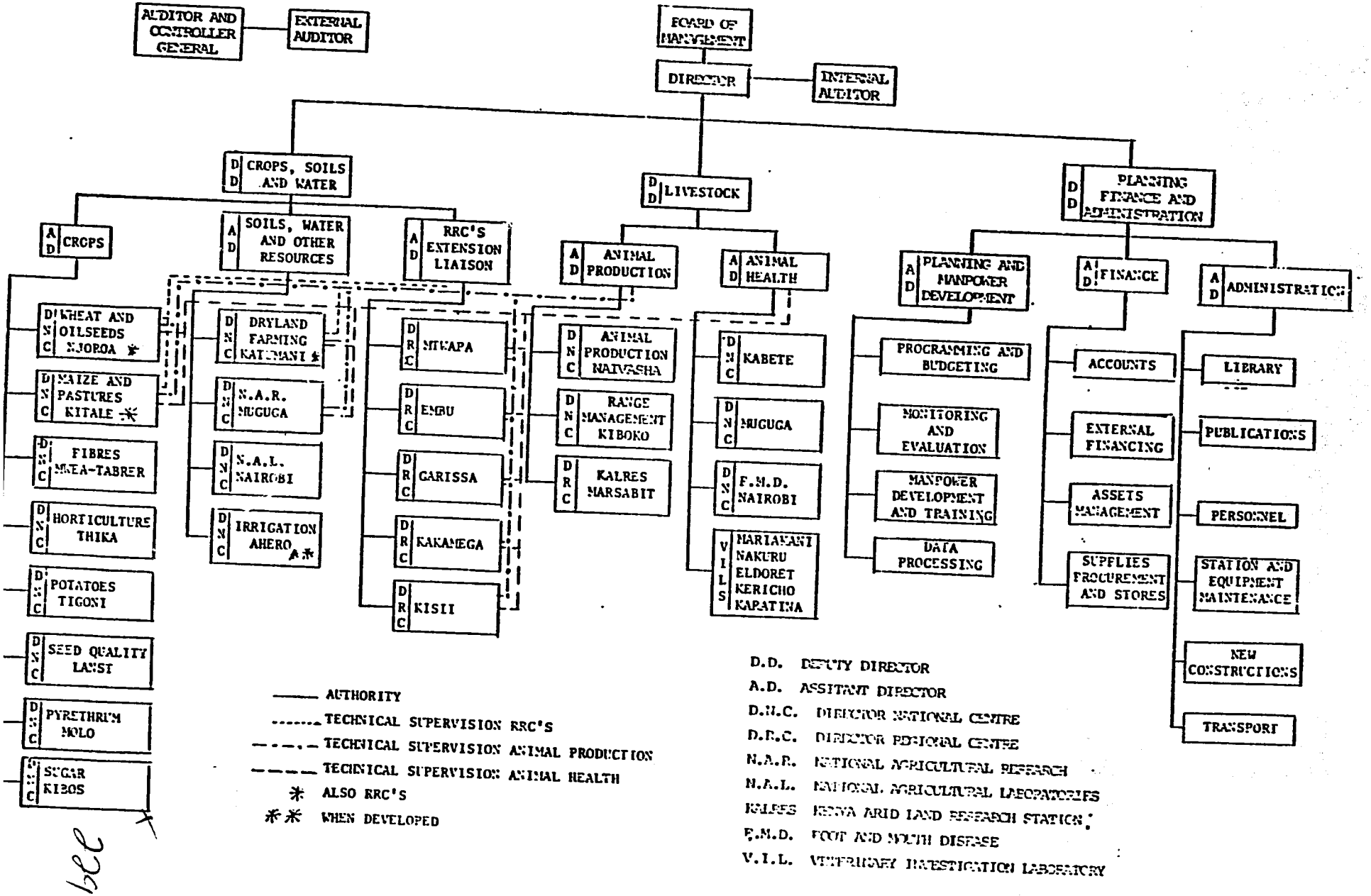

FIGURE 2: COMPOSITION OF MAIZE PROGRAMMING COMMITTEE

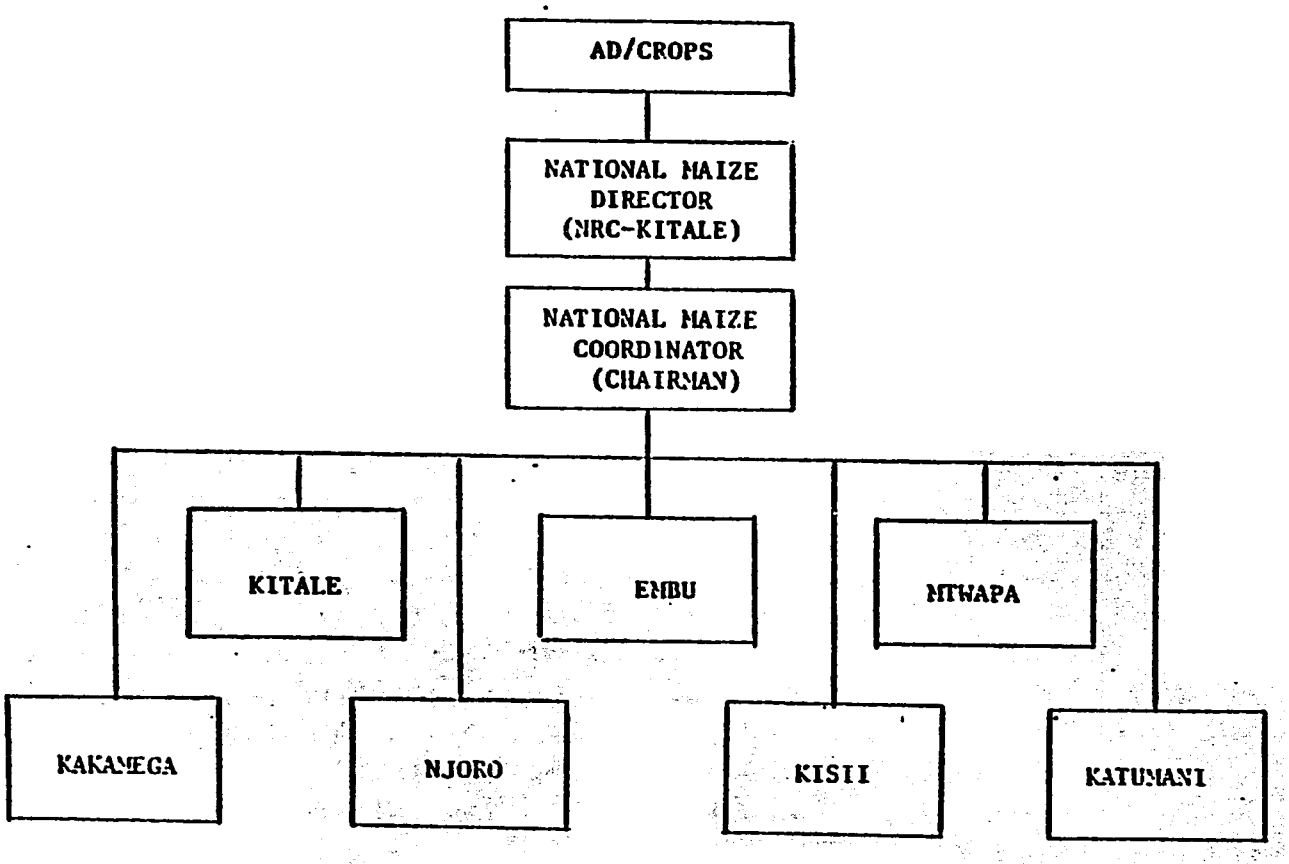

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Figure 3: Composition of Sorghum/Millet Programming Committee

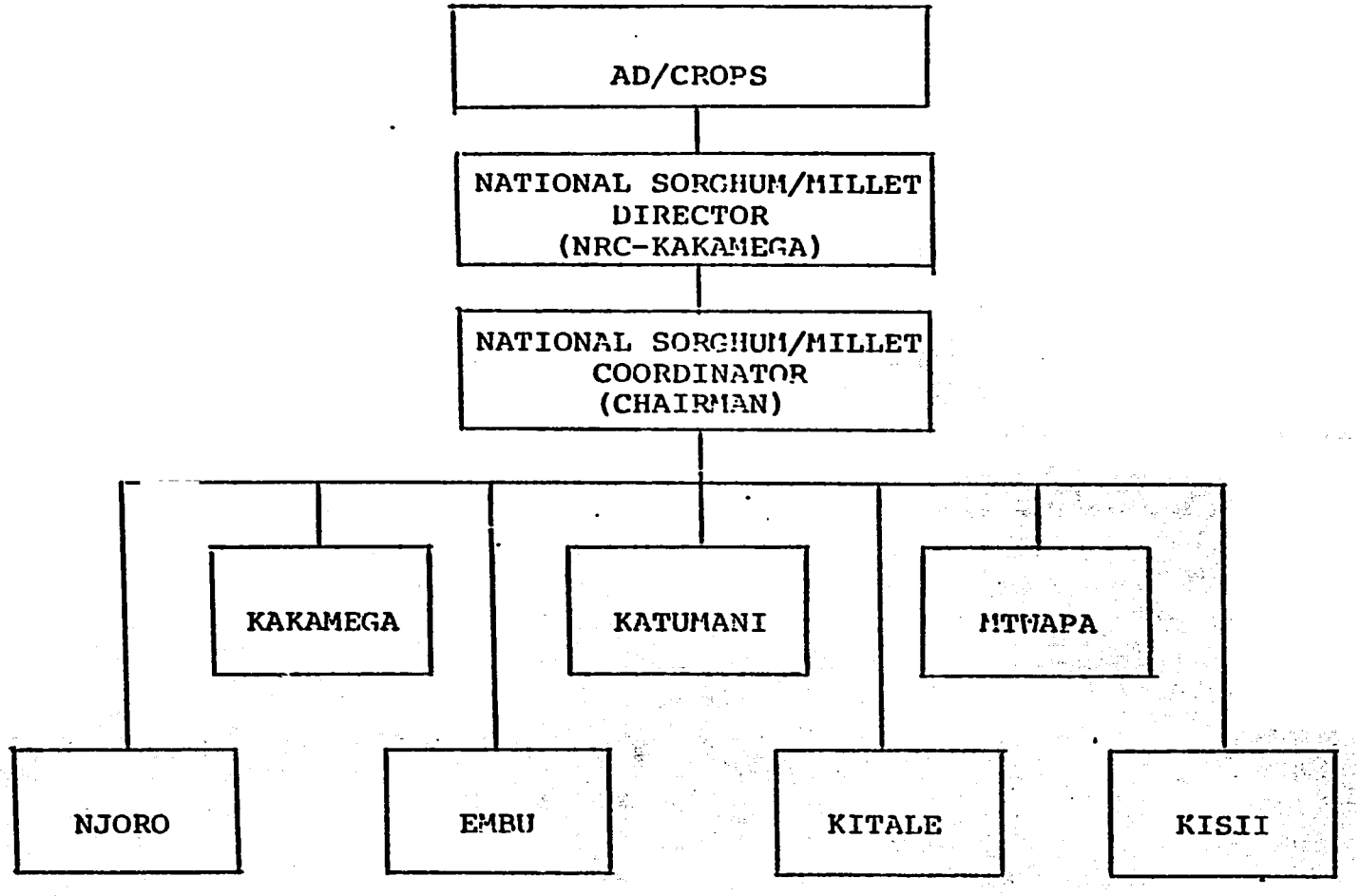
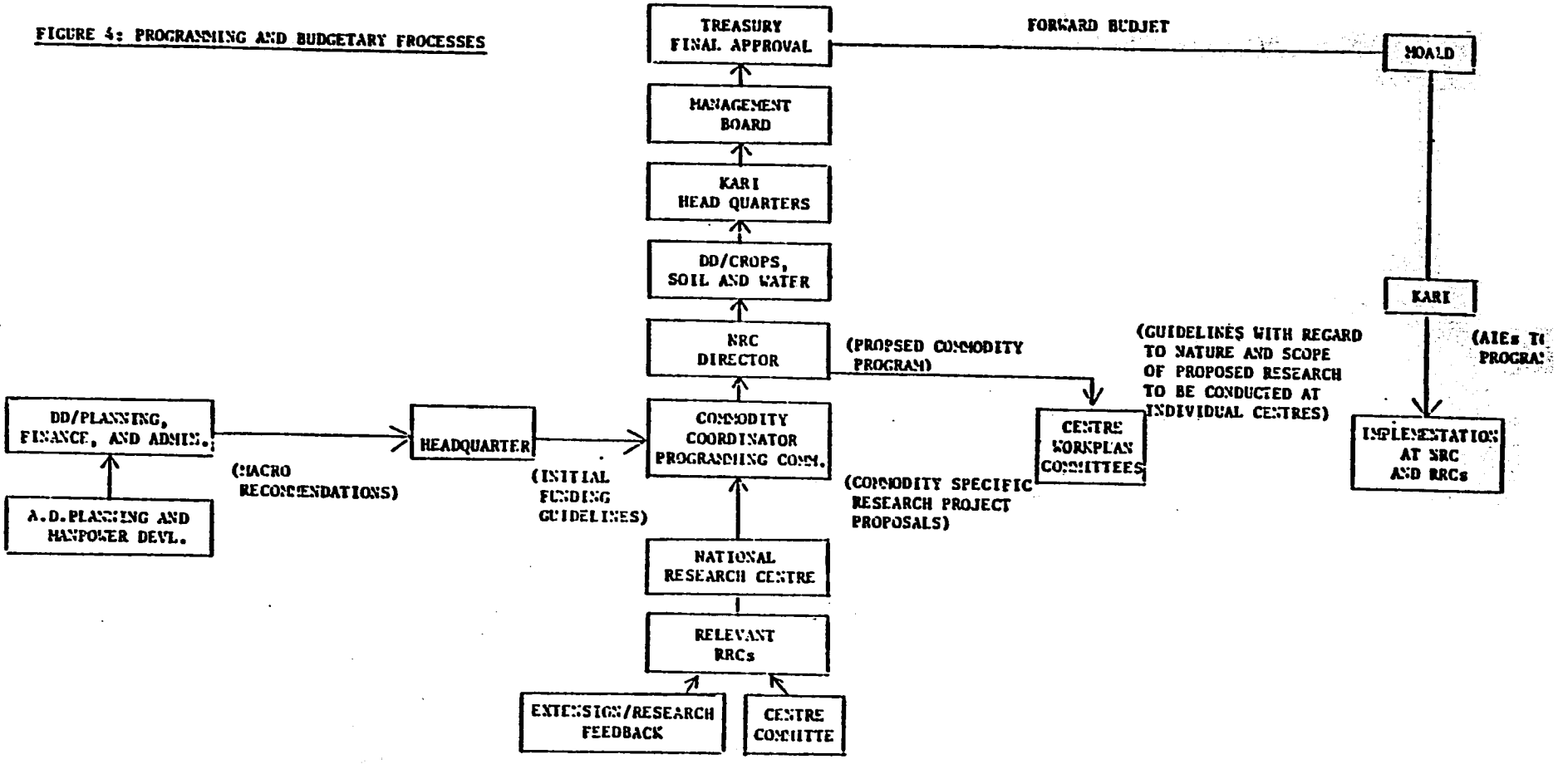


FIGURE 4: PROGRAMMING AND BUDGETARY PROCESSES



Annex G.6 AGRICULTURAL RESEARCH PP SOCIAL SOUNDNESS ANALYSIS

A. Sociocultural Context

1. Population and Demographic Features

The distribution pattern of the Kenyan population reflects land potential and land ownership patterns. Two-thirds of the population live on one-tenth of the land area. Three main regions of population concentrations are discernable; a) the Lake Victoria Basin, comprising Nyanza and Western Provinces; b) the East and West Rift Highland, comprising Nairobi, Central Province, Rift Valley Province (but excludes Turkana, Samburu, Baringo, Laikipia, West Pokot and parts of Kajiado and Narok districts) and Eastern Province (but excluding Isiolo and Marsabit); and c) the Coastal Belt, comprising Mombasa, the coastal areas of Kwale and Kilifi, and parts of Taita-Taveta.

In the Lake Basin region, Kisii and Kakamega districts have an average population density of 400 and 300 persons per km^2 respectively, but in some sub-locations the average rural density exceeds 1000 persons km^2. Extremely high densities also occur in some sub locations in Central Province. In contrast, density is much less on the limited amount of high and medium potential land in Nyandarua, Lamu, Tana River, Kitui, Baringo, Narok and Samburu districts(UNICEF 1984).

Maintaining current levels of food output and consumption per capita is a major challenge. Four main aspects of population dynamics relate to the question of food availability and hence agricultural policy: employment opportunities, internal migration, urbanization, and fertility.

One of the most crucial problems facing the Kenyan economy is the need to provide employment for a rapidly growing labor force. The active labor force, including the unemployed and the under-employed, is nearly 7.6 million. By the end of the century, the labor force is expected to total 14.1 million people. A 1976 study estimated that non-agricultural employment provided jobs for only 20% of Kenya's labor force. Although formal sector non-agricultural employment grew at just under 6% between 1972 and 1977, the growth rate fell to 3.2% for the period 1976-82. Even if formal sector non-agricultural employment grew at 4.6% per annum, the non-formal sector and agricultural sector would need to provide jobs for 2.6 times as many workers in the year 2000 as in 1976 (World Bank 1985).

The internal migration patterns are mainly a result of a search for gainful employment. The 1979 population census data on district of birth and of enumeration reveal that net migration is particularly high in 4 districts, Nairobi, Mombasa, Nakuru and Uasin Gishu. Net migration varied from 524,373 for Nairobi to 120,554 for Uasin Gishu. All other districts with a net increase had less than 60,000. The data showed a negative level of net migration for 6 districts which varied from 247,708 to 106,724, while all other districts with a negative level had less than 61,000. The negative level of migration was highest for Kakamega, Siaya, Muranga, Machakos, Kiambu and Nyeri, in descending order. The positive net migration into Nairobi and Mombasa reflects employment and educational opportunities, while the influx to Nakuru and Uasin Gishu relates to land purchases and wage employment. The districts with negative net migration all exemplify population pressure on high and medium potential land, but also reflect historical patterns of work away from the home district.

Population growth rates by district for the 1969-1979 period serve as another indicator of migration. Seven districts showed an annual growth rate of over 6%: Lamu, Tana River, Marsabit, Garissa, Laikipia, Nakuru and Trans Nzoia. In regards to the latter three, the large increase is due to settlement and wage employment. The other districts are mainly composed of pastoralists and part of the increase reflects improved data collection and lower mortality rates.

Intradistrict movements show a trend of migration into more marginal agricultural areas. For example, sub-locations in Kisii District with medium potential land have above normal growth rates reflecting migration from the highly populated high potential areas. In Kitui District the semi arid and arid lands have absorbed migrations from the medium potential areas.

While only about 15% of the population resides in urban areas, the rate of urbanization is increasing. The proportion of Kenyans who live in urban centers (defined as 2,000 or more people) has grown from 5.1 % in 1948 to 15.1 % in 1979. The urban population doubled between 1969 and 1979. In this period, the number of urban centers rose from 47 to 90, while the number of centers with more than 20,000 people increased from 4 to 16.

The urban population is heavily concentrated in Nairobi and Mombasa, which contain 37% and 16% respectively of the urban total. However, between 1969 and 1979 the other urban centers had more rapid rates of growth. Migration from rural areas to urban centers has been a response to employment opportunity, the scarcity of good agricultural land and rural-urban income differentials.

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Kenya's high population growth rate increasingly makes efforts to meet basic needs problematic. The 1979 census and national demographic survey in 1977 suggest that Kenya attained a growth rate of at least 4%, which was attributable to a natural increase. The total fertility rate at the time as about 8.1 %. USAID and other donors are assisting the GOK to meets its goal of a reduction in the population growth rate. With concerted effort, the 1985 estimated growth rate of 4.0% may decline to 2.8% by the year 2000 with the crude birth rate (CBR) declining from 52/1000 to 35/1000, while the crude death rate decreases from 14 to 9 The projected decline in the CBR would be roughly equivalent to a reduction in the total fertility rate from 8.0 in 1985 to about 4. 0 in 2000. Depending on the rate of decrease, the total population in 2000 would be around 34 million. In comparison, if the total fertility rate decreased to 6 and life expectancy increased to 60 years, the total population would be about 35 million in 2000.

In 1984 Contraceptive Prevalence Survey indicates an increase in use of contraceptive methods. A comparison of the 1979 and 1984 surveys shows that use of modern methods increased from 4.3% to 9.7% and use of traditional or natural methods increased from 2.4% to 7.3%. Provincial results show that unadjusted fertility rates compared with women's responses on the ideal number of children were higher in all except one province. Five to six children tend to be regarded as the ideal number.

The number of desired and actual children a woman has is inextricably linked to biological, economic and social factors. The implications of economic factors have been raised in relation to agricultural policies. While no systematic surveys of the economic value of children in Kenya have been conducted, many studies note the role of children in household survival strategies. Children are valued as a source of security in old age and a means of enhancing a family's chances of diversifying its sources of income. Children under the age of 15 perform important household tasks, but school attendance reduces the amount of time which children contribute to work (see Barnes and Werner 1982). Parents perceive a high payoff from their children's education especially if a child succeeds in obtaining a well-paying job. Remittances to households of origin do occur as illustrated in the results of the Rural Household Budget Survey 1981/82.

The opportunity cost of rearing children is largely determined by the amount labor time withdrawn from household or market production to care for children and the imputed value of that time (the value of the product they would have produced or the size of the wage they would have earned). Because the opportunity cost rests largely with

mothers and most are engaged in smallholder agriculture, the indirect cost is relatively low. Work performed on the homestead is highly complementary with child care, which is seldom the case in wage labor or off farm forms of self employment. Economic constraints on women are so great that women with young children do not necessarily work any less than women without young children. The direct cost of rearing children, however, is increasing. Education is considered a basic need and households are increasingly reliant on purchase of food and other essentials for maintenance of the domestic unit.

2. Land Distribution and Tenure

Only a small portion of Kenya contains good agricultural land. Of a total land area of 5.1 million hectares, only about 7% can be classified as having good soils, adequate and reliable rainfall and gentle slopes. A further 4.5% is suitable for crop production but subject to periodic drought (ILO 1972). Estimates of land potential vary, however, depending on the factors considered. The official land classification based on climate, especially rainfall and altitude, categorizes about 9% of the land as high potential and 9% as medium potential. A further 9% is listed as semi-arid, with marginal crop potential but productive rangeland. Some 73% of the land is classified as arid and very arid. The high and medium potential land is primarily located in the central and western parts of Kenya, but also includes the coastal strip. Most of the population lives in these areas.

Land ownership and land holding patterns are uneven due to the colonial and post-colonial land distribution policies. Tindrick (1979) estimates that some 0.1% of the holdings contain 14% of the arable land, which 2.4% account for 32% of the arable land. According to 1978 - 79 data there are some 2.7 million smallholdings with 13.8 million people occupying approximately 3.2 million hectares. In 1978 there were 3,428 large farms, including ranches with 838,200 people, covering 2.6 million hectares. The medium sized farms in 1979 numbered 52,986 with 457.100 household members and occupied approximately 1 million hectares. While the average size of the smallholding is 1.7, about half are under 1 ha (1978-79 IRS survey data adjusted for non-agricultural households).

No effective policy instruments exist (e.g. a land tax) to encourage efficient land use and discourage the holding of land for speculative purposes. The World Bank has pointed to this as a major issue in the past few years. This is particularly important in addressing the employment and production problems. Analyses have shown that small farmers are at least as efficient, if not more so, than large farmers. The evidence shows that: a) an average small farm produces at least as much output per acre as large farms, b)

small farms employ many more people per acre than large farms and c) small farms are at least as efficient in total resource use as large farms (World Bank 1986).

In the arable areas land tenure is under two main forms: a)customary communal land tenure in which land is held or controlled by various family on clan groups and b) freehold, individually - based tenure. Individual freehold tenure began in the 1950's under a land consolidation and registration program to change from a communal tenure system. Although the pace of consolidation, adjudication and registration has been slow, more than 70% of the registrable land in high and medium potential areas has been individualized. The formal system of individual titled ownership has not demonstrated any causal link with agrarian development and informal social relations contradict the implicit assumption of exclusive rights of the owner over the land. In fact recent GOK policy makes it mandatory that the permission of the wife must be obtained if the husband wishes to sell household land, even if it is registered in his name. The informal social relations contribute in large part to the absorption of the high proportion of the labor force within the smallholder sector.

Rights to land such as ownership, inheritance, use and disposal may be held by different parties at different times. When land rights within homesteads are not understood, outsiders, eg researchers and extension staff, can easily be misled by their own assumptions. There is growing awareness among personnel in MOALD that the simple use of the household as the main unit of analysis obsures aspects important to a strategy to increase agricultural production and food security among smallscale farming households. For example research in Embu shows that one household may have more than one farm as part of its risk strategy and labor and other resources are spread accordingly, and customary use rights are still activated (Haugerud 1983). A study in Western Kenya showed that of the 685 households surveyed only in 59% was the cropland reported to be under the control of one person. Twenty-four percent reported that each married woman had her own plots, while in 22% other family members farmed a part of the land (Bahemuka 1985). Research in a location of extremely high population density in Kisii District found that the size of land holding correlates with the number of family members per household. The larger units have not been subdivided among sons but the sons often have special rights to particular parcels of the land (Bager 1980).

3. Household Structures and Production Factors

Farming households differ accordingly to size of holding, sources and levels of income and dependency on farming for their livelihood. A significant proportion of men who have agricultural

land depart for wage or self employment, leaving their holding to be headed by their wife or mother. Female headed farming households tend to be located in agroecological zones unsuitable for the production of high value cash crops.

Information from the first 6 months of the Rural Household Budget Survey 1981/82 on farming households, (defined as those which consume at least Sh. 20 monthly value of their own produce and have agricultural land) shows similarities and differences between farming households based on sex and marital status of the household head. Sixty-four per cent of the farming households are headed by married men, 17% by married women, 14% by unmarried women and only 5% by unmarried men. Small holdings tend to characterize unmarried female headed households, whereas households headed by married men are overrepresented among those with over 5 acres of land. However when considering the number of household members, married men headed households are on average larger (6.5 members) than others: 5.4, 4.0 and 2.9 respectively for married women, unmarried women and unmarried men headed households.

Distribution of Households by Production Factors

	MM	UM	MF	UF	Total
Household heads	64	5	17	14	100%
Less than 1 acre	50	6	20	24	100%
Less than 3 acres	55	6	20	19	100%
More than 5 acres	72	4	13	11	100%
Agric. main occupation	59	5	21	16	100%
Of those who have:					
Sprayers	63	5	16	16	331%
Plows	69	4	14	13	520%
Fertilizer on hand	69	4	15	17	297%
Insecticide on hand	62	5	19	14	232%
Lowest 20% Per capita Income decile	62	2	22	14	
Highest 20% per capita Income decile	65	9	13	13	
lowest 20% Household Income decile	43	8	21	28	
Highest 20% Household Income decile	80	3	11	6	

Codes for head of household

MM= Married Male
UM= Unmarried Male
MF= Married Female
UF= Unmarried Female

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Household Income and Expenditure by Sex and Marital Status of Household Head.

	MM	UM	MF	UF	MEAN
Mean Gross household income	1394	798	921	707	1188
% Gross Farm income to total household income	54	59	55	60	55
Mean transfers into households	241	139	243	162	225
Per Capita Income	255	394	215	235	252
Gross household expenditure	953	549	682	507	825
Mean food expenditures	186	134	172	127	173
Mean value of own produce consumed	206	131	163	135	185
% value crop sales to gross crop value	21	21	19	18	20
% crop sales to total crop and livestock sales	43	50	52	51	

Male heads of households tend more than female household heads to have a main occupation other than farming their homestead land. Also, they more than female headed households tend to have two or more members contributing cash income to the household. In spite of the differences in levels and sources of income and size of holding, significant similarities arise related to agricultural production inputs. The mean total number of hours worked on crops per month over a 6th month period varied from 69 for married female headed households to 73 for married male headed households. Both unmarried male and female headed households averaged 72 hours. Furthermore, the total number of hours was higher on plots under one acre than on others. In regards to quantity of fertilizer and insecticide on hand and spray equipment female headed households faired proportionally as well as male headed ones. Unmarried female headed households tend to invest more money than others in livestock inputs, although on average they tend to have fewer cattle.

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Data in the above tables indicate that although female headed houeholds tend to be poorer than households headed by men, they tend to be more dependent than the others on farming as their main source of livelihood and that in terms of equipment, commercial and labor inputs they ar proportionally as progressive and innovative as male headed household.

4. Food Consumption and Nutritional Patterns

Maize is the main staple food crop and data from recent years indicate that the demand is inelastic. The current food consumption patterns however are a result of changes in crop production during the past 50-70 years. Around World War I the main food among Africans was millet and sorghum, with a smaller amount of maize being consumed. Consumption of maize gradually gained prominence in response to promotion of new technologies and availability of a new variety of maize seeds because of the increased output per unit of land and labor and the more favorable market price for maize in comparison to millet and sorghum. Thus economic forces led to changes in food consumption habits which have slowly been shaping food preferences especially among the younger generations raised on a staple maize diet. Younger people tend to consider maize as a status food compared to sorghum and millet and to prefer the taste.

Levels of food consumption and nutrition are basically determined by access to available food. Even in the smallholder agricultural sub-sector access relates in part to the level of the households cash income and then the allocation of the cash to food rather than other items. Especially poorer agricultural households sell food crops, usually immediately after harvest, to meet financial commitments and later repurchase, preceeding the next harvest at higher prices. For a significant proportion of the smallholders total maize production would not meet domestic consumption needs, even if maize were not sold.

Preliminary information from the Kenya Rural Household Budget Survey 1981/82 indicates the relationship between food consumption patterns and the gross income of the household. Overall, 63% of the households produce more food than they consume, but as income decreases the greater the proportion of households whose crop food expenditure exceeds the value of crop production. Thirty nine percent of the households in the lower gross income decile spend more on food than the value of crops produced; yet, the absolute amount expended on food per capital increased with gross income.

A comparison of the food consumption patterns of the poor and rich households in each province reveals that poorer households obtain a significantly larger proportion of their total calories

from grains then do rich households (Greer and Thorbecke, 1983). Although tnis comparison was based on IRS - I (1974/75) data, the patterns are unlikely to have changed. At low income levels households satisfy their demand for calories by consuming relatively more of the cheapest source of calories available per shilling.

The relative importance of maize in diets varies from region to region, mainly as a result of different cropping patterns and dietary habits. Overall, maize consumption accounts for an estimated 40-45% of the total caloric intake of the Kenyan population. The proportion of calories derived from maize is assumed to be highest in Rift Valley and Coast Province, respectively 82 and 77% of the total amount of calories obtain from all staple food. The figures for the other provinces are estimated to be Central - 49%, Nyanza - 49%, Western 51% and Eastern - 44% (Kleist 1985).

Millet and sorghum consumption is highest in Nyanza and Western Provinces and tends to reflect local production patterns. Whereas in most provinces millet porridge is the preferred food for pregnant mothers and for weaning infants, for various reasons actual food consumption does not reflect this preference (UNICEF 1984).

Seasonal variations in grain supply are offset through on-farm stocks and market channels. For the latter, however, accessibility to cash within the household determines access to purchase food. Data on child nutrition provide an indication of unsufficient access to basic foods. The Third National Nutrition Survey (1982) showed 28% of the children in the national sample to be stunted or chronically malnourished. District level data revealed that 11 of the 27 districts covered by the survey had a prevalence of stunting above the national average. Kilifi, Tana River, Kwale and Lamu districts in Coast Province have the greatest district level prevalence of stunting. Siaya, Nakuru and Kisii districts also demonstrate high malnutrition, respectively with 37, 35 and 31% of the children stunted.

The data on child nutritional levels combined with information on participants in the Maternal and Child Health Program of the Catholic Relief Services and distribution of food relief reveal three patterns of insufficient access to food:

o pastoral areas when drought affects milk yields and diminishes herd sizes;

o settled mixed farming areas in semi arid zones which often experience localized droughts;

o high and medium potential areas

f) the recommendations were communicated through a variety of public and private sector channels, so that most of the farmers in Western Kenya were aware of them and the expected higher yields.

2. Adoption of Agricultural Recommendations

Beyond the credible levels of adoption of hybrid maize seeds for the long rains in high potential areas and of Katumani composite maize seeds in some of the dryland areas in Eastern Kenya, the improved cultural practice recommendations put forward by extension service this past decade tend to be repeated year after year and largely not adopted by farmers. One reason for this has been that until recently there have been relatively few formal linkages between the farmer, extension and research services to provide farmers with appropriate, useful improved technologies. The forging of research and extensions linkages under the T & V system has been occurring to provide extension with technical messages to pass to farmers. However, almost nothing is done to enable the extension agent to relate the message to the farmer's conditions or to provide a flow of information from farmers to guide research priorities. The problems can be summarized as:

a) agricultural researchers have little practical knowledge about farmers' strategies and conditions which relate directly to the applicability of their research work.

b) T & V and agricultural research are based on geographic area, not matching recommendations with target group characteristics, and

c) agricultural researchers and extension agents do not have a systems perspective and therefore are often unaware of the full economic implications of the recommendations they advocate (see Anandajayasekeram)

3. On-Farm Research Experience

The problems listed above are being addressed in the work of some MOALD research and extension staff with assistance from CIMMYT. Since 1984 CIMMYT has been working periodically with approximately 50 staff members, providing practical training in a farming systems approach. While the experience to date has been positive it also reveals the following weaknesses in the on-farm work:

a) the on-farm trials are often carried out with little participation by the farmer; the research team with hired casual labor perform most of the work.

Case studies on nutrition in various districts point to socioeconomic status of the household as a determining factor of malnutrition since cash is unavailable to purchase the requisite supplies.

B. Institutional Effectiveness Context

1. Hybrid Maize Experience

Before discussing the current situation, it is worthwhile to summarize some of the crucial elements related to the successful introduction and spread of the first hybrid maize varieties in Kenya. While the first hybrid maize seeds and accompanying recommendations were aimed at large commercial farmers, by 1974 the majority of smallholder who lived in favored ecological areas, chiefly Rift Valley and Western Provinces grew, hybrid maize during the long rainy season. The following are linked to the relatively high rate of adoption of hybrid maize:

a) although a package of recommendations was advocated, farmers experimented with elements of the package and most settled on improved seed and only a few other parts of the technical package.

b) a scientist associated with the Kitale station carried out research to document the most crucial elements of the package and these were gradually absorbed into the extension service promotional efforts.

c) although no formal feedback mechanisms existed from farmers to agriculture research and other relevant institutions, numerous household level studies were conducted, primarily by persons associated with the University, which identified problems and a variety of channels were used to present the smallholder farmer perspective to decision-makers at various levels in the public and private sector.

d) related to c) above, there was a shift in some districts away from the "progressive farmer" approach, which was documented to not influence the practices of less progressive farmers, toward extension services directed at "average" smallholders

e) related to c) above, improvements were made in accessibility to the technology through selling seeds and fertilizer in smaller packets and at more distributional points within the rural areas, and

b) the kinds of trials conducted tend to be based on familiar recommendations, especially use of chemical fertilizers, which ignore implications from the informal survey findings, and

c) results are measured only in terms of yields per land unit.

These weaknesses reveal two basic problems: a) difficulty in acceptance of farmers participating in activities labelled as part of research and b) difficulty in considering a variety of options to address an identified problem (eg crop rotation as an option to increase soil fertility). Other institutional-related problems have also become evident: a) although economists have been placed at research stations to do socioeconomic work, they tend to leave for other jobs, and b) a sufficient amount of funds and adequate transport must be made available to facilitate researchers and extension agents involvement in on-farm work.

Furthermore, the attitudes of research station personnel are often biased against working with farmers. When administrators of research stations were not supportive of the farming systems work, staff were unable to devote the requisite time to doing this work. Even after two years of exposure, some team members were unconvinced that on-farm work related to the nature or purpose of their job. Often those with lower educational qualifications more readily understand the value of on-farm work. The style of scientific work occuring on research stations, the standards which divorce research work from the reality of Kenyan farmer conditions, and expectations of comfortable work conditions can be traced to the formal education that scientists have received, often outside of Kenya. Their education has directly or indirectly provided these job expectations, associated with a style of the scientific mode of thought and behaviour. It is difficult to change them and there are no recognized rewards for those who do change.

Besides weaknesses within agricultural research and extension service institutions there is a crucial weakness related to linkages with other institutions with relevant data and research capacities. Two stand out: the universities and the Central Bureau of Statistics. These and other institutions conduct studies which provide for an analyses of different aspects of farming systems in different parts of the nation. There is need for improved access to available information and the interpretation of the information as it relates to the implications for agricultural research and extension.

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C. Beneficiaries

The ultimate beneficiaries of this project will be the Kenyan farming population in general and the vast majority of farmers who raise maize and/or sorghum and millet in particular. If the project succeeds in producing more productive varieties of these and other crops, the farmer and other consumers will benefit from increased food availability and if pricing and other policy measures are correct, increased income as well. Secondarily, input suppliers and other intermediaries in the structure of the Kenyan agricultural market will also benefit from an increased volume of business associated with the increasing levels of output and productivity.

The first line of beneficiaries are those Kenyan managers and technicians who will participate directly in the institutional development process for the research system. These individuals will benefit from increased educational and skills levels obtained through formal training and from knowledgeable counterparts. They will benefit from having access to more tools and other physical resources with which to carry out their work. Most of he benefits are likely to be intangible in terms of increased job satisfaction. Tangible benefits arising from improved skills will depend on the introduction of a planned new scheme of service for the research system.

Another group of direct beneficiaries will be those university and private sector researchers who receive grants to carry out particular research projects. The financial resources provided will act as a catalyst for these individuals and organizations to carry out work which they could not do effectively otherwise, if at all. Once again, the products of such research should ultimately benefit the Kenyan consumer in terms of increased availability of agricultural products as well as those employed in industries which are either created or expanded to support the utilization of products developed through the research fund.

D. Participation

The reorganization of the agricultural research system as proposed by the MOALD involves committees at different levels to help facilitate participation in the establishment of research priorities and allocation of resources. Moreover, the emphasis placed by the MOALD and the Project on on-farm research is based on the premise that farmers ought to be involved in determining areas for research and the testing of plausible recommendations. Furthermore, it recognizes that farmers are very heterogeneous and hence recommendations must be based on specific farming conditions. To help ensure that farmers participation is meaningfully sought and utilized, the project entails the involvement of economists and sociologists.

E. Sociocultural Feasibility

1. Population and Demographic Considerations

Kenya's agricultural policies and programs need to take into account the dynamics between various development efforts and demographic factors. In terms of the proposed project three factors appear to be significant: employment, migration and urbanization trends. The growing labor force will need to be absorbed mainly in the agricultural sector. To assist, agricultural research ought to be geared towards labor intensive technologies appropriate for particular farming systems. Intensification of land use in the high and medium potential areas will be essential for absorbing the growing population and meeting household needs even when taking into account the growth of market centers and towns. While agricultural research particularly on maize is expected to yield results in the medium term, it is imperative that in the long run the risk to crop production be reduced for the semi arid land and coastal zone so that these areas can absorb more people into productive employment.

The rapid rate of urbanization means an increasing number of people totally dependent on purchased foods. The desire might arise for the GOK to use pricing mechanisms to favor the urban population at the expense of food producers, although this has not been the pattern in recent years. Adoption of the maize and other agricultural research results, will in the last analysis be dependent on their reliability and profitability and the reliability of the marketing system. To complement the project, USAID will continue to monitor the pricing and marketing of grain and to keep this as an important topic in their policy dialogues with the GOK.

While several contradictory hypothesis can be advanced regarding the implications of agricultural policies and programs on fertility (see Mbugua and Schuter and Jones 1984), there is no evidence to indicate that the project will have a negative impace on the goal to reduce fertility rates. The intensification of cropping patterns, especially of grains in unlikely to increase the family size by enhancing the labor demand for children, because of the direct cost of rearing children. In fact, if small holdings are not made more economical by intensification of grain production to release land for higher value crops the value of children to diversifying household sources of income may become even greater.

2. Food Consumption and Nutritional Considerations

The contextual description in the previous sections shows that a meaningful proportion of the smallscale farming households are not self-sufficient in the staple grain foods. Moreover, evidence indicates that cash from sale of crops and labor in either insufficient or is not adequately allocated for purchasing food within

a number of households, and hence results in the low levels of nutrition found among children. Women are both primarily responsible for domestic food production and for feeding their families. Increased yields, in volume and caloric content, should help improve access to grains for household consumption.

In the more marginal, dryland areas access to food is more problematic than elsewhere. The project will address this problem through support for research on maize, millet and sorghum applicable to farming systems on a nationwide basis, including the semi-arid zones. A farming systems approach will be necessary to understand household strategies and the interaction between crop and livestock systems. Moreover, a multi-disciplinary approach is required so that maintenance of the resource base (i.e. soil fertility) and water retention are incorporated in the research on grain crops.

An important responsibility of the agricultural researchers will be to identify areas in which applied research is required based on information on farmers' conditions and a preliminary economic analysis of proposed trials to match trials with specific target groups. This ought to precede the allocation of research funds. Also, the economists should be responsible for assisting researchers to analyses their results in terms of crude caloric yields and when appropriate crude energy yield. In this way, caloric yields as well as economic criteria can be used to make comparisons between different improved technologies. The research trials on maize will also include intercropping and agroforestry combinations since farmers tend to intercrop maize with other crops and because of the potential effect on soil fertility.

The project should address the food consumption perspective to on-farm research and experimentation, and to the usage of the Agricultural Research Fund. The production - consumption linkages which might be addressed are the role of women in production, crop labor requirements, market prices and their seasonality, seasonality of production, crop mix and minor crops and income. (See USDA and AID 1985).

3. Feasibility of Proposed Institutional Building

The critical need for building Kenyan capacity to manage all facets of agricultural research has been discussed at length in other sections of the Project Paper. (See Annex G.1.(a) Institutional Analysis and Unattached Annex H.3.). Important to building a long-lasting institutional capacity to plan and conduct research is developing sufficient linkages between the researchers and extensionists and farmers.

The project design recognizes this area as being vital and assigns a high priority to linking AID project activities with CYMMYT and IBRD efforts in on-farm testing and extension. As with the reorganized agricultural research structure, the areas of on-farm research and T&V extension are still evolving in Kenya. Delineating precise lines of organizational linkages is not practical at this time. The research project does place great significance on fostering close collaboration between research and extension as evidenced by the important role given the technical assistance agronomists to be posted at Regional Research Station (Kakamega and Embu). These individuals must have strong backgrounds in farming systems work in addition to coarse grain agronomy.

The project also allows for short-term consultancies throughout its course to assist, as needed, in bolstering the socio-economic capabilities of KARI. Post graduate degree training will be available in relevant socio-economic disciplines to help develop a solid Kenyan base in this important field.

ELIMINATION OF RISKS TO FARMERS: There is an element of risk to being a cooperating farmer. Experience has shown in other countries in the region that cooperating farmers tend to be from high resource households. To facilitate the on-farm research teams working more with "average" resource farmers, the project should urge KARI to establish a compensation account to be used to reimburse farmers for financial losses which occur owing to failure of the technology or through negligence of the on-farm teams. Such a fund will also assist in the establishment of credibility of the on-farm teams among farmers.

FEEDBACK FROM FARMERS: For the on-farm experimental work to be meaningful, explicit institutional mechanisms are necessary to feed information from farms to research personnel so that their work addresses actual farming conditions. This will occur in two ways: senior researchers from the national maize program will attend the station research discussions when the kind of on-farm trails are to be decided. The senior researchers are expected to assist in identification of options to address the problem areas for which no proven technological recommendation are available. Also the senior researchers will participate in sessions at the close of each season when the results of the on-farm experiments are discussed and at these help to identify changes which might be required. Attention should be given to reasons for "failures" and "drop out" of cooperating farmers.

Specific mechanism will be instituted at each commodity station to ensure that the annual program of work incorporates research based on feedback from farmers. It is expected that each scientist or group of scientists will present their work plans. These will be reviewed and aggregated into a station plan. It is recommended that the individual proposals receive peer review to help ensure that the elements address priority considerations and are well designed.

GENDER ISSUES: Gender issues will be addressed in activities receiving support from the Agricultural Research Fund, and by the agricultural research station staff complemented by consultancy services. The formal and informal surveys carried out by the on-farm research teams and complementary research by consultancy are expected to address the main gender issues, such as rights to decide on technologies used on maize fields, expected labor inputs and control of the output from the maize fields. Furthermore, it is mandatory that the possibility of the suballocation of land within the household be understood.

As was indicated during the informal surveys done by the Coastal Institute, researchers may have difficulties in interviewing women when the teams are composed only of males. Women farmers are less likely to give reliable information to a male than a female interviewer, because the answers are apt to reflect gender expectations father than the actual situation. Because of this, the on-farm research teams ought to involve females, possibly from extension services. The project administrators should help to monitor the need and make adjustments accordingly.

Women farmers should be recruited as cooperating farmers since women are the mainstay of the agricultural labor force and have the main responsibility for labor on food crops. Both married and unmarried female heads of household should be recruited. Also, households where the male head is resident but not a fulltime farmer ought not to be ignored. If the range of different structures of agricultural households as well as different levels of resources are not brought into the on-farm research work, it is likely to have little applicability. Kenyan farmers classify themselves and others based on availability and access to key resources; demonstrated success by a member of one's group should have an impact on others from the group. Therefore, the criteria for selection of cooperating farmers ought to include a provision requiring that a representative proportion be female farmers.

Since the project focuses on maize it eliminates the possibility of a bias towards crops which are male dominated. Even in the basic and applied research work on maize, however, a bias could become evident if it did not take into account the demands on women's labor. This will be monitored in the periodic evaluations of the project.

The use of the Agricultural Research Fund is also expected to address gender issues through support to socio-economic inputs to farming systems research and to on-farm experiments as well as studies which address production - consumption linkages. The periodic project evaluations will include an assessment of the use of the Fund to determine if the type of agronomic work is biased against female farmers and if other gender issues are being adequately addressed.

4. Linkages Between Institutions

The Project addresses the establishment of an effective system of linkages between the public and private sectors, including the agricultural college and university research communities as a means to make available research results applicable to various farming systems in Kenya. The linkages will be established in the following ways.

First, to help ensure that data on aspects of gender and socio-economic factors are accessible to the commodity and regional research centers, funds will be available to contract with people from other institutions to carry out work on a complementary basis with the on-farm teams. The work can consist of the processing and interpretation of existing information or the collection and analysis of new information. Priority attention will be given to use of existing information. For example, consultants would be hired to program, analyse and interpret data from CBS surveys on farming households within the ecological zone covered by Embu maize research stations. Also, to help ensure that the on-farm work has a systems approach funds will be available to hire rural sociologists and agricultural economists from other institutions to design and carry out complementary work with the on-farm teams. For example, consultancy work would focus on the household production strategies and sex differentiation of households who participate in the on-farm trials. It is not practical to expect that the socio-economists from the research stations will initially have the expertise or time to do this work. Gradually the direct use of personnel from other institutions should diminish as the research station socio-economists gain experience and then funds will be available to hire local data collections, e.g. for labor input information on trial and comparative plots. Moreover, the staff from other institutions may begin to incorporate a farming systems perspective in their normal research work and publications.

Also, through the Human Resource Development Component, the project will support seminar series at each maize commodity and regional research station. The purpose will be to broaden contact between institutions and the exchange of knowledge.

In addition, the Agricultural Research Fund will be geared to promote linkages between institutions. It is anticipated that many institutions applying for funds do not have adequate staff and hence will have to cooperate with persons from other institutions. Some proportion of the funds are expected to be allocated to groups to do farming systems research, and hence incorporate socio-economic and gender dimensions.

The proposed reorganization of the MOALD research system will establish closer linkages between research and extension services. Yet, the question arises: If viable technologies are identified for

specific farming systems, is the extension service capable of disseminating these? The limited number of farmers directly served under the Training and Visitation System and its lack of attention to different farming systems makes reliance on the extension system questionable. However, dissemination need not and should not be totally reliable on MOALD extension service. While the service will be needed to carry out demonstration trials, it can be anticipated that dissemination of information will occur through government officers, public sector leaders and commercial enterprises. Also, NGOs may be expected to incorporate the technologies into their projects. For this to occur, it will be necessary for the research system to make the requisite information available.

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G. / Engineering Analysis

UNITED STATES GOVERNMENT

memorandum

DATE: May 26, 1986

REPLY TO ATTN OF: Pushkar Brahmbhatt, Engineer, REDSO/ESA

SUBJECT: Kenya - National Agricultural Research Project - PP Design Analysis of Construction Component

TO: Mr. David Lundberg, ADO, USAID/Kenya

I. Purpose

To visit Agricultural Research Centers at Kitale, Kakamega, Embu and Mtwapa to review the existing housing, office/laboratory and other physical facilities in light of additional requirement generated due to the subject project activity. Prepare a Technical Analysis for the construction element of this project and meet the requirements of Section 611(a) of the FAA.

II. Persons Contacted

USAID/Kenya

Dr. Curtis Nissly
Mr. Barry MacDonald

Ministry of Agriculture - Agricultural Research Center

Mr. Stephen A. N'gang'a, Chief Laboratory Technician, Scientific Research Division, Nairobi

Mr. D.K. Muthoka, Officer-in-Charge (OIC), Kitale

Mrs. J. Chumu, Maize Breeding Research Student

Mr. Rutto, OIC, Kakamega

Mr. H. Mulamula, OIC, Embu

Mr. Aziz Abubaker, OIC, Mtwapa

Mr. Mtata, Mr. Kiriro, Maize Agronomist, Oilseed Production, Kakamega

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Others

Dr. Al Manwiller, USTA for Maize Breeding

III. Accomplishments

Site visits to four agricultural research centers were conducted on the following dates:

Agricultural Research Station	Date
Kitale	May 5, 1986
Kakamega	May 6, 1986
Embu	May 8, 1986
Mtwapa	May 12, 1986

My observations of the physical facilities at each of the Research Centers are briefly outlined below:

A. Kitale

The buildings at this station consist of:

1. Laboratory/office block

Two story concrete frame structure, (recently built) with a flat concrete roof. Evidence of leaking through expansion joints.

2. Maize Breeding Structure

This is a single story structure with asbestos roofing on timber trusses. Water leakage through some roof sections due to broken sheets or inadequate overlapping at the eves. Need roof repairs and replacement of damaged ceiling boards.

3. Green Houses

Two green houses are in run-down state. Need replacement of roofing-ridge pieces, some translucent roofing sheets, window glasses and paint work.

4. Cold Rooms

There are 3 nos. of cold rooms, located in the long structure adjoining the maize breeding building. Two cold rooms (#5 and #10) are operational and one cold room is not functioning due to broken down compressor. Heavy water leakage evident around sky-lights (located near these cold rooms) in the passage.

5. Laboratory Block (1st year students)

The structure seems to be in a reasonable state. Most of the laboratory sinks are leaking. Need plumbing repairs.

6. Workshop building

A storage area has been converted into a vehicle-repair shop, two make-shift structures adjoining to this repair shops are used as plumbing and carpentry storage/workshops. Currently the station has a staff of 3 carpenters, one mason, 2 plumbers, one auto-mechanic and 6 assistants. No welder, no electrician.

7. Other facilities

The irrigation of two nurseries is carried out with dam/reservoir water pumped to these nurseries. The fencing around these nurseries has been rotted out.

8. Housing site

The site of the future housing development is located adjoining to the present senior staff housing complex. The site is facing the main access road, and gently sloping away from the access road towards the dam site. The soil characteristics are red color, sandy, well drained type. Electricity and water are available at the site.

B. Kakamega

1. Office Block

A single storey building with 3 rooms. Though the building is old, it appeared well maintained.

2. Laboratory/office block

This is a long, single storey structure having a metal roof covering. The building is old and roofing appears to have been repaired frequently. The station has recently built a cold room structure through their own labor force under the technical guidance provided by the COMWORKS.

3. Workshop/Farm Equipment

The structure is in a reasonable shape and adequate for the current repair/maintenance requirement of the existing farm equipment.

4. Staff Housing

4 nos. of senior staff houses (two nos. type 'C' and two nos type 'D') are located at North-east of the office area. Some 16 nos. of junior staff quarters are located East-north of the offices, adjoining to the surveyed designated plots F.5 and F.6. The future senior staff expansion is located on a SE of the office complex designated site survey plot F.17. The plot is located as a corner plot of the research station facing the main access road to Kakamega town. The site is fairly levelled, free from any growth except for a few trees. Both utilities, water and electricity are available at the site.

C. Embu

This station is divided into two different blocks. Block A houses main offices and Block B has livestock and residential facilities. There are some five buildings at Block A which are being used for various tasks.

1. Office Block

This building houses four offices and one secretary's office. 7 technical officers are accommodated in two small offices.

2. Garage/Vehicle Workshop

This is an old long building. Structurally appears to be sound. The plans are underway to modify this structure to provide storage facilities for the different functional activities and few small offices.

3. Laboratory/Office Building

This is a newly built structure, however, due to lack of adequate office facilities, the building is over-crowded with teaching/research staff.

4. Storage Building (Building # AGR 2/4)

This building appears structurally sound; and can be modified to provide required offices and field laboratories for maize breeding program.

5. Workshop Shed

This structure located on Block B is single storey structure with one section having a basement. Part of the building was used as carpentry workshop. The building is structurally sound, roofing is okay. Central section of this building can be modified to convert into a field laboratory and two offices.

6. Staff Housing

3 nos. type 'C' and 4 nos. 'D' senior staff houses are located in Block 'B'. Most of the staff housing is located on Block B. A corner plot designated as field #9, on Block a, is also available for the construction of additional senior staff houses. The plot is located at north-east corner of Block A, facing Embu-Runyenja road. The topography of the site appears to be fairly level ground.

D. Mtwapa

This station is partly located on the seaside (office block, 4 nos. staff houses, laboratory, library) and the other part of the station is located on the west side of Mombasa-Malindi road (farms, staff housing, workshop, other facilities).

1. Office Block

This is a single storey concrete block. frame structure having a concrete flat roof. Roof is leaking at couple of spots. Spalling of concrete from ceiling in reception area exposing reinforcement have resulted due to roof leaks. Repair works underway. Most of metal fixtures including metal windows have been badly corroded.

2. Four nos. type 'C' Senior Staff Houses

These are 3 bedroomed houses built in 1972. One of the four houses has been declared unfit for human habitation due to excessive structural deterioration. Of the remaining three houses, one house was repaired in 1982 and is occupied. The two remaining houses are unoccupied and will need major repair works to bring to a reasonably acceptable standards. All houses need new roof coverings for flat concrete roofs, replacement of few doors, windows, replastering of ceiling, new electrical wiring, painting, fumigation, site sterilization, site works, etc.

3. Library

A type 'E' residential house has been converted into a library. The building is infested with termites.

4. Laboratory

A 3 bedroom type 'D' house is converted into a pathology laboratory. The building is structurally sound, need routine maintenance and a few minor repair jobs.

5. Workshop and Other Farm Buildings

These structures are located on the other section of the research stations. All buildings are simple in design and functional. Adequate and suitable site is available to build a field laboratory/office block on this location.

IV. Comments/Conculsion

1. With the exception of the physical facilities located at Kakamega research station (these are colonial era facilities), the present poor state of the buildings at the other three stations, is partly due to dereliction on the part of the management and lack of funds for building maintenance. The present state of deterioration could have been reduced if the station management had performed simple maintenance tasks like keeping structures clean (broom, water and a mop cloth), tightening few screws now and then, cleaning roofs and water gutters.

2. Though most of the structures at these stations need varying degree of repair and maintenance works, the present scope of work covers only those physical facilities which are directly related to the proposed project objectives.

3. Each of the research stations must establish a fully staffed and equipped building maintenance unit. This should consist of a qualified and experienced building technician, two masons, two carpenters, a welder/electrician, two plumbers.

4. We have investigated the possibility of rental/lease housing housing at Kitale and Embu and we found that the houses may be available at these two places. Prior to making a decision for constructing houses at these two sites for USTA personnel, the option of leasing the houses should be fully explored. One of the project houses under On-Farm Grain Storage Project (615-0190) will be available by April 1987 at Kakamega. This house can be retained for one USTA personnel proposed at Kakamega.

5. Attached herewith is a Technical Analysis for the construction component, including cost estimates (in the event the leased housing is not available) and 611(a) determination.

Attachment: a/s

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KENYA - National Agricultural Research Project

TECHNICAL ANALYSIS (CONSTRUCTION/REHABILITATION)

I. - Current Status

Each of the Agricultural Research Centers located at Kitale, Kakamega, Embu and Mtwapa was visited by REDSO engineer. Current status of physical facilities available at three stations are briefly described in a Brahmbhatt/Lundberg memorandum dated 5/26/86. Requirements of physical facilities at each of the Agricultural Research Stations have been determined on the basis of the project needs and are briefly outlined below. All the sites for the proposed housing/office construction are located within the stations' boundary. All sites are suitable for proposed construction. Soil characteristics do not require specific foundation designs.

II. Technical Documents

The project will utilize Kenya Government standard type 'D' Upland housing plans and relevant specifications, bills of quantities etc., for the construction of senior staff houses. The Ministry of Works will prepare full design documents for Transit Guest House. The standard housing plans will need some minor modifications to house and operate standard equipment authorized to USTA personnel (air conditioners, washers, dryers, etc). For each site, the center will be responsible for developing topographic site plans. All tender documents for the proposed construction shall be reviewed and approved by AID engineer. All tender documents shall be publicly advertized and the tender will be awarded to the lowest responsive bidder. The construction shall be periodically monitored by the AID engineer, and day to day supervision shall be provided by the engineer from the Ministry of Works. The contract for the construction/rehabilitation shall be entered between National Agricultural Research Board of Management and the selected building contractor.

AID approval to the contract and payment procedures shall be fully described in the project implementation letters.

III. Proposed Construction/Renovation/Cost Estimates

1. Kitale

	US$
a. 1 no. of Sr. staff houses @ $25,500 (approx. area 110-130 sq.mt.)	25,500

b.	1 no. Transit Guest House @ $35,000 (approx. area 160-180 sq. mt.)	35,000	
c.	Field Laboratory and Cold Room (Renovation) L.S.	25,000	
d.	1 Plant protection screen house	12,000	
	Sub-Total (1)		97,000
2.	Kakamega		
a.	2 senior staff houses	51,000	
b.	Field Laboratory/office (100sq.mt)	20,000	
c.	1 Plant protection screen house	12,000	
	Sub-Total (2)		83,000
3.	Embu		
a.	2 senior staff houses @ $25,500	51,000	
b.	1 transit Guest House @ $35,000	35,000	
c.	Field Laboratory/Office (100 sq.mt)	20,000	
d.	Field Laboratory (renovation) L.S.	20,000	
e.	Cold Room	15,000	
f.	1 Plant protection screen house	12,000	
	Sub-Total (3)		153,000
4.	Mtwapa		
a.	1 senior staff house (repairs to the existing house)	17,000	
b.	1 field laboratory/office (100sq.mt)	20,000	
	Sub-Total (4)		37,000
	TOTAL		370,500
	Plus inflation 15%		55,575
	GRAND TOTAL		426,075

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The cost estimates are based on the current square meter costs of such structures in those areas. Renovation costs for a house at Mtwapa are calculated on the basis of detailed renovation estimates prepared by the Ministry of Works.

IV. 611(a) Certification

REDSO engineer has visited all the sites at Kitale, Kakamega, Embu and Mtwapa and inspected the existing facilities to assess requirement for new construction and rehabilitation work.

The cost for the proposed construction are based on current costs of building construction in those areas. Inflation of the current rate has been added for a period of one year, contingency has not been added to the cost estimates.

In the event of rental/lease housing are available at some of these sites, the construction of those facilities shall be omitted.

Based on the foregoing analysis, a reasonably firm planning has been made for the proposed construction/renovation works and the cost estimates are reasonably firm to accomplish the described works. The requirements of FAA section 611(a) as amended are accordingly satisfied.