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MAURITANIA

FOOD FOR DEVELOPMENT

TITLE II, SECTION 206

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MAURITANIA

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I. SUMMARY

Prior to the 1970s, Mauritania was self-reliant in meeting its food needs; what it could not produce, it was capable of importing on commercial terms. During the 1970s, the economy experienced a succession of shocks — the Sahelian drought, the costly Western Sahara War and the stagnation of world prices for iron ore, Mauritania's major source of revenue and foreign exchange. Food production declined, the pace of rural-urban migration quickened, and Mauritania's commercial import capacity eroded due to the cost of the war and reduced iron ore earnings. These Developments caused serious imbalances in food supply and demand, and wide fluctuations in food prices. As a result, emergency food aid became essential. In recent years, food aid has averaged about a third of total food grain requirements.

The USG has responded to Mauritania's food needs to date through emergency relief programming on a year-to-year basis. In contrast, this Title II Section 206 initiative proposes a multi-year Food for Development program in which sales proceeds are used both to alleviate the causes of the need for the assistance and to support programs and projects to increase the availability of food commodities to the neediest. The program will provide up to 60,000 MT of food aid to the Government of the Islamic Republic of Mauritania (GIRM) over a three year period, FY 1983-1985. Local currency drawdowns to support subprojects, in effect, extend the program an additional two years to FY 1987. Total dollar costs will be approximately $17.2 million. Sales proceeds will generate about 1,020 UM million or a $20.4 million equivalent. Over the long run, it is envisioned that Mauritania will become a Title I or Title III recipient. Ultimately, the objective is to reestablish food self-reliance such that Mauritania no longer depends upon concessional food assistance.

This Food for Development program is timely and consistent with the GIRM and USAID/Mauritania's development strategies. The GIRM's Fourth Five-Year National Development Plan recognizes the need to retard rural-urban migration and has reoriented investment priorities toward rural development.

Almost all planned projects in the rural sector aim directly at increasing food production. By the year 2000, the GIRM aims to achieve food self-sufficiency.

The USAID/Mauritania country development strategy is supportive of this national effort. A key objective of the CDSS is to increase food availability and food production. Potentials in both dryland and irrigated agriculture are targeted for development interventions.

Consistent with these GIRM/USAID objectives, the purpose of this Section 206 program is two-fold: (1) to increase domestic marketed food production; and (2) to strengthen the food pricing, marketing, and distribution system. At the end of the project in 1987, the Office of Mauritania Cereals (OMC) will have more than doubled its purchases of locally produced grains from 2,000 MT to 4,500 MT annually; OMC handling capacity will have increased from 20,000 MT to 64,500 MT with stocks turning over annually; and the OMC will be operating as a financially self-sustaining institution.

The outputs of the program constitute an integrated package of interventions directly impacting upon the achievement of the project purposes. A key feature — and the major one justifying this multi-year commitment — is the support this program gives to USAID/Mauritania's food price policy reform program. Under this program, OMC wholesale prices will be raised to import parity plus internal transport and handling by 1987. These adjustments are expected to put upward pressures on producer prices. Through policy dialogue, USAID/Mauritania will concomitantly urge the National Committee for Food Security to increase producer prices.

While adjusting prices toward import parity, a food price stabilization program component will aim to stabilize market prices within a range of fluctuation not to exceed 20% by 1987. Training and warehouse construction will be provided to increase the OMC's handling capacity and thereby its influence on market prices.

As efforts to increase and stabilize prices proceed, a food crop extension program will directly support GIRM efforts to increase local cereal production. This extension effort draws upon the successful experience gained through an AID-supported integrated rural development project scheduled to end in December, 1982. The proposed activity is in the most productive rainfed region of Mauritania and employs an animal traction technology package which has already proven acceptable to farmers. The extension effort will aim to increase domestic production an additional 670 MT/year by 1985.

The 206 program will also directly support local food production through the reinforcement of the GIRM's crop protection service. This intervention supplements an on-going USAID project and will expand the operational capacity of the service unit by an additional 8,400 hectares per year by 1987.

Section 206 support to the Mauritania Rural Roads Improvement Project (862-0214) will have a favorable impact on food production by improving extension agents' access to farmers and by reducing transport costs of marketed inputs and outputs. The road system traverses to some of the most potentially productive agricultural regions in Mauritania. One of these regions is the Guidimaka region, the location of the crop extension effort noted above.

Also facilitating the timely distribution of food aid will be the construction of a bulk handling facility at the Nouakchott port. The facility will significantly reduce excessive demurrage charges now incurred due to poor offloading capabilities. These savings will reduce OMC transport costs and will significantly reduce the extent to which upward price adjustments under the food price policy reform program must be made.

In addition to the policy reform and development project activities to be funded, the GIRM is prepared to carry out a series of self-help measures designed to strengthen its commitment to development and to increase the transfer of resources to the rural sector.

The GIRM will:

- annually increase GIRM recurrent and capital budget allocations to the rural development sector in real terms;
- in keeping with the Grain Market Stabilization Program objectives, announce domestic foodgrain production purchase prices by May 1, prior to the planting season;
- initiate a series of pricing policy studies for sugar, tea, and rice. The Studies will examine the feasibility establishing domestic wholesale market prices at import parity plus internal handling costs;
- improve the planning, analysis, and coordinating capabilities of the GIRM to provide more comprehensive planning in the food and rural development sectors.

The GIRM and USAID will implement a program management plan which incorporates respective rules, regulations, and guidelines which meet acceptable standards of financial, commodity, and accounts management as well as acceptable standards of performance for project implementation and evaluation.

The Section 206 program will be under the joint management of an Executive Steering Committee co-chaired by the GIRM Minister of Finance and Economy and the Director, USAID/Mauritania. The development activities will be co-supervised by the GIRM and USAID appointed project officers. Program operations will be examined quarterly with corrective action implemented as needed. Annual evaluations will justify program modification, continuation, or termination.

II. ECONOMIC DEVELOPMENT SETTING

A. GENERAL

Mauritania is a poor, mostly desert country where the majority of the 1.6 million population is either nomadic herders or subsistence farmers. Livestock herding and agriculture employ more than 85% of the labor force. However, urbanization is occuring at a rapid rate due to the attraction of urban living and the limited income earning opportunities in the agricultural sector.

Since independence in 1960, government investment has been mainly directed toward the construction of transport infrastructure and the exploitation of mineral resources, notably iron ore. Iron ore accounted for 80% of the value of total exports in 1978. Rich marine fishery resources are beginning to be tapped and oil exploration efforts have just begun.

Per capita GDP in 1980 was about $365. In the rural sector, an AID-sponsored Rural Assessment and Manpower Survey (RAMS) estimated that the average monetized rural income in 1980 was $300 per capita. The survey found that only 5% of rural household income is attributable to the sale of agricultural products. On the other hand, livestock activities accounted for 22%; fishing, 2%; commerce, 16%; remittance and gifts, 16%; and government/business salaries, 22%.

The GIRM has made efforts to improve living standards. Nevertheless, the daily per capita calorie supply as a percentage of requirements is 86% (1977); adult literacy is 17% (1976); the child mortality rate (ages 1-4) is 29 per 1000 (1979); 16% of the urban population has access to safe water (1978); and life expectancy is 43 years (1979).[1]

National Resources and Constraints

Mauritania's known economic resources are limited. The fragile natural resource base offers some potential for expanding agricultural and livestock production.

However, major economic, social, as well as substantial investments and political constraints must be overcome in order to realize this potention. Substantial investments are also required which largely capitalize upon intensive as opposed to extensive, development of the land resource base. Less than a third of the total land area of 1,031,000 square kilometers is suitable for culti- vation and raising livestock. Moreover, rainfall in many of these areas is often irregular and insufficient.

Prospects for exploiting the country's mineral and fishery wealth appear favorable. Government investment mainly supports the mining sector as the engine of economic growth. The fishery industry is receiving increasing emphasis and could become a major foreign exchange earner. However, these sectors fall far short of generating sufficient employment for those seeking work and urban unemployment continues to be a serious problem. For this reason, the GIRM is attempting to give more emphasis to agricultural development to improve rural living and help retard the pace of rural-urban migration.

Human resource constraints also contribute to the country's slow pace of development. Few Mauritanian administrative and technical personnel were trained before independence and this scarcity is still strongly felt today throughout all levels of government.

In addition to the relative scarcity of natural and human resources, Mauritania continues to be plagued by financial difficulties. These reached the crisis stage in 1978 when world iron ore prices stagnated and some of Mauritania's major donors sharply reduced budgetary and balance of payments support.

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[1] Comparable average figures for the world's 34 lowest income countries, excluding India and China, are 96% (caloric supply), 43% (literacy), 18 per 1000 (child mortality), 25% with access to safe water (1975), and 50 (life expectancy). Average per capita income for these countries was $240 in 1979.

Prior to these developments, the economy had already been weakened by the Sahelian drought, unprofitable public investments (principally a sugar and an oil refinery), and the costly Western Sahara War. In contrast to an impressive average annual real growth rate of 10% in the 60's, the growth rate slowed to 1.0 to 1.5% in the 70's. Taking into account the population growth rate of 2.9%, per capita income declined in real terms. In 1980, real GDP per capita was estimated to have fallen 1% but rose 4% in 1981 as a result of increasing fish exports, expanded livestock production and a record cereal crop.

Long Term Strategy and Prospects

In response to the financial and economic crisis, the GIRM undertook in 1979 a "Rehabilitation Plan" to redress its difficulties. The Plan, prepared with World Bank assistance, was supported by a complementary IMF Stand-by Arrangement to stabilize the economy, reorient the pattern of investment, and lay a course for sustained long-term economic growth. Most recently, the GIRM released its Fourth Five-Year National Economic Development Plan (1982-1986) which further articulates the national development strategy.

This strategy reverses past policies in which the government played the dominant role in organizing and directing investments in mining and basic industry. A new policy of openness towards private foreign investment will be followed instead. The main and probably the only major public sector project to be started over the next few years will be the Guelbs iron ore mine project while the traditional sectors (agriculture, livestock and fisheries) will be given increasing priority.

The Guelbs project will be the cornerstone of the Fourth Five-Year Plan and the main source of economic growth until 1985. Growth in the rural sector will remain modest because of the long gestation of agricultural projects. After 1985, the rural sector is expected to grow about 3.8% per annum if all irrigated projects included in the Plan are successfully implemented.

Performance under the stabilization program which ended in March 1982 was satisfactory but the financial situation remains precarious. Consultations between the GIRM and the IMF we rescheduled for September to explore the possibilities for a one-year Stand-By program in 1983. Negotiations are currently underway for an IMF Extended Finance Facility. Given the current economic situation and long-term growth prospects, it is evident that substantial donor assistance will be required over the next several years.

B. RURAL SECTOR

Structure

The rural sector includes the livestock, agriculture, and fishing sub-sectors. Since 1974, the rural sector's share of GDP has averaged about 27.0%. In 1979 the estimated share was 26.4%. The livestock sub-sector dominates rural economic activity and accounted for about 21.7% of GDP in 1979; agriculture and artisanal fishing contributed 1.4% and 3.0%, respectively. In 1970, these sub-sectors represented 19%, 4%, and 4% of GDP, respectively. Thus, relative increases in livestock have offset the declines in agriculture production and fishing such that the rural sector's share of GDP has been maintained.

Livestock include cattle, 1.2 million; sheep and goats, 7.5 million; and camels 0.7 million (1978 figures). After the severe drought of 1968-1972, the livestock population recovered, except for cattle, where reproduction is slower. As production exceeds domestic needs, a sizable part is exported, mostly on the hoof to Senegal and the Gambia. With the recovery of the herd, overgrazing has become a serious problem. The Government is encouraging the movement of cattle to the Senegal River region from the desert regions as overgrazing in these areas leads to desertification.

Agricultural production consists mostly of subsistence cultivation of cereals (millet, sorghum, and rice), vegetables, dates, and the harvesting of gum arabic. Local food production meets about one-third of domestic needs with the balance met by imports.

Traditional fishing, which accounts for 5% of GDP, is carried out from small boats along the Senegal River and around Nouakchott and Nouadhibou. In an effort to modernize the traditional fleet, the Government has purchased a number of boats and constructed cold storage facilities with Japanese financial assistance.

Potential and Constraints

Potential exists for expanding output in the rural sector but this is limited by several major constraints. These include the lack of arable land, inadequate rainfall, harsh ecological conditions, land tenure problems, weak food production incentives, insufficient physical and institutional infrastructure, and a paucity of financial resources.

In the livestock sector, growth of the national herd is limited by the land's carrying capacity. Some potential still exists for increasing the number of animals; however, production expansion in the future must be largely achieved through increased offtake and improved range management practices.

In agriculture, the GIRM and donors are mainly investing in irrigated and recessional as opposed to rainfed agriculture. Potential and constraints in the food sector are examined in detail in section IIIA below.

The expansion of artisanal fishing is constrained by the severe shortage of drinking water along the coast between Nouakchott and Nouadhibou. This stretch of coastline is abundant with fish but costly desalination facilities would have to be installed to support settlements. GIRM initiatives in the fishing sector presently focus on exploiting the modern maritime fishing sector through joint ventures with foreign fleets.

Girm Rural Development Strategy and Commitment

Recognizing the need to direct development more towards exploiting the renewable as opposed to extractive resource base, the GIRM's Fourth Five-Year Plan reorients government investment more towards rural development. Under the Third Five-Year Plan, investment expenditures in the rural sector were almost negligible. In contrast, the Fourth Plan allocates 25.5% to rural development.

The three major objectives of the plan for the rural sector are the following:

(1) food self-sufficiency;
(2) protection of the natural environment; and
(3) stabilization and reversal of rural-urban migration.

Projects totaling $387 million have been identified to support the achievement of these objectives. Project activities summarized by category are as follows:

	$	%
	(millions)	
Irrigated agriculture	235	61
Recessional agriculture (including small dams)	37	10
Rainfed agriculture	21	5
Livestock	28	7
Environment	16	4
Other	150	13
TOTAL	$ 387	100%

Of the total amount, 92% is to be financed by donors. Donors must finance almost all project costs because of the GIRM's tight budgetary constraints.

The lack of financial resources is also evident in the government's capacity to finance recurrent costs. Under the IMF Stand-By agreement, the GIRM has made impressive progress each year since 1978 in reducing the national budget deficit (in billion Ouguiyas; 1978-81, respectively: 5.9, 5.2, 4.5 and 3.9). Adjusted for inflation, these declines in real terms are even more significant. Compliance with IMF performance criteria, support of the war, and "misallocation" of development priorities are reflected in the relatively marginal allocation of GIRM recurrent cost support to rural development in recent years. In 1982, only 1.2% of the recurrent budget was allocated to rural development compared to 1.6% in 1981.

Priority budget allocations in 1981 were to defense (18%), education (12%) and interior (local government administration) 7%. Support to mining/energy and commerce/industry were 0.1% and 0.3% respectively. Other notable expenditures were those for debt amortization and interest (13%), subsidies and transfers (8%), capital investment (6%) and miscellaneous (18%). Thus, GIRM domestic budgetary allocations to the more directly productive sectors of the economy have been relatively small. Increasing GIRM support to the productive sector should be expected in light of Mauritania's withdrawal from the Western Sahara War, continuing progress towards achieving financial recovery, and the implementation of the Five-Year Plan calling for more support of productive activities, particularly rural development.

III. FOOD SECTOR ANALYSIS

A. GENERAL

Prior to the 1970's, Mauritania was self-reliant in meeting its cereals needs through local production and commercial imports. During the 1970's, food production suffered major setbacks. Drought took a disastrous toll, and agricultural development suffered from government neglect due to the war as well as the public investment priority given to mining and transport infrastructure. At the same time, population growth and rural-urban migration increased at alarming rates. Domestic food production capacity fell and the government's capacity to finance commercial imports quickly eroded with the stagnation in iron ore prices and failure of several public sector investments. As a result, Mauritania must now meet about a third of its food requirements through food aid. Remaining needs are met by commercial imports and local production, each satisfying about a third of total demand.

Mauritania produces sorghum, millet, and rice as its main food staples. The bulk of domestic cereals is produced in the southern third of the country along the Senegal River border with Senegal and Mali. Rainfed, recessional, and irrigated cropping systems are used. The majority of producers are sedentary subsistence farmers on small farms ranging in size from about 1.0 to 2.5 hectares depending on the cropping system used. Annual domestic production in normal years is about 70,000 metric tons (MT) compared to total requirements of about 200,000 MT. Several government agencies have been established to market cereals and stabilize food prices. Detailed analyses and trends related to food supply, demand, and marketing are presented in subsections C, D, and F.

Food Production Potential

Studies examining Mauritania's foodgrain production potential suggest that over the next couple decades the country may be capable of satisfying most of its food needs through increased domestic production.

The AID-supported Rural Assessment and Manpower Surveys (RAMS)[1] estimates that up to 82% of needs could be met domestically by 1990. Another AID study (Enger)[2] projects that up to 67% of needs could be met. Realizing this potential will require substantial investments and will entail overcoming numerous constraints as will become more evident below. At present, domestic production provides about 35% of total requirements in a normal year.

Food production is basically carried out on dryland (rainfed, small dam, and recessional agriculture) and on developed irrigated land. At present, dryland and irrigated systems provide 30% and 5% of total food demand, respectively, in a normal year. The RAMS study suggests that up to 30% of the year 2000 food needs can be met through dryland techniques compared to 53% for irrigated. Enger suggests that 28% of 1990 requirements can be met by dryland farming compared to 39% for irrigated. By the year 2000, Enger concludes that if proposed irrigation projects are realized, Mauritania could come close to attaining self-sufficiency even assuming modest yields (e.g. 1.5 - 2.0 MT/ha).

Although Mauritania's potential appears promising, the substantial costs for realizing it are important and of increasing concern to donors. In the irrigation sub-sector, a major issue is the economic viability of the proposed schemes. This is reflected in a recent OMVS/FAO analysis which notes four principal problems that have inhibited the realization of the agricultural objectives of the OMVS, particularly the pace of development.[3]

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1 GIRM, Ministry of Economy and Finance, Directorate of Studies and Programming, "RAMS Project, Rural Assesssment and Manpower Surveys Synthesis", August 1981.

2 Enger, Warren J. "Mauritania Food for Development Program (PL480 Title II, Section 206) Background Report", AID, April 27, 1981. (See Annex F)

3 Rapport Intermaire, FAO, 1981.

These are: (1) the high cost of irrigation development required for water control; (2) the high preparation costs of the irrigated perimeters; (3) the large recurrent costs to the national development organizations; and (4) the growing debt of farmers in the irrigated perimeters.

The World Bank, which played a major role in assisting the GIRM to develop its Fourth Five-Year Plan, also recognizes these problems. The Bank questions the cost-effectiveness of rainfed projects as well. In a recent economic report, the Bank notes that "...The Plan rightly gives priority to irrigated agriculture for more than any other Sahelian country, the possibility of developing rainfed agriculture is limited. However, viable projects at an advanced stage of preparation are lacking. Many irrigation projects included in the Rehabilitation Plan need substantial additional preparatory work to become economically viable."

The Bank believes there may be lowland "pockets" in rainfed areas where potential is good. However, it is believed that these are widely dispersed and that efforts to develop them would not be cost effective. The IBRD is implementing a major 3,500 ha. irrigation project, the Gorgol project, from which the Bank expects only modest economic returns.

Enger similarly concludes that irrigation represents the best potential for increasing production of local foodgrains, but also notes it is extremely expensive to develop — ranging between $2,000 per hectare for small perimeters to $10,000 for most larger ones. The proposed IBRD-financed large-scale irrigation project on the Gorgol Noire will cost $25,000/ha. but this includes construction of a large dam in addition to irrigation infrastructure.

The RAMS study is more supportive of rainfed interventions noting that,

> "Government agricultural policy has given priority to irrigated agriculture. However, it must be noted that rainfed agriculture can, with a modest amount of investment,

contribute up to 30% of the grain for domestic consumption in the year 2000. Rain-fed agriculture has been neglected until now, but it must receive priority attention during the transitional period which will last until irrigated agriculture can reach its maximum rate of development: an increase in production in rain-fed agriculture can be made possible through improved technology, intercropping and animal traction."[4]

USAID/Mauritania's food and agricultural sector strategy (See Annex H) concludes that dryland agriculture will be the most effective means of increasing food production in the short run. However, it recognizes that irrigated agriculture may be the only long run solution for satisfying the caloric requirements of Mauritania's population. The Mission supports both dryland and irrigated agricultural development through its bilateral and regional OMVS programs.

A major consideration USAID/Mauritania has taken into account in pursuing its dual dryland-irrigated approach is the timing of irrigated land development. Proposed irrigation projects will not be completed until the turn of the century assuming implementation proceeds without unexpected delays. Urban employment opportunities are limited and all farmers cannot be resettled to irrigated schemes. Therefore, the GIRM and USAID/Mauritania believe efforts should continue to develop the potential that exists in the dryland as well as irrigated areas.

In pursuing both dryland and irrigated development, government and donor efforts must continue and accelerate to increase yields and improve the financial returns to farming.

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[4] Islamic Republic of Mauritania, Ministry of Economy and Finance, Rural Assessment and Manpower Surveys (RAMS), Rural Production, June 1981, p2

More attention must be given to dryland agriculture in particular if the potential in this sub-sector is to be realized. GIRM support to dryland agricultural development has been weak to date. Comparatively little dryland research has been done at the Kaedi Research Center and the curriculum at the Kaedi Agricultural School does not have a well developed dryland farming element. Support also has been weak due to the limited availability of financial resources and trained personnel.

To perhaps a large extent, the relative lack of priority and allocation of GIRM resources to dryland agriculture is influenced by donor interests. Most major donors continue to support irrigated agriculture although more interest is being shown in dryland approaches. The Germans, for example, will implement two major projects in recessional agriculture in the near future.

In rainfed agriculture, the USAID Guidimaka Integrated Rural Development project is Mauritania's most significant activity. However, this project terminates in December 1982. For this reason, the Ministry of Rural Development places it highest priority on the continuation of this project. USAID/Mauritania shares this priority and proposes that the most successful components of the project be continued. (See Guidimaka Crop Extension and Village Infrastructure sub-project description in Section VI E below.)

In light of the donors divergent views concerning dryland and irrigated farming systems, the Title II team recommends that the AID agricultural assessment team to be fielded to Mauritania this fall reexamine in particular the production potentials and development costs relating to dryland and irrigated systems.

Constraints

Potential growth in local cereals production is limited by a combination of constraints which are climatic, economic, technical, and social in nature. The most formidable limitation is the natural environment.

Only the lower third of the country is arable, and this area is characterized by inadequate rainfall, periodic and often devastating drought, and erosion attributed to excessive human and livestock populations.

Present food production systems carry high risks and generate insufficient income to stem the rapid pace of rural-urban migration. Increases in both productivity and producer prices are needed to enhance the profitability of food production.

Migration from villages in the search of higher urban wages in Mauritania and abroad has become an established social phenomenon. Young males aspire to emulate their migrant mentors who are the admiration of the village for their income earning ability and cosmopolitan orientation. Farming, in contrast, involves high risks, meager income, and employment for only about five months of the year.

The lack of physical and social infrastructure (dams, roads, schools, and health clinics) as well as institutional infrastructure (research, extension, marketing and credit) is also evident. A particularly pervasive problem is the limited availability of trained personnel at all administrative and technical levels of agricultural institutions.

Land tenure problems are considered by some observers as perhaps the single most serious constraint. Because of land disputes, scarce arable land may not be cultivated and project implementation can be seriously threatened.

The nomadic Maur population constituting 80% of the population have not traditionally been cereal producers. They continue for the most part, to raise livestock and to engage in more socially prestigious occupations. Grain production is largely left to the more sedentary Black ethnic groups.

Lastly, inadequate financial resources, public and private, are major constraints. GIRM capital and recurrent budget support to agricultural development continues to be limited.

On the other hand, favorable responses to GIRM requests for donor support of agricultural programs are now helping to overcome this constraint. As the GIRM successfully implements its long-term Rehabilitation Plan, its own capacity to support the more productive sectors of the economy should be enhanced.

Private sector rural savings and credit are similarly scarce. No formal institutional credit system exists although consideration is now being given by a major donor to help develop one.

B. GIRM FOOD SECTOR STRATEGY AND POLICIES

Strategy and Planning/Analysis Capability

The GIRM recognizes the challenge posed by the above constraints and is taking steps within its present limited capacity to address them. It is obvious that increasing local food production to levels meeting even two-thirds of total needs will be a long term endeavor, encompassing at least two decades. These efforts will involve high costs which are likely to be met largely by external assistance.

The GIRM food sector strategy is to achieve food self-sufficiency by the year 2000. This will be achieved mainly through the development of irrigated agriculture in the Senegal River Basin. The Five-Year Plan projects food requirements to be 322,000 MT in 2000. Of this amount, 284,000 MT is expected to be met through irrigated production with the remaining 38,000 MT supplied by traditional dryland farms.

GIRM food sector planning and analysis is not done on a continuous basis. There is a technical studies unit in the Directorate of Agriculture but a formal agricultural planning unit does not exist. To prepare the rural development chapter in the Plan, a high-level ministerial commission was established. This commission worked in close coordination with World Bank planning advisors assigned to the Ministry of Economy and Finance (MEF). The MEF prepared the Plan in coordination with all other ministries. The Plan sets objectives and target goals for each sector.

Each ministry submits project proposals for MEF approval. The approved list of projects largely constitutes the sector plan.

There is no comprehensive GIRM food sector strategy such as those currently recommended by the World Food Council. Several food sector related studies have been done - an FAO Food Security Plan, an assessment recently completed by FAC, various RAMS studies, selected project papers, and the substantial analysis undertaken as part of the OMVS initiative. The IBRD is now encouraging the establishment of a planning and coordination unit in the Ministry of Rural Development. It will likely be another year before such a unit can be formed. Thus, at present, the MEF remains the focal point of rural development planning activities.

Food Sector Related Policies

In addition to the GIRM's strategy statement, specific economic policies can further reflect the commitment and likely success potential of food sector production programs. Several policy considerations have already been discussed. It has been noted that GIRM long term development priorities have shifted toward rural development and particularly food production. This is evidenced in the stated objectives of the Five-Year Plan and the allocation of Plan investments. These investments are largely financed by the donors. Nevertheless, the GIRM proposes to increase its support to the productive sectors and this should be reflected in increasing shares of recurrent budget expenditures to rural development as the economy recovers from the current financial crisis. Other GIRM policies deserving of further note are those relating to food self-sufficiency and cereal pricing and marketing.

Food Self-Sufficiency

Perhaps the GIRM's most significant food sector policy is its goal to achieve food self-sufficiency by the year 2000. The potential for achieving this goal is discussed in section C. Mauritania currently produces few cash crops.

As irrigated land is developed, consideration should be given to producing high value crops on portions of the land. A policy of food self-reliance as opposed to food self-sufficiency may be more appropriate should comparative advantage considerations so dictate. Such a policy may further increase the returns to labor thus strengthening farming incentives and enhancing prospects for retarding rural-urban migration.

This option might be further explored with respect to dryland farming in particular. At present, cash crop production is considered inappropriate in rainfed areas due to poor agronomic conditions. On the other hand, gum arabic trees may offer some potential. The EEC will soon begin a project to determine if gum arabic production can be re-established as a commercially viable venture and as a means of reforestation. This and other possibilities might be considered in the forthcoming AID agricultural sector study.

Cereal Pricing and Marketing Policy

The GIRM establishes official producer and consumer prices and operates several public marketing institutions to stabilize these policies. A security stock is maintained as well. Consumer prices are subsidized to reduce the impact of high prices on poor consumers, particularly those in urban areas. Limited quantities are distributed free to the indigent. Official consumer prices for wheat, sorghum, and millet are higher in Nouakchott than in the countryside to discourage rural-urban migration. However, official wholesale prices for rice in Nouakchott average only two-thirds as much as countryside prices. Neither consumer nor producer prices are adjusted to reflect changes in transportation and handling costs to different regions of the country. High prices are charged on sugar and tea to cover the subsidy on rice.

Producer prices are not subsidized except for seeds and fertilizers used in the production of rice on irrigated land. A detailed analysis of GIRM cereal pricing policies and recommended changes are presented in Section IV. Sub-section F provides a more thorough analysis of the current food marketing structure.

C. FOODGRAIN SUPPLY

Background

Prior to the extended droughts of the 1970's, Mauritania was self-reliant in foodgrains (short-term emergency relief supplies excluded). A combination of domestic production, commercial imports, and unofficial border trade was sufficient to meet on-farm and domestic market requirements. The drought brought about socio-economic changes which have had and will continue to have long term effects on foodgrain supply. The most significant of those changes has been out migration from marginal production areas. The combination of lack of adequate water and decreasing numbers of producers have led to decreasing per capita food production -- less land under cultivation and decreasing yields per hectare. There has been a concomitant increasing reliance on imports -- both commercial and grant food aid.

Discussion

There are three basic sources of foodgrain supply for Mauritania: domestic production, commercial imports (including official and unofficial border trade), and grant food aid.

Domestic Production

The FAO has estimated that there are 190,721 hectares under foodgrain cultivation in Mauritania. Of these, 138,000 are farmed using traditional rainfed methods, 48,000 are under recessional methods and 4,721 are using improved irrigation. The FAO also estimates that assuming a normal year of rainfall and growing conditions, foodgrain production should be about 69,900 M/T. The Enger Report, using actual rainfall data and production yields during the drought years of the 1970's, shows that the average annual foodgrain production was 55,709 M/T (See Annex F). This is 14,191 M/T or about 20% below the FAO estimated normal year production level.

The GIRM and Multi-donor Mission report that production in 1980 was 41,000 M/T (down from the 1970's average of 55,709 M/T) and in 1981 was 75,000 M/T (a major increase in real terms but only slightly above a FAO normal year of 69,900).

Food supply in Mauritania is also seriously affected by crop losses. First, it is estimated that at least 20% of the foodgrain crop is lost in the field due to crop disease, pests, etc. Second, it has been estimated that up to 15% of production is lost after harvest due to poor storage, handling and marketing conditions. Taking these losses into account, the production base is better than the statistics indicate. Even with existing production technology, proper attention to these problems followed by corrective action would have significant impact on food availability and import requirements.

Commercial Imports

Official commercial foodgrain imports are rice and wheat flour. The rice is imported and marketed by SONIMEX, a GIRM parastatal. An average of 52,100 M/T were imported over the period 1978-1981 with an estimated 65,000 M/T to be imported during 1982. There is every indication that the annual demand for rice will increase with urbanization and sedentarization and that there will be pressure on SONIMEX to increase imports to meet those demands. Thailand, through French intermediaries, is the primary supplier. The wheat/wheat flour is imported through FAMO, an association of private flour millers and dealers. During the period 1978-1981 an average of 18,200 M/T of wheat and wheat flour in wheat equivalent was imported. It is expected that 27,900 M/T will be imported during 1982. As with rice, there is every indication that the demand for wheat products will continue to increase and that the GIRM will approve FAMO importations.

Unofficial border trade cannot be accurately measured and addressed due to the absence of reliable data. It is generally understood that foodgrains are bought and sold along the borders between Mauritania and Senegal and Mali.

The effects of foodgrain balance sheets in the three countries is unknown. However, the relative pricing structures are such that: (1) millet comes over the border from Mali into Mauritania, so much so that Mali closed its border in 1981, and (2) the domestic subsidized consumer price of rice -- imported and local -- maintained by the GIRM results in shipment across the river into Senegal.

Donor Food Aid

Grant food aid represents a significant portion of the foodgrain available in Mauritania. Following are foodgrain import levels for all donors:

FY 1978	51,500 M/T
FY 1979	22,985
FY 1980	67,372
FY 1981	68,490
FY 1982	55,500

Except for the Catholic Relief Service distribution program, food aid is programmed directly to the GIRM and managed by the CAA and the OMC. The majority of the foodgrain is apparently sold through commercial channels. (An estimated 10-20% is available for free distribution.) A major effort is underway among donors to concentrate their contribution under the OMC in support of the Grain Market Stabilization Program. As this stabilization program becomes more effective and improved production and crop management projects come on line, food aid requirements should decline as a percentage of the total foodgrain requirements. Further, as domestic market prices are increased to reflect import parity plus internal handling costs, some part of the donor import program should become commercialized. Ideally, rice purchases currently controlled by SONIMEX will be opened up to private merchants as well.

Following are Supply/Demand Tables for basic foodgrains:

RICE (000 M/T)

SUPPLY	1978	1979	1980	1981	1982
Beginning stock		10.0	2.0	2.0	2.5
Domestic Production	6.0	6.8	6.5	6.5	6.6
Imports					
Commercial					
Thai (French)	57.0	50.0	42.0	60.0	65.0
Grant					
S. Arabia					5.0
Japan					1.7
Iraq				.5	
Total Imports	57.0	50.0	42.0	60.5	71.7
TOTAL SUPPLY	63.0	66.8	48.5	69.0	80.0
DEMAND					
Market	49.0	60.8	42.5	62.5	74.0
Subsistence	4.0	4.0	4.0	4.0	4.0
TOTAL	53.0	64.8	46.5	66.5	78.0
Ending Stock	10.0	2.0	2.0	2.5	2.0

NOTES:

1. There is little data available on rice consumption in the producing areas and on how much the producer sells across the border. Therefore, production figures in Supply and subsistence figures in Demand are estimates.
2. The market statistics in Demand are not necessarily the total amount the market might move, but rather the amount SONIMEX releases into the market.

SORGHUM/MILLET (000 M/T)

SUPPLY	1978	1979	1980	1981	1982
Beginning Stock					
Domestic Production	30.0	48.2	22.0	33.0	55.0
Imports					
Commercial					
Grants					
USG	10.0		10.0	9.0	10.0
WFP	10.0				
CRS		3.0	3.6	4.0	4.5
Total Imports	20.0	3.0	13.6	13.0	14.5
TOTAL SUPPLY	50.0	51.2	35.6	46.0	69.5
DEMAND					
Subsistence	28.0	46.2	20.0	31.0	53.0
Market	22.0	5.0	15.6	15.0	16.5
TOTAL DEMAND	50.0	51.2	35.6	46.0	69.5
Ending Stock					

NOTES:

1. Sorghum and millet are substitutable in Mauritania - at least statistically.
2. The GIRM and the Multi-donor Mission do not calculate ending stock in determining the structural deficit.

WHEAT/WHEAT FLOUR (000 M/T)

SUPPLY	1978	1979	1980	1981	1982
Beginning Stock	5.0	17.0	8.0	12.0	14.0
Domestic Production	2.0	2.0	2.0	2.0	2.0
Import					
Commercial					
France	13.6	13.6	20.4	30.9	35.9
Grants					
WFP	10.0	10.0	12.5	12.5	8.0
Dutch	4.5		3.0	3.0	
G. Britain	5.0				
Germany	5.0		3.0	5.0	
EEC	7.0	7.0	11.0	2.0	10.0
Belgium		2.0			1.5
France		4.0	6.0	6.0	
Spain			4.0	4.0	2.0
CILSS			3.5		
USG			13.8	15.6	
Canada				2.3	
Finland				3.5	
Libya				4.0	2.0
S. Arabia					10.0
Total Imports	45.1	34.6	77.2	88.8	69.4
TOTAL SUPPLY	52.1	53.6	87.2	110.0	85.4
DEMAND					
Subsistence	2.0	2.0	2.0	2.0	2.0
Market	33.1	43.6	73.2	94.0	73.4
TOTAL DEMAND	35.1	45.6	75.2	96.0	75.4
Ending Stock	17.0	8.0	12.0	14.0	10.0

NOTES:

1. Wheat flour is incorporated as wheat equivalents.

D DEMAND

The estimated total population in Mauritania in 1982 is 1.6 million inhabitants which can be divided into two general groups for the purposes of cereals demand analysis: nomadic (36% in 1977) and sedentary. Trends within these population statistics have important impacts on demand for cereals: (1) a relatively high overall population growth rate estimated at 2.7% per annum; (2) increasing sedentarization (decreasing nomadism — at an estimated annual rate of 3%); and increasing urbanization — both to the larger cities and intermediate population centers. This urban population is estimated at 30% of total population in 1982, up from 21% in 1977.

The interrelated trends of sedentarization and urbanization, resulting in large part from the drought period of the 1970's, have had profound impacts on the structure of demand for cereals in Mauritania. Substitution of cereals for livestock products (i.e. milk and meat) is known to occur with sedentarization and increased consumption of imported cereeals (i.e. rice and wheat) occurs with urbanization. As data on consumption patterns does not permit differentiation between types of cereals consumed, this demand analysis combines the sedentary and urban population as one consumer group. In addition, overall population growth, if accompanied by decreasing domestic production per capita, will result in an increased demand for imported cereals.

The recent trends of increased sedentarization has several causes: loss of livestock from the drought; worsening terms of trade between livestock and cereals; and diminishing carrying capacity of the land which results in competition for land between herders and cultivators. High rates of urbanization result from these same conditions as well as perceived improved employment opportunities in urban areas and the attractiveness of administrative services i.e. health facilities, schools, and, most importantly for this II-206 program, distribution of food aid.

Evide ce suggests that acceptable average minimal demand estimates for cereal in Mauritania is 135 kg/year for sedentary/urban inhabitants and 4 kg/year among nomadic groups. These average figures are used here for calculations of demand figures and food availability deficits. However, these average figures must be treated as minimal needs whic do not take into account structural consumption and nutrition defic encies. They are, for example, considerably below estimates of cereal vailabilities for other Sahelian countries. Unfortunately, very littl information exists as to how the distribution of cereals consumptio varies around these average figures. Considerable variations in ereals availability must be assumed to occur by season, geographic region, income level, ethnic identification, sex/age group. These figu es may overestimate average per capita food availabilities, particular y for non-producers as no account has been taken of field and post-h rvest losses which may be as high as 35% of production. In addition, o estimation is made for on-farm reserves which may be considerab e in good harvest years. The presence of on-farm stocks generally implies higher consumption levels among rural sedentary groups an decreased cereals availability among nomads and urban dwellers.

It is assumed from the evidence available that the FAO recommended that minim l nutrition levels are attained with an average per capita consumptio of 120-130 kg/year. When recent nutrition studies are compared w th findings from the 1950's and 1960's, it appears current average nu rition status has regained pre-drought levels. However, it is fairly lear that certain less advantaged groups suffer from malnutrition iffering in intensity from serious to moderate. Both studies and healt workers indicate that at least 10 percent of all children under five are severely malnourished. Approximately 35-45% fall within the modera ely malnourished category as defined by CRS.

E. DEMAND PROJECTIONS

Total population is estimated to increase by 20% to over 2 million inhabitants by 1990. If minimum average consumption is estimated at 124.5 kg per inhabitant (a weighted average reflecting 84 kg/nomad and 135 kg/sedentary inhabitant), the minimum total demand in 1990 is estimated at 250,500 M/T. (For greater detail see Annex F.)

Production

In projecting the cereals deficits for the food balance sheet, a range of both high and low estimates have been calculated. This high estimate assumes an expansion of irrigated production by 2,000 has/yr until 1990 with an average yield of 4T. The low estimate assumes expanding irrigation by 1,000 has/yr with average yields of 3T. For the purposes of projections, these acreages and yields will be held constant for the next decade. The main reason for this is that arable land is limited and most investment in extension work and production inputs is in irrigation. Therefore main variations will occur in acreage and yields under irrigated agriculture.

The worst case scenario would put production in 1990 at 62,000 MT, slightly less than the FAO "normal" year production but with an additional 10,000 hectares under irrigation. This would represent extremely dry years with extremely low river floods throughout the decade. Our high projection, 167,050 MT, assumes a regular development of irrigation reaching 26,000 has by 1990. However, this is modest in terms of GIRM hopes and quite conservative in terms of double cropping potential. It is, however, realistic in terms of agricultural extension capabilities and management levels. It should be emphasized that these production estimates are considered to be the outside parameters for any given year of production potential. The likelihood of obtaining the upper estimates is considered to be less than 10%, or one year out of ten. On the lower end, the historical data would indicate that in four out of ten years, the low estimates will be real. Thus our probability distribution is skewed toward lower production potential.

Carryover stocks are totally omitted as no estimation of on-farm stocks exists and official grain handling agencies do not maintain even indicative inventory figures.

Summary of Estimates of Cereals Deficit in 1990

1990	tot. requirements*	production	deficit	commercial imports	residual
high	250,500	167,050	83,450	80,000	3,450
low	250,500	63,000	187,500	80,000	107,500

(See Enger)

* per capita consumption estimated at 124.5 kg.

IMPORTS

To the high and low estimates of production on the supply side are added projected commercial imports. Mauritania now carries a large foreign debt with heavy foreign exchange requirements for debt servicing. In addition, rising world prices for oil, food items, and manufactured goods will require increasing amounts of foreign exchange, and the prospects for earning foreign exchange do not appear very optimistic. Barring some unforeseen discovery of mineral or oil resources, it is doubtful the foreign exchange earnings will increase substantially. For these reasons, we have decided to project commercial imports of cereals at 60,000 tons of rice and 20,000 tons of wheat flour, which is approximately the present import level.

Projections - Food Aid as the Residual

Our projections to 1990 suggest a continuing food deficit. The high estimate, which will require more intensive efforts and investment in agricultural production as well as good rains, indicates a gradual decline in the deficit. On the other hand, our low estimates show major deficits of increasing quantity throughout the decade.

It is likely that the true availability of cereals will lie somewhere between our two projections for most years in this decade. Thus, if food aid continues at the 40,000 to 60,000 ton levels, it may be able to cover the deficit in the food balance over the next 10 years. However, in the event of an exceptionally low rainfall year, major insect attack or extremely low river flood, 60,000 tons would be insufficient to meet minimal needs.

The level of cereals projected under the proposed project, 20,000 tons per year, would appear to represent about 1/3 of food aid needs. However, if a margin is built in to provide for distributional problems, market imperfections or non-food uses, then the minimum base of 135-150 kgs. per capita requirement as proposed by RAMS would show the situation as more precarious. In a bad year, food aid requirements could rise to 120,000 tons, which is double local production in a good year. It should therefore be kept in mind that the proposed level of PL 480 cereals is intended as a stabilizing mechanism for food prices. Occasional shipments of emergency aid coupled with continued aid shipments by other donors will be needed.

F. MARKETING

Responsibility for wholesale cereals marketing in Mauritania is shared by several actors: the government; para-public institutions; and the private sector. The public institutions engaged are differentiated by commodity or purpose. Each plays a dual role of procurement and redistribution and each interacts extensively with the private sector at different stages. The major state institutions involved are the Food Aid Commission (CAA), The Mauritanian Cereals Office (OMC), and the National Society for Import and Export (SONIMEX).

Imports From Non-African Countries

All cereal imports from non-African countries are handled by one of several governmental, parastatal and private organizations or companies.

CAA

The current CAA was established in 1978 to manage requests for, reception of and distribution of donor food aid. Its distribution policy operates on an ad hoc basis — with the purpose of distributing free and subsidized food aid to areas of acute food deficits. The grain movements are apparently not directed with any systematic programming, but are largely conducted in response to the appeals of local prefects who execute its distribution to the local population. Each prefect has his own critieria for assigning sales and/or quotas to target recipients or groups, e.g., village officials or lists of families, identified through computer lists of the 1977 census. Because little systematic monitoring of food aid procured and distributed by the CAA takes place, the ultimate beneficiaries are not known.

It is estimated that 10-20% of the tonnage of cereals which moves through the CAA is made available for free distribution. The remaining food is sold at subsidized prices (10 UM in Nouakchott and 8 UM in the countryside). The portion of these sales proceeds which are recuperated are used by the CAA to cover its operating costs.

It is not known what percentage of the food distributed is resold at open market prices but anecdotal evidence suggests that the incidence of resale is important. At least a part of the payments made to the local treasury office for these grain sales are known to remain in the local community and not remitted to the capital. This is primarily attributed to the fact that these Treasury receipts are needed to keep the local government machinery running.

Although the grain sales procedure does provide needed funds for local government expenditures, prefects complain that this activity has become the primary activity for the prefectual offices, taking staff time from other functions.

TABLE 1

CAA Food Aid Distribution - 1981

	Shipments	Free Distributions		Stocks	
		Region	Projects	CAA	OMC
Hodh El Guarbi	3,589	1,300	222	100	331
Hodh El Chargi	4,355	1,400	350	-	200
Brakna	2,060	1,500	300	150	1078
Guidimaka	390	300	300	-	320
Assaba	1,900	1,000	350	-	883
D. Nouadhibou	400	300	-	-	-
Inchiri	310	700	150	180	-
Gorgol	858	1,500	300	-	579
Tagart	120	1,000	651	50	-
Adrar	2,820	1,800	150	400	189
Tiris-Zemour	1,100	900	-	20	-
Trarza	2,680	1,800	305	90	1317
District	6,503	2,500	-	2500	8860
TOTAL	27,085	16,000	3,078	3490*	13712

* Does not add to column total due to unidentifiable 45 ton error in CAA stocks

OMC

The OMC, operational since 1976, has reported directly to the CAA since January 1980 when it was transferred from the Ministry of Rural Development. The Director of OMC reports to the Commissioner of CAA, who in turns reports directly to the Prime Minister or President. Its stated overall objective is to stabilize grain prices in domestic markets. Towards that end, the OMC functions include:

- maintenance of adequate grain (operations and stabilization) stocks (imported and domestic) to assure timely availability and distribution to interior markets;

- establishment of an emergency reserve of imported and/or domestic grain to meet serious deficits caused by disruption of supply or production;

- operation of a producer price support program through crop purchases at fixed official floor prices and timely disposition of the purchase grain; and

- the longer-term objectives of the above would be to encourage domestic production and thereby reduce the grain deficit in the country.

Until 1981, the OMC played a fairly limited role of stock handling on contract to the CAA. Only the FRG security stock of 5000 MT was handled by the OMC. With the receipt in 1981 of 20,000 MT USG commodities and 8,000 MT WFP commodities, the OMC has effectively sold food aid at near world market prices in periods and geographic areas of cereal shortages throughout the country through a system of agents who sell to private wholesalers and retailers. OMC receives deliveries of food aid at the wharf, stocks, treats and transports the cereals to storage in Nouakchott and the interior.

The OMC has conducted a buying program since its inception. The OMC effectively offers economic prices for local millet and sorghum production in an effort to provide a floor price as an incentive to local production. In addition, the OMC is charged with stabilization of cereal prices, maintaining security stocks, and supporting crop prices through the purchase of locally produced grain. It operates its price stabilization program through 16 regional centers (13 of which distribute U.S. food aid) which maintain stocks of sorghum and wheat for sale to all comers at a fixed price. The OMC maintains its own separate warehouses, some of which are rented from the CAA, for regional operations. It also has its own fleet of vehicles and operates its own garage to support distribution and buying operations. OMC buying operations for locally produced grain were described earlier.

Besides its price stabilization programs OMC also maintains emergency food reserves. Construction of 32,000 tons of additional warehouse space for holding the reserves is currently being financed by the African Development Bank. At the present time the OMC has accumulated 10,000 of an eventual 30,000 ton emergency grain reserve.

Beginning in 1981, the OMC became the parastatal agent responsible for purchasing paddy from irrigated perimeters along the Senegal River. Until this time, SONADER had been an actor in grain marketing -- buying from the farmers to whom it provided inputs -- but GIRM initiatives are currently seeking to restrict SONADER activity to cereals production. The OMC buys paddy from rice farmers at the official price 12.5 UM/kg and sells to SONIMEX at 24 UM/kg -- totalling 26 UM/kg -- or 2 UM/kg more than the OMC will receive in payment. If these estimated costs are accurate, the GIRM must make up this 2 UM/kg margin.

In order to successfully perform its role of grain stabilization and to ensure that its activities are centralized in the appropriate areas, the OMC is in the process of setting up a system of price monitoring and market information gathering.

SONIMEX

SONIMEX is responsible for importation and internal distribution of rice, tea, sugar and certain textile products. Table 2 describes the evolution of SONIMEX's food imports since 1978. In addition, SONIMEX is required by the government to purchase locally milled rice from the OMC at a fixed price of 24 UM per kilo. In 1981 this amounted to 1136 tons.

SONIMEX has been charged with implementing the government's policy of subsidizing rice for local consumption and financing the subsidies from above market prices charged on the other products it handles - all staples in Mauritania. It distributed the bulk of its products in the same way as the OMC, operating through 15 branches located in provincial capitals and principal towns. The SONIMEX branches are completely separate from the OMC branches.

Formerly, SONIMEX operated through a system of 550 licensed retail merchants from its 15 branches. According to the current Director of Marketing, this system no longer operates and SONIMEX now distributes its products, except for rice, to anyone who requests them at the branch offices.

Since June 1981, rice distribution has been controlled by the Confederation Generales des Emploieurs Mauritanien (CGEM) which is the sole entity that can authorize SONIMEX to sell grain to individuals. Its membership consists of several large merchants, including SONIMEX and the OMC, which authorize distribution to themselves and to their competitors. Each region has a monthly quota with Nouakchott getting 1/4 - 1/3 of total supplies. Quotas are fixed by the Ministry based on requests by prefects and governors, but in practice these quotas are not always respected by CGEM. Thus CGEM controls both the supply and demand of rice at the wholesale level with SONIMEX merely acting as its executing agency.

In 1981, the management of SONIMEX was changed in an effort to address past irregularities and reestablish SONIMEX on self-financing. The price of sugar was raised to cover increased subsidies on rice.

Official prices at which SONIMEX sells tea, rice and sugar are set at the ministerial level. Given the current subsidized consumer price of rice in Mauritania, relative to rice prices in Senegal, imported rice is reported to be crossing the border into Senegal. To keep imported rice in Mauritania, consideration is being given at the ministerial level to raise the consumed price of rice.

There is concern on the part of the government that increased rice prices will lead to decreased access on the part of the poorest segments of the population and social unrest among wage earners. This danger may be overestimated as periodic shortages in rice have resulted in price doubling with no apparent repercussions.

SONIMEX is now responsible for buying locally produced rice from the OMC and distributing it through established procedures.

TABLE 2

Imports of Rice, Tea and Sugar
by SONIMEX, 1978 - 1981
(metric tons)

YEAR	RICE Broken	RICE Whole	SUGAR	TEA
1978	56,699	301	27,830*	2,684*
1979	49,000	1000	46,979	1,815
1980	42,000	-	23,575	2,986
1981	56,250	3750	n.a.	n.a.

Sources: SONIMEX for rice and Republique Islamique de Mauritanie, "Annuare Statistique", 1981; IBRD for sugar and tea.

* Consumption, not imports. Taken from "Mauritania - Recent Economic Developments", IMF, 1980.

SONADER

SONADER had been an actor in grain marketing. However, GIRM initiatives since 1981 have sought to restrict SONADER activity to cereals production. SONADER is a semi-autonomous government agency under the tutelage of the Ministry of Rural Development which is responsible for rice production projects in the country's narrow southern grain production belt along the river. SONADER was originally established as a technical production and extension service; it incorporated the role of paddy purchasing agent to provide an outlet for local production and as repayment for the provision of production inputs. Since the 1981 buying season, the OMC has begun to take on the role of purchasing paddy. SONADER was responsible for rice milling. The OMC has also begun to take on responsibility for rice milling in the rice production area.

Interregional Trade

It is not surprising that the trade between Mali, Senegal and Mauritania is sometimes quite active. All three countries historically have pursued cheap food policies which operate to the disadvantage of producers which requires them to discourage rather than encourage interregional trade in cereals in spite of the fact that Western Mali is a surplus grain producing area.

Estimates of the amount of interregional marketing activity are unreliable but it is clear that substantial quantities of sorghum move into southern and eastern Mauritania from Mali and this flow will increase with a more aggressive pricing policy in Mauritania. Estimates of sorghum and millet imports from Mali vary between 5000 and 15,000 tons, much of it by camel caravan. There is also some maize moving into the area from Senegal, usually in pirogues at night since the Senegalese monitor the border closely.

While sorghum and millet from Mali move into Mauritania on a more or less regular basis, subsidized rice imported and distributed by SONIMEX may flow into both Mali and Senegal. According to the marketing director at SONIMEX, upcountry rice prices in Mali and Senegal are 70 - 100% higher than the SONIMEX sales price in Nouakchott. SONIMEX does not have an estimate of the quantity of rice leaving the country but some indications are that it is very substantial. Cross border trade depends largely on national scarcities and the ability of governments to maintain prices.

Private Commercial Importers

Imports of wheat flour are handled entirely by the private sector. Three or four commercial importers import and distribute to their agents and other merchants about 15,000 tons of wheat flour per year. This product flows entirely through private channels to some 500 bakeries throughout the country.

Cereal Processing Industries

There is no large scale flour milling capacity in Mauritania but there are numerous urban and town grist mills which grind imported wheat into a coarse flour used to make cous-cous, a traditional Mauritanian staple dish. These mills charge from 3 - 5 UM per kilo for custom grinding. Most imported sorghum appears to be hard pounded just like local sorghum varieties.

There are two large scale rice mills in Mauritania, one at Kaedi operated by SONADER and one at Mpourrie operated by the Chinese. The mills at Kaedi operate at a 65% milling ratio; Mpourrie at a relatively lower 56%. Milling costs per kilo are estimated at 3 UM and 2 UM respectively.

The OMC will take over management of the Kaedi rice mill 1 June 1982. It is proposed that two additional units be put into operation under OMC management. Proposed locations are in Boghue and Rosso. These mills are scheduled to operate at capacities of 600-800 kg/h.

Small scale rice hullers have been distributed in villages in the past but the majority have not been well maintained and are largely malfunctioning, particularly those found in more eastern villages.

G. USUAL MARKETING REQUIREMENTS (UMR)

AID HANDBOOK 9, 11 5, "Applicability of Section 202 to Programs Under Section 206" provided in part: ". . . Because of the provisions of Section 202, the improvision of a usual marketing requirement (UMR) may be necessary depending on the country and commodity in connection with Section 206 program. Imposition of a UMR would be handled on the same basis as Title I: If the recipient country had made commercial purchases of the commodities to be programmed under Title II, it would be required to continue to do so, usually at a level reflecting its average commercial purchases over the last five years. UMR could be reduced or eliminated in special cases if justified by the financial condition of the country."

The five year foodgrain supply-demand analysis shows that the GIRM imports significant quantities of staple grains, partly under commercial arrangements and partly under food aid grants. Commercial imports over the last five years (amounts averaged) have been 55,000 M/T of rice and 22,900 M/T of wheat/wheat flour calculated at whole grain equivalent. The GIRM has not commercially imported corn, sorghum or millet during the last five year.

Based upon the supply-demand analysis, USAID proposes that a UMR be imposed for the import of not less than 22,900 M/T of wheat/wheat products in wheat equivalent from the free world market during the life of the Section 206 program. Specifically:

US FY	M/T
1983	22,900
1984	22,900
1985	22,900

Any extension of the Section 206 program beyond the FY 1985 supply year would require a reassessment of this UMR.

H. BELLMON AMENDMENT

REQUIREMENTS

The Bellmon Amendment (Title IV, Section 401 (b)) provides that: "No agricultural commodity may be financed or otherwise made available under the authority of this Act except upon a determination by the Secretary of Agriculture that (1) adequate storage facilities are available in the recipient country at the time of exportation of the commodity to prevent the spoilage or waste of the commodity, and (2) the distribution of the commodity will not result in a substantial disincentive to or interference with domestic production or marketing in that country." AID Handbook 9, 11B6 "Requirement of Section 401" elaborates as follows: "In order to enable the Secretary of Agriculture to make a determination for approving Section 206 programs, the recipient government at the time of program request must provide for inclusion in the program approval documentation: (1) a description of available storage facilities, and (2) information that the assistance will not result in a substantial disincentive to domestic production in that country. This information will also be required at the time of the periodic Call-Forwards against approved programs."

DISCUSSION

The GIRM through the OMC, with the assistance of USAID and other donor technical assistance, has developed a commodity receiving, storage, and transportation system sufficient to meet the requirements of item (1) of Section 401.

The commodity marketing system that was developed, especially the multi-year price adjustment to attain import parity plus internal cost market price, minimizes the disincentive effects of Section 206 imports on domestic production and marketing. USAID is satisfied that the implementation of the Section 206 program will not violate the Bellmon Amendment.

Following is a narrative justification:

Port

Despite poor and minimum facilities, the lack of operational equipment, and seemingly poor management, it has been USAID's experience that small lot grain shipments can be received and handled at the port. USAID is satisfied that commodities delivered under Section 206 will be handled adequately and it is therefore recommended that we continue using the port.

The port at Nouakchott is not a port in the usual sense, but rather a single wharf 250 meters long jutting perpendicularly to the coastline. It is unprotected, subject to long shut-downs or work delays due in large part to adverse weather conditions. The wharf, in its original design, was not intended to service large vessels. It is a wharf for small vessels and lighters. The wharf has been extended and at most can accommodate one or two 2,500 M/T vessels at a time. This extension is of limited use however, due to recurring damages especially to fenders.

The wharf equipment is in a state of disrepair. Much of it is non-operational or of only marginal use. For example, of nine lighter barges available, only four can be used since there is only one motor launch (not a tug) available for towage. Wharf unloading is limited due to the inefficiency of fixed cranes (versus mobile cranes) which, for the most part, are inoperable. Port authorities have negotiated an arrangement with the European Development Fund (FED) to furnish new equipment which will improve operations and maintain them at a satisfactory level until the port under construction by the PRC becomes operational (completion now estimated for 1986).

The port does not have good foodgrain handling facilities or systems. Various ideas have been considered for establishing new methods. Several studies have been made which have concluded that the most efficient and economic thing to do is to build bulk grain handling facilities.

For a comparative analysis of alternatives see Annex G (Charles Vandervoort, "Transport of PL 480 Grain for Mauritania: A Review of Current Problems and Analysis of Proposals for Reducing Transport Costs," pp. 26-35 and Appendix 2, p. 55) and the Bulk Handling Sub-project proposal.

Other constraints on port efficiency resulting in high operational costs include poor management, poor and costly labor practices including excessive charges for overtime without performance, poor maintenance of equipment, and the abusive practice of double assignment of stevedore gangs with the resulting double charges.

In spite of the foregoing, the port does function. For an analysis of cargo handled, see Annex G, Tables 1, 2, 5B, 6 and 7. As noted, in 1981 the port handled about 294,000 metric tons of imports, of which about 74,000 metric tons were food aid and about 90,000 were commercial foodgrain imports.

It is the conclusion of the USAID and Section 206 Design Team that the port is adequate to handle Section 206 commodities. USAID will continue programming the shipment of foodgrains under present arrangements until the bulk grain handling facilities can be installed.

Storage

There are no shed storage facilities for foodgrain imports at the port. Commodities off-loaded are not immediately moved from the port but moved to an open air area and stored for various lengths of time. Foodgrains are stacked on dunnage, pyramid style, and covered with tarps. (Section 206 commodities will not be stored in the port over an extended period of time; they will be moved to the OMC storage depot near Nouakchott.) Considering the minimum rainfall in the area, short-term open storage at the port is not a major problem. The storage area is relatively clean and commodities are reasonably well handled and protected.

The OMC has a central warehousing facility at Nouakchott. It was constructed under financial arrangements with the Dutch. The compound is spacious, well maintained and of good design. It consists of 16 1,000 M/T capacity steel and concrete warehouses and 10 500 M/T capacity mobile silos (heavy mesh, lined with plastic and covered with tarps). An additional 10 mobile silos (500 M/T capacity) are available for consignment to regional storage centers as required.

The Africa Development Bank has signed a loan with the OMC for the construction of 32 1,000 M/T warehouses along the same design as the Dutch units. These units will be built in the various regions of the country. They will be built as multipurpose units providing for storage of security stocks as well as marshaling sites for the OMC procurement program. Until such time as the ADB units are completed, the OMC will continue its current practice of leasing adequate facilities in the regions (6,500 M/T capacity).

The OMC now controls or owns (or will control or own in the near future) a total of 64,500 M/T storage capacity. Germany is currently providing technical assistance in warehouse management and commodity quality control. USAID provides management services for commodity marketing, storage, and currency control. USAID is satisfied that the in-country storage arrangements are adequate.

Transport

The OMC maintains a relatively small fleet of 7 trucks, 1 12 M/T and 6 10 M/T. These are usually operated out of Nouakchott on short-run hauls and for direct haulage during the procurement system. Normally, the OMC relies on the private sector for transporting commodities to the regional distribution points. However, truckers may occasionally refuse to haul into an area, usually because of bad roads. In addition truckers may get together to try to force transport prices up. In this case, the OMC will then use its trucks until the situation stabilizes.

During the past year private truckers organized the Federation of Mauritania Transporters in an effort to secure higher general transport rates. To date, the OMC and the Federation have been able to negotiate differences and keep commodities moving. The OMC has a central garage at Nouakchott for the maintenance of its equipment. Technical assistance is furnished by the Germans.

USAID, in its monitoring role with the OMC, is satisfied that transport arrangements are adequate to meet the commodity transport needs of the OMC.

Disincentive to Production and Marketing

The Section 206 program is designed to furnish foodgrains in response to clearly identified structural deficits. In prior programs, Title II emergency contributions were a part of a relief package identified by a multi-donor mission and supported by several food aid donors. Under Section 206, the US contribution to the GIRM would become a fixed amount (assuming overall food availability remains deficit) and would be calculated as a known quantity in the supply-demand analysis. Thus, when the multi-donor mission or the GIRM prepares the annual food balance, the appeal to donors not already committed to the grain stabilization program would be for the so-called emergency program or meeting the balance of the deficit. Although the level of this emergency need might vary from year to year, Section 206 contributions would remain constant.

Important questions remain about the adverse effects of grant imports on production of like or similar commodities, on marketing practices, and on producer and consumer prices. The policy reform measures adopted by the GIRM (See Section IV below) and those being implemented by the OMC represent an effort to address these questions. The policy for the multi-year price increases with the goal of marketing at import parity plus internal costs serves several objectives: (1) it gradually removes consumer subsidies; and (2) it will enable the GIRM to commercialize some part of what is now donor aid.

In addition, the policy to establish a revolving fund with the OMC for use in maintaining producer floor prices should have incentive effects for producers. As the market price approaches import parity plus internal costs, the producer price should be raised accordingly, allowing a more favorable producer margin than under the present system.

USAID is satified that, given the policy reform now in place, the import of Section 206 commodities will not have long-term disincentive effects on production or interfere with normal marketing practices.

IV. FOOD PRICE POLICY REFORM PROGRAM

A. INTRODUCTION

Developing country governments and donors have become increasingly aware of the importance of food pricing policy as a means of stabilizing food prices, strengthening the financial viability of storage and marketing institutions, and enhancing producer incentives for increasing domestic food production. Policy reform in the food sector is now recognized as a major element of AID efforts to increase the developmental effectiveness and impact of food aid. This Food for Development program supports USAID/Mauritania's food price policy program as a key feature for justifying this multi-year food aid commitment.

B. GIRM FOOD PRICE POLICY

At present, the GIRM is pursuing a food price policy which aims at stabilizing market prices, establishing a minimum security stock, and encouraging local food production while at the same time protecting consumers from high prices. This policy is influenced by the government's desire to dampen speculation by private traders, insure against severe food crises such as those experienced during the drought of the 1970's, become more self-reliant and less dependent upon food aid, and demonstrate its humanitarian concerns for the population's social welfare.

In practice, these objectives are implemented through two public marketing institutions, the CAA and the OMC, and two semi-autonomous government agencies, SONIMEX and SONADER. The CAA performs the social welfare function, distributing free food to the indigent and selling subsidized food to poorer consumers through a chit system. The CAA also uses food in support of food for work programs.

The OMC, an executing agency of the CAA, performs the price stabilization, security stock, and local production support functions.

The OMC sells grain wholesale at subsidized prices much higher than the CAA and maintains a producer floor price. The consumer price for OMC products, mainly sorghum and wheat, are determined by the free market.

SONIMEX buys rice, sugar, and tea commercially and sells these commodities wholesale to traders. Wholesale prices are fixed such that surpluses earned on tea and sugar cover subsidies on rice. The free market also sets consumer rice prices for SONIMEX sales. Mauritania's cereal marketing institutions are examined in more detail in section IV and in Annex B.

SONADER is primarily a production as opposed to marketing institution. It is responsible for the country's major rice production projects. SONADER's limited role as a paddy purchasing agent is being gradually assumed by OMC. SONADER purchase prices are the same as those of OMC.

Official prices for the above institutions are set by the Comite National de Securite Alimentaire (CNSA*). CNSA was formed by Presidential decree in February 1981 to determine national policy for issues of food security. The most important of its duties with regard to issues of pricing policy are establishing grain and cereal ceiling prices for the OMC, CAA and SONIMEX and establishing producer floor prices to be paid by the OMC and SONADER. The Committee is also responsible for establishing a grain reserve for extreme emergencies.

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* National Food Security Committee

The current wholesale price and subsidy structure for Mauritania's food staples is as follows:

FOOD WHOLESALE PRICES UM/kg

	Sorghum		Wheat		Rice
	CAA	OMC	CAA	OMC	SONIMEX
Wholesale	8/10*	13/14*	8/10*	13/14*	19/14*
C&F Kiffa incl internal costs	23	23	25	25	27
Subsidy	15/13	10/9	17/15	10/9	13**/8
Producer Price	-	13	-	13	21
Producer Price relative to import parity	-	21	-	23	25

Within market, between market, and across border price relationships of the above commodities are discussed in detail in section III and in Annex B. Problems imposed by the above structure are the following:

Costly subsidies. At present, food sales are heavily subsidized. Local currency generated from food aid sales proceeds cover these subsidies on sorghum and wheat. The rice subsidy is supposed to be covered by SONIMEX surpluses on sugar and tea. However this does not always occur. If the OMC and SONIMEX are to operate on a financially self-sustaining basis, independent of GIRM and/or donor subsidies, these subsidies must be eliminated.

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* Prices are for the countryside and Nouakchott. The GIRM charges a higher price for sorghum and wheat in Nouakchott to discourage rural-urban migration. At the same time, rice prices are lower in Nouakchott than in the countryside.

** Paddy price; equivalent is 12.5 UM.

CAA disruptions. CAA sales to poor consumers (as determined by the prefects in each province) probably have a dampening effect on local production incentives and disrupt OMC sales in the few towns where both the CAA and OMC have centers. As wholesale prices of OMC cereals increase, CAA prices must follow in their wake if market distortions are to be avoided.

Rice "exports". Rice prices in Mali and Senegal are 70-100% higher than the SONIMEX sales price in Nouakchott. SONIMEX believes rice is leaving country in substantial quantities as a result.

Producer disincentive. Prices are subsidized in favor of the consumer. Local production incentives are dampened to the extent producers are not paid prices relative to import parity.

C. USAID/MAURITANIA FOOD PRICE POLICY REFORM PROGRAM

Recognizing the need to address the problems emanating from the above price structure, USAID/Mauritania is undertaking a food price policy program with the GIRM. This program is directly linked to the USAID country development strategy objective to increase food production. The objectives of the program are the following:

1. To stabilize food prices and set producer floor prices to enhance producer incentives for increasing domestically marketed production.
2. To strengthen the financial viability of GIRM food marketing institutions enabling them ultimately to operate independent of GIRM and/or donor subsidies.

The mission will encourage reform by engaging in policy dialogue with the principal GIRM organizations involved in cereal marketing and pricing. These include the CAA, OMC, SONIMEX and the National Committee for Food Security. Policy dialogue will be directed to increase CAA subsidized sales prices to be more in line with those of the OMC; raise

OMC wholesale prices for sorghum and wheat to import parity plus internal transport and handling costs; increase SONIMEX wholesale consumer prices for rice to import parity plus internal transport and handling costs; and to raise prices paid to local producers to import parity plus internal transport and handling costs less private sector transport and handling costs. The latter costs are those from Selibaby and Kaedi (the major domestic grain producing areas) to Kiffa and Aleg (the major northern points of consumption for domestically produced surplus grains). The focus of this proposed Title II program will be to raise OMC prices over a five year period (1983-1987) to import parity plus internal transport and handling costs to Kiffa. Concurrently, over the same five year period, USAID/Mauritania will be promoting the other targeted changes outlined above.

Coordination with other donors will be an important aspect in pursuing these other changes. The World Bank, for example, is particularly concerned with rice pricing. To enhance the GIRM's price analysis capability, the Bank and the French are supporting a project to establish a planning and coordination unit in the Ministry of Rural Development. Among its functions, the unit will examine food pricing and marketing issues and make recommendations for improvements. The IMF is also concerned over food pricing and endorses the import parity pricing formula. The Fund believes it may be possible to eliminate the rice subsidy by shifting it in the form of a wage increase. Other bilateral donors also share USAID's interest in price adjustments as will become more evident below.

D. OMC FOOD PRICE POLICY INITIATIVE

The OMC was established in 1976 and has been developed with substantial technical training and commodity assistance from West Germany. A detailed description of OMC operations is included in Annex A.

USAID/Mauritania's efforts to increase OMC wholesale prices began in earnest a year ago. Following a series of lengthy discussions with the OMC over price policy, the GIRM announced a 63% increase in OMC prices for sorghum and wheat; prices rose from 8 UM/kg to 13 UM/kg.

This increase far exceeded USAID and other food donor expectations. The WFP and FRG have also been encouraging the GIRM to raise OMC wholesale prices. Other donors including France, Belgium, the Netherlands and the EEC have interest in increasing their food aid allocations to the OMC. These donors look to USAID as the lead donor in this initiative and urge that it be continued.

This 206 program seeks to raise wholesale prices for all foods handled in significant quantities by the OMC (presently sorghum and wheat) to import parity plus internal transport and handling. Annex C presents an illustrative schedule to achieve this objective by 1987. Supporting tables and explanatory notes accompany the schedule.

Should the GIRM elect a uniform wholesale price formula for sorghum and wheat, the "single price" must reflect a commodity-weighted average based on the sale of the previous twelve months. However, beginning in 1986, adjustments for each commodity must be set separately.

The projected schedule is a guideline to be used in evaluating progress toward the 1987 objective. In light of the 63% increase in 1982, relatively modest increases are suggested through 1985. Adjustments may be accelerated or decelerated depending upon circumstances. USAID and the GIRM will review performance annually in accordance with the 206 program evaluation plan (see section V, E). Justification for a follow on 206 program after 1985 will rest, in large measure, upon price policy performance.

This and the other components of the USAID/Mauritania food price policy reform program will be coordinated with similar USAID programs in neighboring Sahelian states. Regional price developments will be monitored and will be taken into account in reviewing and recommending all price adjustment proposals. See section III F for a discussion of present regional prices and trade flows.

V. TITLE II SECTION 206 PROGRAM MANAGEMENT

The GIRM and USAID/Nouakchott, upon notification of program approval, will prepare a program agreement (PROAG) that will incorporate by reference the terms and conditions of the PL 480 Title II Commodity Transfer Authorization, relevant portions of the Section 206 project paper, and relevant GIRM rules, regulations and operating manuals as may be required. The PROAG will become a part of the binding obligations of both parties. It will include, at a minimum, certain specific management requirements.

A. GENERAL

The GIRM and USAID/Nouakchott Joint Responsibilities

Establish a PL 480 Title II Section 206 Food for Development Program Executive Steering Committee to be jointly chaired by the Minister of Economy and Finance and the Director, USAID. The Committee shall be comprised of the joint Chairpersons, the Director of Projects, Ministry of Economy and Finance and the USAID Food for Peace Officer. The Chairpersons may each appoint one advisor for fiscal management purposes. The purpose of the Committee is to provide leadership, guidance and general oversight for the implementation, administration, and operation of the Section 206 program including but not limited to:

- Ensuring that the terms and conditions of the program agreement are understood and accepted by all parties concerned.
- Ensuring that the program policy reform measures are in place and effectively implemented.
- Ensuring that the financial management plan is operational at each level of program implementation.
- Ensuring that the report requirements for account, commodity and project monitoring are in compliance with GIRM and AID rules and regulations.
- Ensuring that joint annual evaluations are made and that action will be taken to correct program deficiencies, if any.
- Ensuring that project implementation issues are resolved quickly to prevent delays and adverse effects on the program.

Appoint Section 206 implementation officers of comparable technical specialities. These officers will have mutual responsibility for projects. Their responsibilities will include but not be limited to:

- Providing technical assistance to the implementing agency (agencies) at the project level.
- Providing systematic reports to the Committee regarding project performance.
- Monitoring project implementation and taking action to correct deficiencies as they occur.
- Assisting in annual evaluations to ensure that the purposes, goals and objectives of the project are being attained or to recommend corrective action, modifications or revisions.

The GIRM Responsibilities

Arrange for the receipt, handling, storage and transport of the Section 206 commodities as outlined in the Commodity Management section of this project paper.

Market the Section 206 commodities in compliance with the policy reform measures of the proag, depositing gross sales proceeds in an Agriculture Commodity Account at a muutually agreed upon institution. (See Financial Management Plan for special considerations).

Manage the sales proceeds accounts in compliance with the Financial Management section of the proag furnishing the Committee reports required under GIRM rules and regulations and AID HANDBOOK 19.

Provide U.S. official representatives free access to the program, its records, ledgers, reports, commodity facilities, and sales systems and to travel throughout the country to observe project implementation.

Accord the U.S. its right to audit.

USAID/Mauritania Responsibilities

Furnish the services of a Food for Peace Officer to assist the GIRM in meeting the Commodity Management Plan requirements including preparation of reports for the Committee.

Furnish the services of a financial management specialist to assist the GIRM in meeting the requirements of the Financial Management Plan including the preparation of account reports for the Committee.

Furnish the services of senior technical specialists to provide guidance to the project officers.

Furnish the services of a Section 206 Food Monitor to maintain program surveillance, reporting findings to the Committee or other functional unit for action.

As program experience is gained, the GIRM, USAID or the Committee may add to the tasks listed above if mutually acceptable.

B. FINANCIAL MANAGEMENT PLAN

The commodities imported under the Section 206 program will be sold through the OMC market system at prices mutually acceptable under the terms of the policy reform section of the GIRM Grain Stabilization Program. Local currency generations, for use in development activities supportive of the policy reform, will be at a rate not less than the US export price of the commodities. The GIRM will deposit gross sales proceeds in a special account at a mutually agreed upon institution. The account shall be entitled "Agricultural Commodity Account" herein referred to as the Account. Deposits resulting from the sale of commodities will be used for agreed upon development purposes.

The Account management will be the joint responsibility of the GIRM Minister of Economy and Finance and the Director, USAID/ Nouakchott. The Controller, USAID/Nouakchott will act as accounts advisor to the Minister and Director to ensure that the USAID accounts management requirements and standards as set forth in the AID HANDBOOK 19 are met. The Minister will designate a counterpart to the Controller to ensure that accounts management requirements and standards of the GIRM are met.

Disbursements from the Account will be limited to transfer of funds to Project Accounts which have been established under the approved Section 206 program agreement including authorized amendments thereto. Project Accounts must be registered with and approved by the Minister and USAID Director. Each disbursement from the Account to Project Accounts must be certified by both the Minister and Director. The Minister and Director will authorize the establishment of individual Project Accounts only after they are satisfied that the project activity is at the implementation stage and that funds are required.

Initial transfer of funds from the Account to the Project Account(s) will be limited to that amount necessary to fund one quarter (3 months) implementation requirements (this amount may be increased for funding costs for items where the use of such items extend over a longer period of time).* Project Account replenishment will require certified expenditure vouchers and shall be presented on a quarterly basis.

Project Accounts are to be examined periodically by the Minister and Director. Project Accounts not disbursing funds for project implementation may have deposits recalled with these deposits being distributed among other Project Accounts or redeposited in the Account until such time as that project funding becomes necessary.

Annually, the Minister and Director will review overall accounts management and provide joint certification that both the GIRM and USAID accounts management standards have been met. At that time, interest accruing to the Account will either be distributed to the Project Accounts or held in the Account for support of new project activities which have the prior approval of the GIRM and AID/W.

The Project Accounts will be established in the name of the authorized activity(ies) under the Section 206 program agreement. The Project Accounts will be jointly managed by the GIRM designated implementing agent(s) and the USAID appointed project officer(s). Disbursement from the Project Account will be by mutual consent for prior approved purposes. The Project Accounts are to be managed in compliance with the standards established for the Account. The Controller, and this GIRM counterpart will provide accounts management advice and guidance to the Project Account(s) managers. Issues arising which cannot be resolved at the Project Account management level will be referred for settlement to the Minister and Director.

* SPECIAL CONSIDERATION: To ensure that the OMC operating costs are met during the initial sales periods, the steering committee may authorize, if necessary, OMC operating cost's first priority on use of funds.

The USAID Controller and the GIRM counterpart will (1) examine and agree that the procedures, documentation, and account reports system of the responsible institution are acceptable and meet the account management and fiscal report requirements and standards of both the GIRM and AID HANDBOOK 19 or they will jointly design and recommend to the Minister and Director a system that meets those standards, (2) examine the individual project reporting systems to ensure that the reporting on the receipt and use of funds made available for implementation meet the standards required or to make the appropriate changes, and (3) agree on and issue an annual reports format which will adequately reflect the effectiveness of the overall accounts management performance.

The Account and Project Account(s) will be available upon request for examination and/or audit by official representatives of the GIRM and the USG.

C. COMMODITY MANAGEMENT PLAN

A revised commodity management procedure will be used for the Section 206 Program which takes particular consideration of the special conditions which exist in Mauritania. These conditions and considerations are enumerated below:

Special Considerations

The multi-year framework of the projects to be implemented requires a constant flow of local currency budget support. An interruption in disbursement would result in serious implementation problems for the development activities. To avoid disruption of implementation, commodities must be imported and marketed and sales proceeds then deposited in the appropriate account (See Financial Management Plan) before implementation is initiated. Subsequent commodity sales and deposits must also be timely to ensure constant funding.

This need for regular flows of currencies to sub-project accounts is particularly important in view of the fact that annual tonnage levels will be determined by need to avoid overstocking and to avoid the creation of a different set of problems, particularly Bellmon Amendment related issues. Therefore annual actual levels may vary beneath the proposed 20,000 MT maximum.

The port at Nouakchott is subject to sea conditions that all but preclude deliveries during the period January - March. (This assumes the continuation of present port arrangements which may be altered by the installation of bulk handling facilities discussed in the OMC project). Therefore, the Commodity Management Plan should provide for a Call Forward arrangement that may result in deliveries other than port in the January - March period.

Due to limited port facilities which are described in the Bellmon Amendment section above, shipments of USG cereals to the port must be limited to small vessels (3-5000 MT). Calls-Forward must be frequent enough to accomodate these limited tonnage levels.

In view of the above considerations, as followed in good commercial marketing practices, the foodgrain balance sheets should be calculated on 12 month market demand plus a 3 month operating stock (a 25% carry in-carry out). This operating stock would provide some of the flexibility needed to accommodate problems of decreased cereal deficits, port and weather conditions and cash flows.

Management Plan

In response to the foregoing considerations, USAID and the GIRM will jointly manage the commodity import activities along the following lines:

USAID-GIRM will develop a Call-Forward plan that will take advantage of the best seasonal sea conditions for delivery of commodity shipments to the Nouakchott Wharf. Assuming installation of adequate bulk handling facilities, Calls-Forward will call for direct shipment to Nouakchott, obviating the need for trans-shipment at Dakar. The Call-Forward system will take into account the need for a continuing supply-demand analysis to ensure that serious overstocking and shortfalls do not adversely affect the program. Therefore, the supply-demand analysis will include a 3 month operating reserve (25% carry in-carry out).

The GIRM will be responsible for the following:

Arrange for the receipt and handling of the commodities at the port (the commodities shall be admitted duty free and exempt from all taxes); payment of discharge costs including but not limited to demurrage, detention, and overtime charges by the delivery carrier; obtaining independent cargo discharge survey reports; payment of wharfage, taxes, dues, and port charges assessed against the cargo whenever assessed and collected by local authorities from the consignee; and for lighterage and for lightering costs when assessed as a charge separate from the freight rate.

Arrange to receive commodities at ex customs and provide for storage, maintenance and transport to the points of distribution including sales site and maintain a series of commodity management records which will reflect the volume, condition, and disposition of all commodities received including commodities unfit for human consumption.

Remit gross sales proceeds from the sale of Section 206 commodities to the Agriculture Commodity Account as discussed in the Financial Management Plan, (Sub-section B above).

Promptly notify USAID in writing of circumstances pertaining to the loss, damage, misuse or improper distribution of commodities occuring within Mauritania. This notification will include information regarding responsible parties, and action taken to recover the loss. (A sample format for this report is EXHIBIT I, AID HANDBOOK 9).

Initiate and pursue claims against third parties.

USAID will be responsible for the following:

Based upon an annual supply-demand analysis and the desired timing for the arrival of commodities, submit to AID/W an annual Call-Forward including a reassessment of the port, storage and transport capabilities as well as the disincentive effects of Section 206 grains on local production and marketing. Also, the Call-Forward will contain appropriate shipping instructions as listed in 7B3 of AID HANDBOOK 9.

Provide to the GIRM technical assistance in managing the receipt, storage, transport and monitoring of the Section 206 commodities. (USAID assistance in the sales procedure is set forth in the Policy Reform Section and Financial Management Section)

Monitor reports on commodity management including the reports on loss, damage and misuse of commodities and follow-ups on claims. USAID will establish a procedure for the review of claim reports and follow-ups as set forth in 8C through 8E of AID HANDBOOK 9.

Furnish AID/W with required reports on Title II Section 206.

In the event there is a dispute about the commodity management requirements, the terms and conditions of AID Regulation II (English Copy) will prevail. (Reg. II is incorporated as a part of the Title II Transfer Authorization).

D. PROGRAM IMPLEMENTATION SCHEDULE

August 1982	(1) AID/AFR project committee review recommends program approval. (2) AID/AA/AR - chaired ECPR held. Participants to include appropriate representatives from the Food Aid Sub-committee of the DCC. ECPR approval constitutes DCC approval with approval notification cable clearance.
October 1982	Program Agreement (PROAG) will be prepared and negotiated by USAID. PROAG will include by inclusion or reference the implementation requirements of the Project Paper, the Title II Commodity Transfer Authorization (including AID Reg 11), and other such AID regulations as may be required. Title II Commodity Transfer Authorization and the Program Agreement signed by GIRM and USAID.
November 1982	USAID calls forward first year commodity requirements including update of Bellmon Amendment requirements and shipping instructions.
November - March 1983	(1) USAID-GIRM establish management and implementation relationships described in the PROAG, including the opening of currency accounts as described in the Financial Management Plan. (2) Receive and sell first year Title II commodities.

April 1983	The Annual Evaluation is initiated. (Evaluation Calendar is described in the PROAG)
April - September 1983	Local currency generations deposited in the Agricultural Commodity Account.
September 1983	The Executive Steering Committee reviews currency generations and deposits and authorizes the transfer of funds to the individual project accounts.
October 1, 1983	The Steering Committee will authorize the implementation of Section 206 projects. On each quarter date thereafter, the Steering Committee will review program status in compliance with the procedures set forth in the Program Management Plan, Financial Management Plan, Commodity Management Plan, and other implementation instruments and reports as may be agreed upon. The Evaluation Calendar will be implemented on a third quarter date as noted in the calendar.

E. THE ANNUAL EVALUATION REQUIREMENT

Background

The Section 206 program agreement will require that the GIRM carry out an annual evaluation of the program which will include evaluation of individual projects. It is this annual evaluation which will justify the release of the subsequent year commodity transfer and continued dispersal of local currency generations deposited in the Agricultural Commodity Account. The scope of the evaluation must be comprehensive, providing both the GIRM and USAID/Nouakchott reliable data on overall program performance on areas of activity needing corrective action including proper recommendations for change, on financial management, and on the status of development projects. If requested, USAID may assist the GIRM in carrying out this requirement.

Discussion

Six months prior to the due date of the annual evaluation report, the GIRM and USAID will discuss the annual evaluation requirement including the schedule and the contents for the particular year. At a minimum, the evaluation should cover the topics outlined in the general scope of work discussed below. Specific topics and the specific scope of work for each year's evaluation will be agreed upon prior to the actual evaluation.

Following are responsibilities and the generalized scope of work for the annual evaluation:

GIRM Responsibilities

- Examine the background and the current structure for the management and implementation of the Section 206 program agreement at both the national and the sub-project level. Discuss the role(s) of the GIRM implementing agency(ies) in fulfilling the terms of the program agreement.

- Discuss the current program progress and compare accomplishments to the implementation benchmarks and goals previously established for the review period. Analyze shortfalls, if any, explaining reasons why plans were not realized. Propose alternative strategies for attaining stated objectives and propose new sets of benchmarks for the next implementation period.

- Provide a complete accounting of the currency accounts including a statement of balance. Ensure that the financial management plan is appropriate. If not, recommend necessary revision.

- Submit the evaluation report to USAID/Mauritania for review, commands, and recommendations.

USAID/NOUAKCHOTT Responsibilities

- Provide to the GIRM technical advice and guidance for the planning and preparation for the annual evaluation.

- Assess the evaluation report in terms of its adequacy in addressing the specific topics and scope of work for the review period.

- Assess the feasibility of the GIRM recommendations for program-project revisions including the managerial and technical capabilities of the implementing agency(ies). Verify the potential impact of the proposed changes.

- Submit the GIRM report to AID/AFR including an endorsement of the GIRM recommendations for program revision (if the recommendations are not supported, a statement of USAID reasons for non-support and a proposed solution to the problem), a call forward for the type and volume of commodities, as well as and shipping instructions for these commodities to be programmed for the subsequent import period.

- Review the GIRM evaluation report including the USAID comments to (1) determine that the report meets evaluation standards, (2) determine that the status of program implementation is acceptable, and (3) endorse proposed revisions if deemed appropriate.

- Submit to FVA for processing the subsequent year food requirement call forward.

In meeting the annual evaluation requirements discussed above, the GIRM or USAID or both may request AID/W to furnish special assistance. Further, both the GIRM and USAID are encouraged to send representation to AID/W to participate in its review of evaluation reports submitted.

The Evaluation Calendar - FY 1983 and subsequent years:

April 1	The GIRM and USAID discuss and jointly agree on the specific topics to be included in the scope of work for the particular year evaluation.
June 1	Determine and secure, if desired, external assistance to assist with the evaluation.
July - August	Carry out the agreed evaluation.
September 30	The GIRM submits the final evaluation report to USAID.
October 30	USAID submits the GIRM evaluation report to AID/W/AFR and DCC including comments, suggestions, and recommendations.
November 30	AID/W and DCC complete their review and notify USAID and the GIRM of the report's acceptability as well as implement the subsequent commodity call forward.

A. SUB-PROJECT BUDGET

Local Currencies

UNIT: ($000 3/ - UM 000) 1/

	$ 1984	UM	$ 1985	UM	$ 1986	UM	$ 1987	UM	$ 1988	UM	$ TOTAL 2/	UM
Guidimaka	852	42586	913	45658	991	49538					2756	137782
Crop Protection	120	6000	160	8000	150	7500	40	2000	30	1500	500	25000
Operating	(70)	(3500)	(60)	(3000)	(50)	(2500)	(40)	(2000)	(30)	(1500)	(250)	(12500)
Infrastructure	(50)	(2500)	(100)	(5000)	(100)	(5000)					(250)	(12500)
Bulk Handling	907	45350	1886	94300	207	10350					3000	150000
OMC	3331	166538	3044	152200	2840	142000	282	14100	284	14209	9781	489047
Market Study	(50)	(2500)	(50)	(2500)							(100)	(5000)
Infrastructure	(881)	(44038)	(594)	(29700)	(440)	(22000)	(282)	(14100)	(284)	(14209)	(2481)	(124038)
Operating Costs	(2400)	(120000)	(2400)	(120000)	(2400)	(120000)					(7200)	(360000)
Rural Roads	649	32450	558	27900							1207	60350
TOTAL COSTS	5859	292924	6561	328058	4188	209388	322	16100	314	15700	17244	862179
TOTAL GENERATIONS (est)	6200	310000*	6800	340000**	7400	370000***					20400	1020000
Budget Contingencies 4/	567	28376	13	642	3212	187000					3156	157821

1/ Exchange rate $1.00-UM 50

2/ Variations in totals due to rounding line items

3/ Dollars shown for information purposes only

4/ USAID-GIRM to propose use if cumulative contingencies result in surplus availability

* FY1983 Sales 20,000 MT @ 15.5 UM/kg

** FY1984 Sales 20,000 MT @ 17.0 UM/kg

*** FY1985 Sales 20,000 MT @ 18.5 UM/kg

NOTES:

I. Local Currency Generation:

A. Currency generations are in the year preceeding proposed expenditures.

B. Generations are estimated based on 20,000 M/T to be wholesaled at price equalization at the following rates:

FY 1983	15.5 UM per kg
FY 1984	17.0 UM per kg
FY 1985	18.5 UM per kg

II. Program Values:

A. Title II Commodity Value - 60,000 M/T @ $135		= $ 8,100,000
B. Estimated Ocean Freight @ $210 per M/T		= $16,600,000
C. Total PL 480 Investment		= $20,600,000
D. UM Generations (based on formular IA above)	UM	1,020,000,000
E. $ Equivalent of UM Generations		$20,400,000
F. Planned Allocations	UM	862,179,000
1. UM for Development	UM	502,179,000
2. $ Equivalent		$10,043,580
3. UM for OMC Operations	UM	360,000,000
4. $ Equivalent		$ 7,200,000

G. Unallocated

1. UM	UM	157,821,000
2. $ Equivalent		$ 3,156,000

III. Constants

A. $ and UM cited as allocation in the sub-project table are in FY1983 constant prices.

B. Exchange rate used is $1 = UM50

B. Project Title: OMC Support
Implementation Period: Five Years
Life of Project Funding: $9.8 million (Section 206)
$106,000 (project 682-0231)

I. DESCRIPTION

A. Project Background

All residents of Mauritania, producers and consumers alike, suffer from the effects of the drought on grain availability. One unfortunate result of this variable supply is the annual grain price fluctuation between harvest seasons. The price paid to the producer is low following a harvest because large amounts of grain are sold in a short period, creating a temporary glut on the market. The consumer price is generally very high preceding a harvest because the previous year's stock has been consumed and little grain is available. These phenomena are governed primarily by the supply of grain available on the market, short before harvest and relatively abundant afterwards.

In recognition of the destabilizing effects of these market fluctuations, the GIRM decided in 1981 to revitalize the Office Mauritanien des Cereales (OMC) as an active market instrument. The OMC had passed from its creation in 1976 through a long period of inactivity caused by a lack of liquidity. In 1980, its real functions consisted of managing the national security stock, undertaking local grain purchase campaigns, and contracting transit services for commodity handling at the Wharf and Nouadhibou port. Its operations were limited to ports or points of grain entry in Rosso, Nouakchott, and Nouadhibou.

In 1981, USAID furnished 20,000 MT of PL 480 grain to the OMC under the Emergency Program to permit the Office to begin operations on a nationwide scale. USAID and the GIRM signed a project implementation letter authorizing sales at a mutually agreed upon price in 13 centers throughout Mauritania. The sales proceeds were allocated for operational expenses and for strengthening the OMC infrastructure.

An assessment of this expansion of OMC activities is included in the Annex.

B. Specific Project Activities

This Title II, 206 Program is a continuation and formalization of the Title II Emergency Program in 1980 - 1981 and the Title II, Chronic Deficit Interim Program 1981 - 1982.

The rate of consumer price increases is pegged to gradually decreasing GIRM budget allocations for the OMC. Over five years, this budget support will be reduced to zero. In 1981, the GIRM agreed to raise the price of PL 480 grain to a point where all operating costs and the FAS value of the grain were covered.

1. OMC Operating Costs

Project-related operating costs of the OMC will constitute a project activity to be funded in the OMC Marketing Program. These costs include warehousing, transport, wharf expenses and general overhead.

2. OMC Infrastructure

This activity will fund infrastructure improvements to assure adequate storage, management, and transportation of the grain provided under this project. This includes the construction of one 1000 MT warehouse and five 500 MT warehouses in grain-producing regions, as well as provision of pallets for all warehouses. Selection of warehouse sites will be made upon mutual agreement between the OMC and USAID. Warehouse construction will follow existing design plans for OMC warehouses. Construction requirements and standards will be coordinated with other donors currently financing OMC warehousing. The REDSO/WA Engineer will approve construction plans before any construction is begun.

Four vehicles will also be provided under this activity: two large semi-trucks which will be used primarily for short hauls where OMC trucks are competitive with private truckers (wharf to Nouakchott warehouses, for example), one Land Rover for the Control Division's audit trips, and one double cabin Datsun for shuttles between Nouakchott sales points, wharf, warehouses, and headquarters. Additionally, security lighting will be provided for the Nouakchott warehouse complex.

3. OMC In-Service Training

The roles of the OMC agent and warehouseman are essential. Annual training courses will be provided to assure good management of grain stocks and detailed information about local production and marketing systems. This training will be outside — third country and US as well as in Mauritania. For greater detail on training outside Mauritania refer to the Annex.

The Ecole Nationale de Formation et de Vulgarisation Agricole (ENFVA) in Kaedi will serve as a center for the in-country training. Fifteen OMC agents and warehousemen will receive refresher courses annually at the school. Funds budgeted for the training may be used in the form of a block grant to the school or under a contract between the two institutions. Emphasis will be on storage techniques and basic accounting skill. Gathering and analyzing market data will also be an important subject in the curriculum. Exact course content will be developed in cooperation with the OMC, the ENFVA, and the FRG technical assistance team, and will focus on techniques where improvement is needed in OMC operations.

4. Marketing Monitoring Support

Maintenance of an OMC radio network to be provided under the existing marketing project will be continued for five years and then institutionalized in operating costs as the OMC develops the capacity to maintain its own radios.

The in-house price monitoring system which is to be established from the 1981 Emergency Program should be in place by the time the II 206 project begins. This activity, in combination with the training component, will give the OMC the capacity to gather data, analyze market developments, and react quickly to regional needs.

5. Market Studies (For summary on SOW, see Annex A, J)

C. Project Goals

The project aims to stabilize producer and consumer prices and stimulate local grain production over the long term. By assuring adequate grain supplies to consumers during the pre-harvest period, it will serve to reduce the price fluctuations which currently are manifested in the Mauritanian grain marketing system.

D. Linkage to Country Development Strategy

A major objective of USAID/Mauritania's country development strategy is to increase food availability and food production. The Mauritanian Cereals Office (OMC) Support Project directly contributed to this objective through strengthening the institutional capacity of the OMC to stabilize domestic food prices and enhance local production incentives. The ready availability of cereal imports is essential to stabilizing price fluctuations and maintaining producer price certainty.

E. Linkage to Policy Reform

USAID/Mauritania's policy reform initiatives are concentrated on food price adjustments which stabilize food prices, enhance local production incentives and strengthen the financial posture of the OMC. The OMC is the GIRM's main instrument for implementing this policy. The operating and material support provided to the OMC under this project therefore supports this policy program directly.

F. Beneficiaries

The OMC's capacity to manage, sell and buy cereals will be considerably stengthened by this project. However, consumers should also benefit from the stabilized grain prices, as should producers receiving a higher floor price for grain. Merchants who can adjust to the new system of higher margin-lower volume business, as well as transporters, small millers, and rural laborers stand to profit from the Marketing Project due to increased employment opportunities.

G. Impact on Development Constraints

This OMC project seeks to address the following constraints to development in Mauritania -

Weak Institutions

By putting II 206 commodities through the OMC, paying operating costs, and providing funds for infrastructure and personnel improvements, this project will strengthen the capability of the OMC to manage grain and become increasingly economically and financially viable.

Lack of trained manpower

The OMC project is comprised of an in-service training component to improve OMC personnel management and technical skills.

Lack of a data base

As part of the OMC project, a price monitoring system will be put in place to allow the OMC and other actors to better understand grain stabilization needs in Mauritania. In addition, a marketing study will be carried out to understand the structures and margins more perfectly.

Irregular grain supply

The OMC project will assist the OMC in its mandate to regularize the availability of traditional grains throughout the country throughout the year.

II. ANALYSIS

A. Current Status

The project implementation letter for the 1981 OMC Marketing Project and an assessment of the operations under this agreement are included in Annex A. Of the activities other than operating expenses financed under the 1981 PIL, only the revolving fund for local grain purchases has really become functional. The accretion of new duties and new partners in stabilization and marketing operations has prevented full utilization of available funds. Slow approval of contracts by the Central Contract Commission has also added to the delay. However, USAID anticipated that within the next year most of the components enumerated in the 1981 PIL will have been put into place. Funds which were programmed for the construction of rural warehouses may eventually be channeled with the current BAD-FAD financing of 32 warehouses nationwide. The other components of the 1981 PIL remain unchanged, and contracts will be drawn for the required commodities by August, 1982.

B. Outputs

1. Approximately 40 trained rural marketing specialists and warehousemen.
2. Construction of one 1000 MT warehouse and five 500 MT warehouses.

3. A fully operational OMC price monitoring system. In conjunction with the FRG technical team, a periodic analysis of national and regional grain markets.
4. Construction of a bulk handling facility for imported grain.
5. Studies on the impact of food aid, traditional marketing of cereals, and national price and production trends.

C. Implementation Schedule

January 1984	Contract let for construction of 1000 MT warehouses in southern Trarza Region and of 500 MT warehouses in southern Hodhs. Contracts let for purchase of 2 semi-trucks (tractor and trailer), one Land Rover, and one Datsun double cabin pick-up.
March	Construction of security lighting system for Nouakchott warehouse complex begins. Construction of bulk handling system begins.
June	Refresher course in grain storage and marketing at Kaedi. Security lighting system finished.
September	Trucks ordered in January arrive. Bulk grain handling system completed.
December	Warehouse construction completed.
January 1985	Contract for construction of 500 MT warehouse in southern Hodhs let.
June	Refresher course at Kaedi
December	Warehouse construction completed.

January 1986	Contract let for construction of 500 MT warehouse in southern Hodhs.
June	Refresher course at Kaedi
December	Warehouse completed.
January 1987	Contract let for construction of 500 MT warehouse in southern Hodhs.
June	Refresher course at Kaedi
December	Warehouse completed
January 1988	Contract let for construction of 500 MT warehouse in River Valley.
June	Refresher course at Kaedi
December	Warehouse completed

III. MANAGEMENT

The OMC will call-forward PL 480 commodities as indicated in the commodity management plan (Section V). The OMC will monitor commodity receipts, transport and sales, and provide regular reports to the USAID project officer. The USAID Food for Peace Officer will be responsible for assuring that the commodity management practices used by the OMC conform to Regulation 11. The USAID project officer in charge of the OMC Marketing Project will monitor operational expenses incurred by the OMC, assure that all OMC project activities follow the project implementation schedule, and advise the USAID comptroller and Director to authorize funds related to this project.

IV. BUDGET AND FINANCIAL PLAN

A. Budget (in 000 UM)

ITEM	FY82	FY83	FY84	FY85	FY86	FY87	FY88	OBSERVATIONS
Warehouses	27,600	0	22,016	20,000	10,000	10,000	10,000	proposed to construct office/storeroom in con-
Office/Storeroom	2,944	19,800	0	0	0	0	0	junction w/ BAD-FAD funded warehouses in 19 locations using FY82-83 funds - 206 would fund some warehouses as in PID.
Warehouse Equipment	6,437	4,442	6,000	6,000	6,000	6,000	0	
Fumigant	6,072	0	0	0	0	0	0	pesticide revolving stock should be created in 1st year
Office Equipment	1,656	0	0	0	0	0	0	
Repairs	400	0	0	0	0	0	0	
Training	1,900	1,900	2,000	2,000	2,200	2,200	2,200	
Revolving Fund	100,000	0	0	0	0	0	0	revolving fund may eventually be reprogramed
Radio/Maintenance	4,210	5,050	1,680	1,700	1,800	1,900	2,000	
Vehicles	1,584	582	10,342	0	0	0	0	
Elec Nkt Warehouse	0	0	2,000	0	0	0	0	
Subtotal Infrastructure	-	-	44,038	29,700	22,000	0	0	
Studies	0	0	2,500	2,500	0	0	0	
Operating Costs	-	-	120,000	120,000	120,000	14,100	14,209	
TOTAL	-	-	166,538	152,200	142,000	-	-	

B. Financial Plan

Because the financial viability of the OMC is essential to all to the development activities to be financed under the II 206 project, it is important that the OMC have an operating reserve to continue to generate the funds necessary to finance these sub-projects. OMC receipts of the gross proceeds need to be front loaded to cover initial wharf and transport costs which are incurred in getting the grain to market areas. The interim II 206 - type program will have to advance these funds to the 206 activity to get the program underway. This requirement will continue for two quarters, depending on the season in which the grain arrives. Hence, the Gross Proceeds Account will be called upon to reimburse the II 206 - type project account for 6 months of operating costs and then to advance the third quarter estimated expenses to the OMC - USAID project account. Thereafter, the OMC can submit a quarterly estimate of expenses for replenishment of the joint account. However, other sub-project activities should not count on currency generations before January of 1984.

Financial arrangements for remitting funds will function similar to the 1981 PIL guidelines. Up-country remittances will be sent via postal or bank transfers to the Gross Proceeds Account in Nouakchott. From there local currency will be transferred to the OMC - USAID project account based upon a quarterly estimate of need. In case of conflict with demands from other projects, OMC operating expenses will always receive priority.

The OMC - USAID account will be used to fund the activities outlined in I-B of this PID. The OMC will present USAID with a monthly bill for operating expenses which the project manager will honor, upon verification of the charges.

C. Reporting

The OMC will keep USAID fully informed concerning the status of commodity receipts, transports and sales, and provide complete details as requested. Representatives of the USG will have access to and be permitted to audit all records pertaining to the use of commodities provided. The OMC will also submit a quarterly report to USAID which will include the following items:

1. Beginning stocks
2. Arrivals
3. Stock transfers
4. Sales
5. Damaged Stocks
6. Ending stocks
7. Currencies generated
8. Deposits and disbursements

V. EVALUATION

The OMC Marketing Project will be evaluated in 1983 and 1984 during the fourth quarter. These evaluations will consider how well the OMC has performed in achieving the goals of the specific project activities indicated in I-B, and in its overall management of the marketing program.

C. Project Title: Bulk Handling Facility
Implementation Period: Three years
Life of Project Funding: $3 million

I. PROJECT DESCRIPTION

A. Background

Mauritania is able to domestically produce only one-third of its food needs. The remaining two-thirds is imported. These imports -- both donated and commercial -- are brought in through either the port at Dakar or the port at Nouakchott. Despite the recent effort in agricultural development, Mauritania will remain dependent on imported food and its port facilities for the foreseeable future. The port at Nouakchott is in extremely poor repair as discussed in the port facilities section above. The Peoples Republic of China is currently constructing a new improved port which is scheduled for completion in 1986. A deep water port exists at Nouadibou but it is far from urban centers and ultimate recipients of imported commodities. The port at Dakar is relatively well-equipped, particularly for handling food, but transshipment by coastal vessel to Nouakchott or hauling by truck adds considerably to the cost. There are additional costs and delays of border taxes and sovereignty disputes. Because of inadequate local port facilities, handling costs remain exceedingly high and are counterproductive to donor policies of making food available at low cost; for 1981, the port handling fees were a minimum of $7 million.

B. Project Activity

The GIRM and USAID propose using Section 206 local currency generation in support of construction of bulk grain handling facilities in the vicinity of the port of Nouakchott. Installation of this facility will involve construction of a jetty able to support fixed conveyors linking it with maritime installations and installation of two grain silos, bagging and transport loading facilities.

The facility will also be comprised of vacuum and force pumps linked to a flexible detached evacuation systems.

Pre-feasibility studies indicate that the economic rate of return of this project to be at a minimum of 25%. Although the arguments are compelling, a more thorough feasibility study is required before the final decision to proceed is made. Under the auspices of the BMDC (Mauritanian Bank for Development and Commerce) the feasibility study will be carried out with financing from sources other than Section 206.

As currently envisioned, the bulk handling facility would cost about $9 million of which 60% ($5.4 million) would be local currency financing. Section 206 would finance $3.0 million of the local currency costs at 75 million UM each year for FY 1984 and FY 1985.

C. Project Goals

The goal of the bulk handling facility is to improve food handling at the port of Nouakchott to bring down the costs, cut down on food losses and increase food availability — both donated and commercial -- to Mauritanian consumers.

D. Links to Strategy

The Mission has an overall strategy for the food and agricultural sector to increase food availability. This bulk handling facility fits directly into this strategy. Among other services, it will significantly expedite the unloading of cereal imports during times of unexpected food shortages.

E. Links to Policy Reform

The ultimate objective of the price policy reform encouraged by Section 206 — that is increasing food aid consumer prices towards a level of import parity — is to allow Mauritania to decrease its dependence on donated food and increase its ability to import commercially.

The bulk handling facility can be an instrument to reach this objective as it will result in decreases in the real total cost of food imports. In addition, these savings will reduce the extent to which consumer cereal prices must be increased to conform with the price policy program criteria.

F. Beneficiaries

The initial beneficiaries will the GIRM and private institutions which currently pay high prices for food handling. These institutions will realize important savings through this facility. The ultimate beneficiaries will be the consumers who will benefit from lower prices for imported foods.

G. Impact on Development Constraints

1. Poor Port Facilities - This facility directly addresses the inadequate bulk handling capabilities which currently exist at the port.

2. High Cost of Food Handling - Related to the first constraint, this facility will reduce handling costs and food losses currently experienced at the port. It it estimated that these costs will be reduced by 80%.

3. Limitation on Vessel Size - This facility will allow larger vessels to unload offshore. This will cut ocean transport costs considerably both for shippers and for the GIRM as well as paying unloading demurrage fees.

4. Adverse Sea Conditions - This facility will allow unloading of vessels even in adverse conditions which occur during much of the year.

II. ANALYSIS

A. Current Status

The BMDC proposes to create a Development Company with support from the bi-lateral and multi-lateral donor institutions as well as private investors to install a bulk handling facility at the port of Nouakchott. Pre-feasibility studies have been conducted which indicate that the project is economically and technically viable. A more detailed feasibility study must now be carried out to confirm this.

The project has attracted the interest of several donors and investors to date such as the World Bank, French Aid Organizations, the World Food Program, as well as AID. Once this feasibility study is completed, additional subscriptions can be collected. Cautious estimates of construction time are from 12 to 18 months.

B. Outputs

Outputs of the project include installation of two mobile silos, construction of a jetty and installation of a piping system with vacuum pump.

C. Economic Analysis

Two separate pre-feasibility studies of bulk handling facilities at Nouakchott port have been done. Venderwoort has reviewed these as well as a third option and calculates internal rates of return of 26% or higher for all three alternatives. However cost estimates for the same facility vary between two and nine million, depending on the source of information. A more thorough study involving engineering as well as economic aspects of a new facility is required before it can be verified that this proposed sub-project is indeed economic justified. There is a high probability that this is the case.

Table I includes a revised set of costs and benefits that include the cost of the feasibility study and corrects for delays in undertaking the project. A major benefit of the proposed project is to avoid demurrage charges that average over $17.00/ton for the large majority of food aid imports coming in by sea. Other imports are affected in a similar way. The bulk handling facility will eliminate port congestion by drawing an estimated 50,000 - 75,000 tons of current cereal imports away from the existing port. These benefits are short term however since the Chinese are building a new port that is projected to be operational in 1986. At that time, port congestion should be alleviated even without the project. Thus after that year, the savings represented by the port facility will be in terms of reduced transport costs from direct shipment of grain in large (10,000) bulk carrying vessels.

Vanderwoort estimates that total transportation savings will amount to at least $50.00 per ton for shipments arriving in the larger vessels. That estimate is probably conservative since recent US shipments to Nouakchott via Dakar have been averaging around $210.00 per ton as compared to $110 - $115 per ton direct to Dakar. If Nouakchott could efficiently handle larger ships currently going into Dakar -- something it cannot do with existing port facilities -- it should realize similar savings.

The economic analysis in Table I assumes an initial shift of 50,000 tons of grain from the more expensive small coastal vessels to the larger bulk grain carriers. This is in addition to 25,000 tons currently being shipped in large vessels.

The feasibility study will be carried out by the Mauritania Development Bank. For this particular project the economic and financial calculations are the same since most inputs are imported and unskilled labor is only a small part of the costs. In addition, current cost estimates are so varied that any adjustments would be of questionable accuracy. However, given the conservative way in which benefits were counted, and given that we have used the highest of all cost estimates, the 25% calculated rate of return is conservative.

TABLE I

ECONOMIC BENEFITS AND COSTS OF A NEW BULK GRAIN HANDLING FACILITY IN NOUAKCHOTT

(000 UM)

	YEAR 1	2	3	4	5	6	7	8	9	10
Projections (00 MT)										
Port Traffic	266 (a)	293	322	354	389	428	472	518	571	627
Tons Incurring Demurrage	-	-	190	-	-	-	-	-	-	-
Grain Imports	147	146	145	144	143	142	141	140	139	138
Carried by Large Vessels	25	25	75	80	85	90	95	95	95	95
Increment due to Project			50	55	60	65	70	70	70	70
Benefits & Costs										
Benefits:										
Savings in Demurrage	-	-	2400	-	-	-	-	-	-	-
Savings in Transport Costs	-	-	2500	2750	3000	3250	3500	3500	3500	3500
Total Benefits	-	-	4900	2750	3020	3250	3500	3500	3500	3500
Costs:										
Port Handling			300	330	360	390	420	420	420	420
Incremental Benefits	-	-	4600	2420	2660	2860	3080	3080	3080	3080
Investment Costs										
Plant & Equipment	4500	4500								
NET BENEFITS	-4500	-4500	4600	2420	2660	2860	3080	3080	3080	3080

IRR = 26%

(a) 1984 estimate. Other years projected at 10% growth rate.

D. Social Impact

As stated above, the facility will decrease the cost of food handling and therefore the cost of food to the suppliers who should pass these savings on to the consumers.

III. IMPLEMENTATION SCHEDULE

feasibility study (other financing)	January - June 1983
begin construction	August 1983
complete construction	February 1984

IV. MANAGEMENT

The project will be financed and managed by the Development Company created by the BMDC. Technical maintenance and day to day operations will be managed during the first five years by the BMDC and SPIE - SETEM (contractors) and then transferred to FAMO-Mauritania.

During the construction USAID represented by the FFPO will receive quarterly reports and, through the management committees, authorize further disbursements. Once is is constructed, the USG as a financier and user of the facility will make periodic checks on its operations. This will be part of normal procedures for assuring adequate facilities for receiving and hahdling PL 480 commodities.

V. BUDGET AND FINANCIAL PLAN

It is currently proposed that the Development Company will start with capital of 30 million UM. The partners in this company will be as follows:

	UM (000,000)	
BMDC	10	33.33
SFI	5	16.66
PROPARCO	5	16.66
SPIE-SETEM	3	10.00
FAMO	2	6.66
SONIMEX	3	10.00
CAA/OMC	2	6.66

The financial partners: SPIE-SETEM, BMDC, SFI and PROPARCO will pass their shares over to Mauritanian partners after five years.

The costs of the project are estimated at $9.0 million of which 60% (5.4 million) would be local currency financing. AID through Section 206 would finance $3.0 million with local currency as shown below.

(000 UM)

FY 1984		FY 1985		FY 1986	
$	UM	$	UM	$	UM
907	45,350	1,886	94,300	207	10,350

VI. EVALUATION

USAID will evaluate the feasibility study to determine the viability of the project and whether to continue at the proposed funding levels. USAID will appraise progress on the construction effort once a year in 1984 and 1985 to ensure that the facility will be useful for PL 480 bulk commodity handling.

D. PROJECT TITLE: Reinforcement of Crop Protection Service

IMPLEMENTATION PERIOD: 5 Years

LIFE OF PROJECT FUNDING: $ 500,000

I. Project Description

A. Project Purpose: To strengthen and expand the ability of the Mauritanian Crop Protection Service to combat agricultural pests within the national boundaries, with an additional capacity to demonstrate, train, and assist local farmers in pest management practices which they will use to reduce food crop losses.

B. Background: A major constraint to increased food production in Mauritania is losses due to agricultural pests. It is estimated that insects, grain eating birds, and other pests take a toll on average of 20-30% of potential food harvested before it is available for human consumption. USAID has been active in the area of crop protection since the inception of the Regional Crop Protection Project (RFCP) in 1977. USAID increased its efforts in this area in 1981 when the CILSS/FAO/AID Integrated Pest Management Project (IPM) began its activities. The RFCP Project is an institution-building project aimed at the establishment of an effective Crop Protection Service (CPS). To date significant progress has been made in the training of personnel, construction of facilities, and the establishment of Mobile Crop Protection Teams. The CILSS/FAO/AID IPM Project is an applied research project designed to formulate integrated pest management techniques which can eventually be extended to the farmer. Despite serious administrative difficulties with the regional management of this project, progress has been made in the identification of the pests causing damage to Mauritanian food crops and work has begun on the evaluation of the levels of damage.

C. Project Activities: The on-going efforts noted above, while continuing to be effective and useful, have not yet touched, nor can they be expected to touch all of Mauritania's producers. This activity therefore proposes to build upon and extend the action programs of the Crop Protection Service to permit broader contact with producers and result in lowering levels of losses due to agricultural pests. Section 206 sales proceeds will be used to expand and improve the physical facilities of the Crop Protection Service. This will include:

1. The construction of four Regional Crop Protection Centers in the major agricultural zones of Mauritania. These centers will a) serve as bases for the Mobile Crop Protection Teams allowing them to be more effective and economical in carrying out their duties, b) serve as locations for farmer training and field demonstration of pest management techniques and c) serve as locations where farmers can report insect and other pest infestations and get immediate advice from the team members. Section 206 sales proceeds will also be used to provide a portion of the necessary operational support and labor to allow these facilities to attain maximum effectiveness.

2. The construction of a diagnostic center at the Ecole Nationale de Formation et de Vulgarisation Agricole (ENFVA) located in Kaedi. This facility will ensure that the agricultural agents trained at ENFVA are more thoroughly instructed in the identification of the agents causing damage to Mauritanian food crops and the control of these agents. This center will also serve the farmers of the Kaedi area as a location where pest problems can be diagnosed and advice given on their control.

3. The construction of fences around four existing pesticide storage warehouses. Fences will be constructed around these warehouses to ensure that local inhabitants and domesticated animals will not be exposed to any possible adverse effects due to the pesticides stored at these facilities.

D. Project Goals: The overall goal of this project is the increased availability of locally grown food through the reduction of crop losses due to agricultural pests. This goal is to be attained by: 1) improving and expanding the ability of the Crop Protection Service to combat infestations, and 2) increasing the awareness of the Mauritanian farmers concerning pest problems and the methods for decreasing losses due to plant pests. Through working towards these goals, the project will also have a positive impact on increasing farmer incomes and decreasing the trend of rural-urban migration.

E. Linkage to Country Development Strategy: A major objective of the USAID/Mauritania country development strategy is to increase food availability and food production. The Reinforcement of Crop Protection project contributes directly to this objective by preventing food crop losses that can reach as high as 20% of the potential crop due to insects, birds, disease, etc. Areas serviced include the Guidimaka Region, the focus of GIRM/USAID crop extension efforts.

F. Linkage to Policy Reform: USAID/Mauritania's policy reform initiatives focus on food price adjustments to stabilize food prices, enhance farmer production incentives, and strengthen the financial viability of the Mauritanian Cereals Office (OMC). The Crop Protection Service project complements this reform program by increasing the availability of local cereals for local purchase by the OMC. A measure of success of the reform program is the extent to which the OMC can reduce or at least not further increase its dependence on food aid and imported cereals.

G. Project Beneficiaries: The target groups for this project are 1) the large group of small farmers who produce primarily for on-farm consumption, and 2) the Crop Protection Service.

It is estimated that 20% of Mauritania's population, or about 320,000 people are involved in farming. The primary intention of this project is to raise the standard of living of this group of farmers who are now surviving at the subsistence level. The risks of decreases in production resulting from unexpected depredation will be significantly reduced through the strengthening of the Crop Protection Service's ability to combat pests and train Mauritanian farmers in pest management methods. In summary, the Crop Protection measures developed through this project will assist the farmer to ensure that his expenditures for farm inputs will not be negated by uncontrollable pest infestations.

H. Impact on Development Constraint: The Mauritanian Crop Protection is a new agency created in January 1981. Because of limited resources, both human and material, the Service has not been able to completely fulfill its mandate to survey and protect all of Mauritania's croplands. The Section 206 project will address this constraint by allowing the service to expand its coverage of Mauritania's agricultural zone. The four Regional Crop Protection Centers to be constructed under this project will ensure a greater contact with farmers and therefore increase the efficiency of the Mobile Crop Protection Teams' work. Money to be made available for the procurement of local supplies and operational costs will allow the teams to circulate on a regular basis within a given zone of responsibility ensuring a more complete surveillance of the pest situation at any given time.

Lack of trained technicians is also a major constraint to improved crop protection in Mauritania. The construction of a diagnostic center at the ENFVA, in conjunction with the training to be initiated at this institution under the auspices of the Regional Food Protection Project, will begin to address this constraint.

II. Analysis

A. Current Status: Estimates of losses vary but most experts agree that an estimate of 20% preharvest crop yield loss due to agricultural pests is conservative. The two major pests which cause damage every year to Mauritania food crops are grasshoppers and grain-eating birds. Grasshoppers, predominately *Oedaleus Senegalensis*, cause damage to a varying degree every cropping season. Population levels of this pest depend primarily on climatic conditions. When conditions are favorable, levels can easily reach 50 insects per square meter and damage at times approaches 100%.

Grain-eating birds, *Passer Luteus* for the most part, are migratory pests which cause damage to maturing sorghum and millet in the recession agricultural fields. Although traditional bird scaring techniques control damage to some extent, losses often reach 50%.

There are a great many additional pests and organisms which cause damage to Mauritanian food crops including plant diseases (smuts and mildews in cereal grains), nematodes, weeds, rodents and insects other than the grasshopper mentioned above.

The Mauritanian government has identified crop protection as a priority area of agricultural development, and it is with this priority in mind the Crop Protection Service was created in 1981. This Service has been mandated to address the entire scope of crop protection problems in Mauritania and although the government has allocated significant resources to the development of the Service, these have not been sufficient to completely fulfill the mandated scope of work. During the 1981-82 cropping season, the two existing Mobile Crop Protection Teams were able to survey approximately 35,000 hectares of croplands.

Of this area about 4,000 hectares were actually treated with pesticides. The 35,000 hectares surveyed represents only about 20-35% of Mauritania's cultivated land surface (estimated to vary between 100,000 - 190,000 hectares depending on weather). Due to lack of resources, the mobile teams were not able to cover the rest of the cultivated land area of Mauritania.

B. Outputs:

1) Four Regional Crop Protection Centers located in the major agricultural zones of Mauritania. Each center will consist of two buildings, a sleeping, eating, bathroom and cooking facility, and the other serving as an office, a warehouse, a pest collection room and a small meterological station.

2) One diagnostic center at the ENFVA located in Kaedi. This will be a room not larger than 50 square meters which will house a pest collection, crop protection reference materials, and other didactic materials to be used for teaching crop protection at the school. The Regional Food Crop Protection Project will supply the necessary materials and expertise to set up this facility and assist with the instruction.

3) Fences around four existing pesticide storage warehouses to protect local inhabitants and domesticated animals from any adverse effects of the materials being stored in these warehouses. Fences will be 100 meters long at each warehouse.

C. Economic Rationale: A significant decrease in crop yield losses due to agricultural pests will be the major benefit of this project. This will arise from two sources.

1) Increased Operational Efficiency: Although the Mauritanian government has allocated significant resources to the operation of the Mobile Crop Protection Teams (MCPT), allocations have not been timely enough to allow the teams to reach their maximum potential.

During the 1981-82 cropping season, the teams were inoperable for nearly one month during the height of the six-month grasshopper infestation season due to delays by the GIRM in making funds available. By providing an operating cushion the project will prevent this month of "down time." We expect this to increase the area covered by the teams at least 20%.

2) Effects of Constructing Permanent Centers: It is assumed that as the Regional Crop Protection Centers become operational (two in 1986, two in 1987) the MCPT's response to pest infestations will become more rapid and more effective. The centers will improve access to supplies and will decrease the distance the teams must travel between treatment sites.

At present, one of the major constraints to operations has been the unpredictable availability of fuel, oil, and spare parts in the agricultural zones. Teams often must send a UNIMOG to a distant town to locate fuel or supplies. Regional centers will be equipped with fuel storage facilities and will have small warehouses for the storage of spare parts and other supplies.

In addition, the centers will be centrally located in the major agricultural zones. RFCP will equip each center with a two-way radio to increase communication between the regional agricultural offices of the Crop Protection Service central headquarters and the teams. Farmers and agricultural personnel will thus have constant access to the mobile teams and will be able to identify the areas of infestation for the Teams. This will decrease the time the teams spend travelling to sites and time spent surveying. As a result, we estimate that the proportion of the time that the teams actually spend treating infested areas, relative to the time spent locating fuel, travelling, and scouting, will increase from the present 20% to about 35%.

3) Project Benefits:

a. Increase in Surface Treated: During the 1981-82 cropping season, each mobile team was able to survey about 17,500 hectares and treat approximately 2,000 hectares. By 1984, the Crop Protection Service will have four mobile teams operating in the agricultural zone of Mauriania. A 20% increase in operating efficiency and another increase in coverage of 75% due to the permanent centers would result in an overall increase in area treated per team of 2,100 hectares per year or 8,400 hectares total for four teams.

b. Ratio of Surface Treated to Surface Affected: It is assumed that for each hectare treated against insect pests (predominantly grasshoppers; see section II-A Current Situation), losses are decreased on that hectare and on three additional hectares. This ratio of 1 hectare treated: 3 hectares total has been observed as an average from five years of Sahelian Crop Control experience.

c. Losses Avoided on Treated and Affected Surfaces

1) Treated Surfaces: On each treated hectare, we estimate that average yield losses of 20% are avoided. This estimate seems reasonable as most experts concur that an overall 20% due to agricultural insect pests in the Sahel is a conservative figure. In the areas treated, where infestations are the highest, losses would often reach 50% if left untreated, and 100% losses are not uncommon.

2) We assume further that on 3 additional hectares, not treated but adjacent to the treated area, there is a 10% decrease in losses. By the time grasshoppers would have moved on to the three adjacent hectares, plants there would have attained a later growth stage and so would have been more able to tolerate insect damage.

The 10% figure could vary greatly depending on the stage of crop growth, the state of development of the insects, and the distance between adjacent fields.

4) Project Costs: Since the teams are already in place with the project, staff salaries and a great deal of vehicle travel time will be incurred without this project. Essentially only variable operating costs associated with using the UNIMOG for treatment will increase. These amount to 500 UM per hectare in financial terms and 475 in economic terms as for the following:

Variable Treatment Costs for Crop Protection Service

	Cost per Hectare (UM)	
UNIMOG:	Financial	Economic
Depreciation	85	85
Repairs	45	36
Fuel	70	54
Pesticide	300	300
TOTAL.....	500	500

In addition to these variable costs, are $250,000 allocated for construction of the new centers and an equal amount for operating support from the 206 funds.

This subproject has a very high financial and economic internal rate of return. The more meaningful gross benefit-cost ratio in this case is 1.4 in financial terms and 1.72 in economic terms.

D. Long-Term Benefits of Permanent Centers: There are several additional benefits which will result from construction of the centers. The benefits are difficult to quantify, but are potentially very important.

First, records to be kept at these centers will eventually provide a data-base for predicting pest outbreaks. Second, the centers will be sites for demonstrations of farm-level control strategies. The ultimate goal of this training is to make farmers more responsible for the work of crop protection (scouting and treatment). A farmer-based scouting program would allow earlier detection of insect infestations. Thus, a much higher proportion of infestations could be controlled by farmers themselves, using inexpensive powders or baits which require no motorized vehicles for application. Earlier detection of infestation might also allow a decrease in the overall number of hectares treated, since timely treatment will prevent infestations from spreading. Interventions by mobile teams would be limited to the occasional large infestation, with resultant savings in fuel costs.

Finally, the centers could function as sites for demonstrations by Service de Vulgarisation ("Extension Service") personnel of non pest-related techniques: improved agronomic practices, etc.

E. Social Analysis: As expressed in the original project paper, the goal of RFCP is to increase the standard of living of subsistence level farmers by increasing their production of staple grains. Specifically, RFCP seeks to reduce crop losses due to insects, diseases, and birds. The target group of subsistence farmers produce primarily for on-farm consumption, though farmers may also engage in cash-crop (vegetable or grain) production. Reducing grain losses increases the food available for subsistence families.

The major social effect of decreasing crop losses in Mauritania will be an increase in the quality of nutrition and therefore of health for all subsistence farmers and their families. No fundamental changes in village-level socio-economic structures are foreseen.

Secondly, land tenure patterns are not an issue in this project. As farmers are not obliged to pay for the benefits of the project, it will work within any of the existing village land tenure systems. And as explained above, the project will not cause the concentration of land in the hands of any sub-group of farmers.

Finally, the impact of the project on the farmer labor patterns is likely to be small. Control measures undertaken by the mobile teams may reduce the amount of time farmers, both men and women, need to spend protecting their fields.

It is more likely that farmer education undertaken by the teams will lead to an increase in the perceived need for crop protection activities on the part of the farmers.

III. Management of the Project:

A. GIRM: The Mauritanian Crop Protection Services has gained extensive experience in the past several years in the management of foreign assistance projects. This includes the two USAID projects and several grants from the French government for the purchase of pesticides. The CILSS/FAO/AID Integrated Pest Management Project is entirely administered and implemented at the country level by the Mauritanian government. The Regional Food Crop Protection Project is jointly directed by the Chief of the Crop Protection Service and USAID Project Manager. The Chief of the Crop Protection Service and the Service's accountant have both attended short-term training programs sponsored by USAID on the financial and technical management of USAID projects. Through this training, along with the day-to-day operations of the two projects, both of these persons have become very familiar with USAID management requirements.

In light of the above, the GIRM should have no difficulty in the management of the PL 480 Crop Protection Assistance Project.

B. USAID: The USAID Regional Food Crop Protection Project will have a Country Project Officer stationed in Mauritania until the completion of that project in 1985. This person will be designated as the mission officer responsible for implementation of the section 206 Crop Protection Assistance Project. Following completion of that assignment, monitoring responsibility is given to the Food and Agriculture Division. Through periodic site visitations, reports evaluation, joint GIRM-USAID meetings, the section 206 Management Steering Committee will determine the adequacy of the project management and recommend an alternative course of action if necessary.

IV. Budget and Financial Plan: (all figures in US dollars)

A. Operational Costs:

YEAR	GIRM	RFCP	SEC. 206 ($)	SEC. 206 UM(000)	TOTAL
1980	30,000	26,000	-0-	-0-	56,000
1981	75,000	40,000	-0-		115,000
1982	80,000	50,000	-0-		130,000
1983	100,000	50,000	-0-		160,000
1984	110,000	10,000	(70,000)	3500	190,000
1985	130,000	10,000	(60,000)	3000	200,000
1986	160,000	-0-	(50,000)	2500	210,000
1987	180,000	-0-	(40,000)	2000	220,000
1988	190,000	-0-	(30,000)	1500	220,000
1989	220,000	-0-	-0-	-0-	220,000
		TOTAL	(250,000)	12500	

NOTE: Although PL 480 Project Funds are only programmed for five (5) years, a 10-year budget is presented to indicate past funding and estimated future funding after the end of the project.

B. Construction Costs: (PL 480 Only)

YEAR	AMOUNT UM(000)	AMOUNT $	
1984	1000	(20,000)	- Fencing around existing 4 Crop Protection warehouses
	1500	(30,000)	- Diagnostic Center for ENFVA
1985	5000	(100,000)	- Two Team Bases
1986	5000	(100,000)	- Two Team Bases
	Total.. 12500	(250,000)	

		$	UM
C. Total Costs:	Local Operations:	(250,000)	12,500
	Construction:	(250,000)	12,500

V. Evaluation Plan: The implementation plan outlined in section VI of this proposal will be used to measure the progress of the project. This, along with the Annual Progress Reports to be required of the Mauritanian government, will be sufficient for evaluation purposes. USAID will organize a project review at least once a year. At these reviews the Chief of the Mauritanian Crop Protection Service, along with the USAID Officer responsible for the implementation of this project will present the Annual Progress Report along with the Annual Workplan for the up-coming year. The GIRM annual evaluation will determine the adequacy of the project evaluation.

ECONOMIC AND FINANCIAL ANALYSIS OF
CROP-PROTECTION SUB-PROJECT

DESCRIPTION	YEAR FY84	FY85	FY86	FY87	FY88	IRR	B/C (1)
Mobile teams in operation	4	4	4	0	0		
Permanent teams in operation	0	0	2	4	4		
Increase in area (HA) treated due to:							
Operational Funds (2)	1600	1280	960	640	320		
Permanent Centers	0	0	3600	7200	7200		
TOTAL AREA TREATED	1600	1280	4560	7840	7520		
Increase in area (HA) affected	4800	3840	13680	23520	22560		
Increase in grain production (Tons) (3)	320	256	912	1568	1504		
Financial Analysis (000 UM)							
Value of incremental production (13 UM/kg)	4160	3328	11856	20384	19552		
Operating Costs (500 UM/HA Treated)	800	640	2280	3920	3760		
INCREMENTAL NET BENEFIT	3360	2688	9576	16464	15792		
Investment Costs	6000	8000	7500	2000	1500		
NET BENEFIT	-2640	-5312	2076	14464	14292	65%	1.40
Economic Analysis (000 UM)							
Value of incremental production (15.5 UM/kg)	4960	3968	14136	24304	23312		
Operating Costs (475 UM/HA Treated)	760	608	2166	3724	3572		
INCREMENTAL NET BENEFIT	4200	3360	11970	20580	19740		
Investment Costs	6000	8000	7500	2000	1500		
NET BENEFIT	-1800	-4640	4470	18580	18240	+100%	1.72

(1) Gross Benefit - Cost Ratio at 15%

(2) Projected to decline in a straight line as GIRM picks up increasing share of operating costs.

(3) Assuming average yields of 400 kg/HA, 20% loss avoidance for area treated and 10% for area

VI. Implementation Schedule

1984	January - March	- annual work plan is written - warehouse fencing activity is put out on bid and contractor chosen - architect is contracted to design plans for ENFVA diagnostic facility - construction of diagnostic facility is put out on bid - supplies/material/personnel are procured/hired for bird control activities and field work begins
	April - June	- construction of fences begins - contractor chosen for construction of ENFVA diagnostic facility - list of all supplies/materials/personnel for cropping season activity is compiled and procurement/hiring begins
	July - December	- mobile teams begin cropping season activities - fences around storage warehouses are completed - diagnostic center at ENFVA is completed - list of materials/supplies necessary for bird control activities is compiled and procured - annual progress report is prepared
1985	January - March	- annual work plan is written - teams begin bird control activities - diagnostic center at the ENFVA begins operating - training program organized by the RFCP and IPM projects uses the facility to train graduating class of agr. students

		- architect contracted to design plans for four team bases - construction of two team bases (Kaedi and Kiffa) goes out on bid
	April - June	- contractor chosen for construction of team bases in Kaedi and Kiffa and construction begins - list of materials/supplies for mobile team cropping season activities is compiled
	July - December	- teams begin cropping season activities - list of materials/supplies for bird control activities is prepared and procurement begins - annual progress report is prepared
1986	January - March	- annual work plan is prepared - construction of bases at Kaedi and Kiffa is completed - teams begin bird control measures - construction of team bases at Aioun and Ouldyenge goes out on bid
	April - June	- construction of Aioun and Ouldyenge bases begin - list of supplies/materials for mobile team activities is compiled and procured
	July - December	- teams begin cropping season activities and begin using bases constructed in Kaedi and Kiffa - surveillance of construction of team bases in Aioun and Ouldyenge - annual progress report is prepared - list of materials/supplies for bird control activity is compiled and procured

1987	January - March	- annual work plan is prepared - bird control teams begin work - construction of team bases in Aioun and Ouldyenge is completed
	April - June	- list of materials/supplies for cropping season activities is prepared and procured
	July - December	- cropping season field activities begin - team bases in Aioun and Ouldyenge begin functioning - annual progress report is prepared
1988		- annual work plan is prepared - all construction is completed and Crop Protection Service continues yearly activities

E. Project Title: CROP EXTENSION AND VILLAGE INFRASTRUCTURE PROJECT

Implementation Period: Three years

Life of Project Funding: $2.76 million from Section 206
1.09 million from 682-0231

I. PROJECT DESCRIPTION

This project builds upon the most successful features of the present Guidimaka Integrated Rural Development Project. Its purpose is to increase food production in the Guidimaka region, Mauritania's most potentially productive dryland agriculture area. The project is composed of three basic components:

A. Crop Extension

The main focus of the project will be the extension of a cereal technology package consisting of animal traction, higher yeilding local seed varieties, credit, and simple improved cropping practices. Vegetable gardening extension will be pursued during the cool season. The package offers an internal rate of return of 16% and has already been enthusiastically adopted by farmers introduced to it to date.

B. Animal Health

Animal health is an essential complementary activity supporting the animal traction program. Village volunteers will be trained to diagnose basic symptoms and basic veterinary materials will be made available for sale through village pharmacies.

C. Village Infrastructures

The project will continue the construction of village small-scale infrastructure projects such as wells, schools and dispensaries. This activity has elicited a high level of village participation, support and goodwill.

Perhaps more important, it has often helped establish good rapport which facilitates introduction of the technology package. Villagers provide 75% of infrastructure costs.

The project is based on two years experience gained in determining the acceptability of the selected activities. The extension package is technically sound, economically viable and socially acceptable. Key outputs by 1986 include 275 farmers employing the technology package; and 75 small infrastructure projects completed. The number of teams of oxen training and village animal trainers will be increased to 275 and 5 respectively. Supplementary foriegn exchange financing will be provided to fund a three person technical advisory team. Project costs for the three-year project total $2.76 million from Section 206 and $1.09 million from 682-0231 (See Annex E).

II. BACKGROUND

The Guidimaka Integrated Rural Development (GIRD) Project (682-0201) was originally designed as a largely research oriented activity to develop methods for increasing crop and animal yields. A follow-on project was envisaged to undertake an expanded extension program based on the results of the first project. The original project agreement was signed in September 1977. After long delays, field activities began in April 1979 with the arrival of the technical assistance team.

During the first year of field activities USAID/GIRM officials and the contract team believed various interventions in Guidimaka had already been proven effective and adaptable while others would require one or two rainy season demonstrations for verification. It was therefore decided that extension agents would be trained to carry out field trials on a number of interventions.

An amended PP was approved in May 1981 to redirect the project. Some project components were eliminated or de-emphasized while others were added.

The amended PP included components consisting of cereals research and extension, animal traction training and extension, vegetable gardening, range management, and animal health, environmental protection, and small village infrastructure projects (mainly wells and schools).

In February - March 1982, an interim evaluation was undertaken. The evaluation report noted several managerial problems - inadequate procurement planning, logistical difficulties, cost overruns, and frequent replacement of technical assistance team members - which seriously hindered the effectiveness of the projejct. Concern was also expressed over the lack of institutionalization into the GIRM structure and whether the project structure was cost-effective considering the limited degree of extension attained to date. Despite these difficulties, the evaluation lauded the contract team for its initial successes in its adaptive research activities, particularly agronomic works, and the acceptance the extension package had gained from the local population.

In concluding, the evaluation considered three future options as follows: (1) halt all activities when the project ends in December 1982; (2) continue in the same mode but expand operations geographically; or (3) develop an alternative, more cost effective framework to extend the most promising technologies for improving agricultural and animal productivity. It was recommended that the third option be followed.

At this time, USAID/Mauritania is about to undertake a major agricultural sector assessment to better refine its agricultural and food sector strategy. The USAID program will continue to support agricultural sector activities in the Guidimaka area as this proposed project capitalizes upon USAID/Mauritania's substantial investment in the Guidimaka area to date and is consistent with its overall country strategy.

III. LINKAGE TO USAID COUNTRY DEVELOPMENT STRATEGY

A major objective of USAID/Mauritania's country development strategy is increased food availability and production. This project directly contributes to this end through the extension of a tested and acceptable cereal technology package. The animal health and village infrastructure components indirectly support this objective as discussed above.

IV. LINKAGE TO USAID POLICY REFORM INITIATIVES

USAID/Mauritania's principal policy concern is improving the availability of food and financial returns to rural labor engaged in food production. This is to be achieved by encouraging more GIRM commitment to improving productivity food production in dryland regions and through a program of upward producer price adjustments. The successful implementation of this project can demonstrate the merits of investing in selected dryland areas offering potentials for high yields.

V. BENEFICIARIES

Experience to date in extending the technology package shows that the initial beneficiaries are the relatively innovative farmers willing to take risks and able to invest in the animal traction equipment. As these early adopters continue to employ the technology package and demonstrate its advantages, other more conservative farmers are likely to adopt the package as well. Other beneficiaries include villagers that will have access to the small infrastructure projects and those gaining training and jobs as extension agents and animal trainers. About 90,000 people live in the Guidimaka region.

VI. IMPACT OF DEVELOPMENT CONSTRAINTS

A. Inadequate Rainfall - the use of animal traction for field preparation and weeding improves water retention and thereby increases yields. The construction of village wells will ensure a more reliable water supply for human and animal consumption and hygiene. Wells will also permit gardening during the cool season.

B. Unimproved Farming Technology - the extension package will enable farmers to increase yields by as much as 50%.

C. Inadequate Physical Infrastructure - village wells, schools and dispensaries will be constructed by the project.

D. Lack of Trained Human Resources - the project will train additional extension agents, animal trainers and farmers in improved cropping and animal health practices.

E. Unavailability of Credit - the project offers a revolving credit fund to purchase animal traction equipment. A 50% down payment is required, usually with the balance paid the next crop system.

F. Inadequate Food Availability - the increased cereal and vegetable production resulting from the project should increase the availability of food nutritional diet in the villages participating in the project.

VII. ANALYSIS

A. Current Situation

1. Animal Traction Demonstration and Extension

During the 1980 and 1981 rainy season the project confirmed the positive effect of animal traction and contour plowing on soil water retention and crop yields.

Cattle are most suitable for the heavier valley soils since they can work longer without tiring, require less care than horses, and can be salvaged for meat. More attention will be given to weeding with oxen during the last year of DRIG activities. This project will extend these activities to an ever increasing number of farmers.

Prior to 1978 there was virtually no animal traction in the Guidimaka. In 1982 there are at least 13 peasant owned oxen teams and 7 project demonstration teams trained by the project. To date, the project has sold animal traction equipment to farmers in the Direct Intervention Zone, and has trained 9 animal trainers and 6 apprentices. Local carpenters have learned to make yokes for the cattle and local blacksmiths have learned to make certain repairs on carts and plows. Animal traction has also been used to haul water from deep wells in the region.

Animal traction/agricultural extension centers have been established in five villages. Each is staffed by a trained extension worker as well as an animal trainer and an assistant trainer. Under the DRIG project all animal training is being done by project animal trainers in these centers. The small number of such trainers relative to needs and budgetary resources is limiting the pace of expansion of project activities. Therefore this project will shift to a system in which one training team works with group of five farmers, teaching them how to train their own animals. In this way the number of animals trained per animal trainer can increase much faster than at present and the project can concentrate on extending the package to new farmers. Once trained, individual farmers can train their own replacement oxen by themselves.

To addition to animal traction training, village extension agents use the village extension centers as a base of operations. DRIG's approach has been to work very closely with a small number of pilot farmers (usually 3) who agree to adopt the entire package of animal traction, contour plowing, plant spacing and planting in rows, thinning and weeding.

The project plows with its own animals a small portion (25m x 25m) of a farmer's field for demonstration purposes and the farmer then uses all recommended practices on the plowed parcel and traditional practices on an adjacent control plot. In addition the agent works less intensively with other farmers in the area interested in adopting all or part of the technical package.

This project will adopt a more formal approach to extension. It will continue to concentrate in a small number of villages but, except for the Selibaby center, will move the extension center to a new village every two years and increase the number of pilot farmers per extension agent. The centers are not permanent structures but nonetheless do facilitate the integration of the project into the village social structure while providing a base of operations. During the first year of operations the project will assist a first group of five pilot farmers in each village to train their oxen and will plow a 25 x 25 hectare plot for any other farmer agreeing to try the package but who does not yet have animal traction equipment. It is anticipated that an average of 15 additional farmers per agent will try the package in this way, 5 of whom will go on to adopt the animal traction package the following year. The extension agent will then work closely with all 20 farmers on the fields and on the demonstration plots and will also continue to follow-up less closely with those farmers trained in the previous year. Altogether each extension agent should be working closely with 20 - 35 farmers at one time in a given village and less closely with 20 - 35 others training in a previous village.

When the animal trainers complete plowing of the demonstration fields they will periodically visit farmers in both the current and previous village in order to check on their work and to continue training in using animals for weeding.

Following the cultivating season the animal trainers will train a second group of five farmers, most of whom would have cultivated the demonstration plots during the previous season. Thus over a year, each animal training team will train 10 farmers and 10 pairs of oxen and will plow 15 demonstration fields.

This substantial expansion of extension activity is only possible because of the very positive view of DRIG held by farmers throughout the region. It will no longer be necessary to convince the farmers to try animal traction and the associated cultural package as was the case in the initial years of DRIG. Extension centers will be set up only in villages requesting them and already aware of the project's accomplishments.

The project will increase the number of village extension centers to ten and train agents currently in the Nature Protection Division to do agricultural extension. In this way the project will maintain its experience and knowledge in this domain while making these agents more polyvalent and increasing their activities over the agricultural production season. The number of animal trainers will also be increased to ten by upgrading aids to the current trainers or hiring and training new ones. In addition, the extension center at Selibaby will continue to operate.

This sharp increase in extension activity will require a full time expatriate extension management specialist. This specialist will arrange short term training missions taught by other in-country technicians; establish a system for reporting on the previous month's and programming the coming month's activities for extension agents, with sufficient detail to permit supervision; ensure that animal health extension agents provide regular vaccinations and care for farmers' oxen and establish a monitoring system for this; identify villages most receptive to the project's extension package; and supervise the project's animal traction credit program.

2. Credit

The financial analysis of the animal traction package shows that farmers with 1.5 hectares of land obtaining pre-project average yields of around 650 kilograms per hectare in a normal year will probably not find the package sufficiently profitable at current producer prices for sorghum unless inputs are available on credit and animal training costs are carried by the project.

Though this group of farmers will not be the most active adopters of the package, they probably represent the largest group of producers in the region and equity requires the project to respond to their needs. The economic rate of return of the fully costed package for most farmers is over 16%. At current producer prices a credit program requiring 50% down and the remainder over the next two years with the project covering the cost of the animal trainer would permit farmers to earn a similar financial rate of return. Though this is not an especially attractive rate of return given the opportunity cost of capital in rural areas, many farmers who have their own cattle or who have little dry season employment would find it attractive.

The project will assign a specially trained monitor-level extension agent to manage the credit program under the supervision of the extension specialist. He will maintain a system of accounts; visit farmers over the cultivating season to ensure that their equipment is operating properly; buy back animal equipment for 90% of the amount of any payments already made by the farmer should the farmer, for one reason or another, abandon animal traction during the first year of operations; ensure an adequate supply of equipment, yokes, and harnesses for the credit program; and collect payments from farmers at harvest time. In conjunction with the extension advisor and the governor, he will establish criteria for repossessing equipment not promptly paid for and for refunding to farmers any equity remaining after resale to another farmer. Eventually this position will be integrated with a National Input Marketing Company now the process of being formed in Mauritania.

The project will also arrange to act as an agent for OMC purchases in order to permit farmers to make credit repayments in kind.

3. Cereals Applied Research and Seed Production

The present research program has centered upon varieties of millet and sorghum which are drought-resistant, high-yielding and fast maturing.

To date one variety of millet (Souna III), one short cycle sorghum (Sidi Neiliba) which is very drought resistant, and one variety of longer-cycle, high-yielding sorghum (E35-1) have proven most productive. New corn variety trials were unsuccessful and are being discontinued. Neibe varieties from Upper Volta gave yields at least double those of local control species. Stringa-resistant sorghum varieties are also being tested and look promising.

This project will undertake no new research. It will continue with confirmatory field trials on farmer's fields of those varities offering 50% or more yield increases as part of initial seed multiplication efforts. Farmers, however, will do the work and grow the seeds under contract to the project. The prices paid for these seeds will be determined by project staff and participating farmers. Once new seed varieties are accepted by farmers, seed will be exchanged with farmers at the rate of 1 kilo of seed for 1 1/2 kilos of other sorghum in order to discourage human consumption of scarce seed supplies.

4. Animal Health and Animal Husbandry Extension

The project will continue its animal health and animal husbandry activities but on a reduced scale in relation to DRIG and oriented primarily toward oxen, horses and donkies used for animal traction. Two field agents, one in animal health and one in animal husbandry will schedule periodic visits to each of those farmers having traction animals within the project. In addition they will collaborate with the livestock service on regional vaccination campaigns. The animal health agent will supervise the sale of veterinary products through village veterinary volunteers trained by DRIG. As extension centers are moved from one village to another, additional volunteers will be trained so that each village will have access to veterinary supplies on a long term basis.

The sale of veterinary products through village veterinary volunteers is a new and experimental concept in Mauritania. If all goes well it is hoped that the Ministry of Livestock will integrate this system into its own ongoing operating structure.

5. Vegetable Production

The project is having a substantial impact on village vegetable production through its wells and extension program. Small vegetable plots earn substantial amounts of money through village level sales in spite of the fact that the bulk of production is consumed at home. Tomatoes, cabbage, egg plant, carrots, and onions are readily consumed in villages even though prices are quite high, averaging 10-15% of the daily wage per kilo. Even at half this level cash profits in vegetable production will be very attractive.

The current system of having special agents in charge of vegetable projects is not cost effective. This project will provide training to all agricultural agents so vegetable production can become an important part of their off-season activities. Agents currently working in vegetables will be trained in the use of the project animal traction/ cultural practices technical package and will assist with the cereals production campaign during the rainy season.

6. Training

The project will provide a short-term training in animal traction training techniques, the handling of veterinary products for the village veterinary volunteers, the use of the animal traction/cultural practices technical package, credit management and other topics as the need arises. Some of this will be done by expatriate and high level Mauritanian staff but a good part will have to be done elsewhere or by in-country technicians recruited for very short periods of time. The project provides financing for these training activities.

7. Small Infrastructure Projects

To date, this has been one of the most appreciated and successful aspects of the DRIG project and has promoted receptiveness to DRIG's other inverventions. During the cool and hot, dry seasons, there is relatively little agricultural work to do in most villages. Thus, there is labor available to improve village infrastructure. Of 34 small projects, 15 have been completed and 19 are on schedule for completion in 1982. This project will extend this technology to other villages outside the present Direct Intervention Zone.

This component will continue DRIG's policy of providing only 25% of the total cost of the projects in the form of cement, iron, skilled labor and other purchased materials. Villagers will be responsible for the remaining 75%, whether in cash or in kind. There is a long list of villages seeking such services and the Governor is very cognizant of the need to induce villagers to make the maximum possible contribution to their own development. The projects are mostly wells, but include schools and dispensaries for which the governor guarantees staffing before construction is allowed to begin. It is anticipated that the project will undertake 25 such projects per year over the three year life of the project. The GIRM regional Governor with guidance from the Project chief of party is effectively encouraging this component and will continue to do so.

The present DRIG project will produce a comprehensive final report which will analyze results of all experiments and demonstrations. This will provide baseline statistical and financial data for this project and establish the technical value of experiments still in progress that appear promising for extension to farmers.

B. Outputs

Table 1 outlines project outputs over the three-year life of this project. Only cereals and vegetable production will continue after year three when USG funding stops. In fact the most important gains in output for these two items occur after the project ceases as producers continue to apply the techniques they learned from the project. In addition, the outputs assume a spontaneous rate of expansion in animal traction of 5% per year after the project ends up to year 6, since by that time a critical mass of users and supporting institutions such as blacksmiths and village veterinary volunteers will have been created and the private sector will play a much more supportive role. It also assumes a spontaneous spread in the area planted with new varities of 10% per year after the end of the project. Additional grain output is predicted from production increases associated with the incremental use of animal traction stimulated by the project. In addition there is an assumed 25% increase in yields due to the spread of new varieties onto an area equal to the area cultivated by those same animal traction farmers and other farmers who accept the demonstration plot.

TABLE I

OUTPUTS OF GUIDIMAKA EXTENSION PROJECT

Project Outputs	YEAR 1	2	3	4-10
New villages entered	10	5	5	0
Animal trainers trained	5	0	0	0
Farmers taught to train their own animals	55	110	110	0
Teams of oxen trained	55	110	110	0
Demonstr. plots placed	55	110	110	0
Equipment loans	40	80	80	0
Hectares planted to improved seeds	55	200	630	10790
Traction animals vaccinated	200	450	700	0
Veterinary products sold (000 UM)	250	375	500	0
Additional grain produced (tons)	50	190	430	6480
Additional vegetables produced (tons)	10	25	35	280
Village infrastructural project undertaken	25	25	25	0

VIII. Economic Analysis

Based on the current technical package which includes application of animal traction, contour plowing, plant spacing, planting in rows, thinning and weeding on traditional cereal varieties, average farmer yields have increased from 1300 kg/ha on control plots to over 1900 kg/ha on the farmer cultivated demonstration plots. Moreover, these farmers report 50-100% increases in area cultivated even where weeding continues to be done by hand. Using much more conservative average pre-project yields of 650 and 800 kg/ha coupled with 50% increases in yield per ha and 33% and 50% increases in area cultivated respectively, the economic analysis yields economic interval rates of return of 28% using the higher yield base year and 16.5% for the lower yield. Though no randomly sampled objective yield data is available for the Guidimaka area, these two yield figures probably represent the lower and upper bounds of average normal rainfall yields. Thus the animal traction/ cultural practices package will definitely be more attractive to the most productive farmers. To date, most pilot farmers fall into this group. Details of the calculations and assumptions are listed in Annex D.

In addition to those farmers adopting animal traction, those who do not but who did execute the work of a demonstration plot on his farm are assumed to have partially adopted the package (i.e., plant spacing, thinning, timely weeding) such that their total production increased by 20% or about 280 kgs per farm. The net benefit to the project is 35% of this or 100 kgs since the remaining 65% is assumed to represent the opportunity cost of the added labor. After the end of the project net, spontaneous adoption of these techniques is assumed to occur at the rate of 5% per year, as with the more complete animal traction/cultural practices package.

Yields for both groups should rise even further when the project amasses enough improved seed to begin distribution to farmers. A test of nine varieties of new seeds yielded an average of 2300 kg/ha compared to an average of 1400 kg/ha with traditional seeds.

The economic analysis assumes that all farmers -- those adopting the animal traction package because of the project and all those who cultivate a demonstration plot but do not adopt the package -- plant one-half hectare of their land in improved varieties the first year they are engaged by the extension service and all of their land in improved varieties each year thereafter. To the extent these farmers do not plant this amount of land in new varieties other nearby farmers not contacted directly by the extension service are assumed to plant an equal amount of land.

The varieties are assumed to increase yields by 25% on the average, of which 1/5 covers the opportunity cost of the additional labor required to harvest the added production and 4/5 represents incremental value added by the project. Base yields used for computing benefits from improved seed are the same as yields without the project and not cumulative on yields obtained from improved cultural practices and animal traction.

Finally, once the animal traction system and improved varieties are in place, production should respond quite quickly to availability of fertilizer and economic producer prices. Thus the estimates of increased production due to the project's activities are conservative if these other events occur. All area and yield related benefits are calculated on the assumption that 2/3 of farmers in each benefit category are above average and 1/3 are average. See Annex D for more details of the calculations.

A major activity of the DRIG's infrastructure projects has been the building of wells. Wherever these are built the output of vegetables arises dramatically. Since present project production is only a modest 20 tons, a recent project evaluation team concluded that a potential annual incremental benefit stream of 20% per year for the next five years, followed by 10% annual increases thereafter, even after allowing the the "without project" scenario, is not unreasonable. Our calculations assume each new village in which an extension center is placed begins cultivating vegetables with output during the first year amounting to one ton and then rising to two tons thereafter.

All vegetables are sold within the producing village and are valued at 20,000 UM per ton. This is about 20% below observed prices in one village where current production is 1.2 tons and 2/3 of total production was consumed at home by cooperative members. The not incremental benefit accruing to the project is then assumed to be one-half of the total value of the vegetables produced, since most of this work occurs during the dry season when migration is the only alternative and rural opportunity costs for labor are low.

For village infrastructure projects we have assumed that benefits equal four times expenditures on the assumption that these structures would be much more costly if built by the government. The 75% contributed by the peasants also represents a net increase in investment at the expense of consumption or leisure and therefore has a very low opportunity cost.

On the cost side the economic calculations include depreciation on existing DRIG vehicles that will be transferred to the extension project. This has been calculated on one-half of the normal planning rates because in the absence of support from the projects motor pool these vehicles will last only half as long as would otherwise be the case. Project personnel have been shadow priced at 95% of the wage bill, motor bikes at 80% of acquisition cost and materials, per diem and contingencies at 90%. The cost of the revolving funds has not been included in the economic calculations since the economic calculations used to measure the net incremental benefits of the animal traction package assumed cash payment for all inputs. The absence of any obvious method for valuing the benefits of the cash sale of veterinary products also suggests that is appropriate to omit the cost of this program in calculating project returns.

Annex D lists the costs and benefits of the overall project and shows an economic rate of return of 4% to year 10. All undepreciated investment is salvaged out in year 10.

The cutoff point for the benefit stream is arbitrary but it is not likely that animal traction and varietal improvement can sustain yield increases over the longer term unless fertilizer and other inputs are brought to bear. After year six declining yields on land cultivated by animal traction over the first five years of the project cycle will offset increased production arising from spontaneous spread of the technology elsewhere. Thus this project is only a short term solution to increasing agricultural yields in the Guidimaka. Longer term growth will require development assistance funding for institutions which support more input intensive technologies.

IX. SOCIAL IMPACT

There are a number of social and human constraints which this project addresses directly. The maor constraint is that of rural exodus and labor availability. For many years young men have been leaving Guidimaka to seek work elsewhere. Those who leave are most often the youngest and strongest members of the community. The consequences of the labor shortage have been exacerbated by the drought.

Therefore, one of the primary positive social results from this project is providing employment and greater income earning possibilities in the Guidimaka and making life in this rural area more attractive. This can be accomplished by improving economic prospects for those who live there, providing essential services, and upgrading rural life in general.

The activities of this project create jobs and train individuals for rural careers in such areas as animal traction, improved cultivation practices, and market gardening. It also provides work for woodcutters, blacksmiths and others as mentioned above. The project creates rural income by encouraging production of marketable vegetables and cereal grains and in total promotes greater agricultural productivity.

Many of the young people who leave the Guidimaka are discouraged by the amount of agricultural work there is to be done relative to the labor available. By introducing innovations such as animal traction for plowing, weeding and hauling water, and by introducing higher yield varieties, the present project has demonstrated how to produce more with fewer people.

The people of Guidimaka appreciate the importance of schools, hospitals, and wells and are prepared to contribute money, labor and time to help create these infrastructural improvements. Small infrastructure projects proposed by this project encourage self-reliance in local communities. Children raised in the villages and educated there are more likely to remain, social networks remain firmer and rural orientation can be maintained. Towns with wells are not abandoned; those without them are always seasonal villages without stability or prospects for the future. Additionally, with these small self-help projects, the villager has the opportunity to voice a preference for the type of project and to contribute to its construction.

With this evidence of GIRM's interest in the development of the area, the populace has become more responsive and interested in governmental development programs. Government agents in turn have been able to establish an active dialogue with the populace.

X. IMPLEMENTATION SCHEDULE

Agricultural efforts in the Guidimaka are based upon rainy and dry season periods. Due to the fact that project activities take place cyclically during specific seasons, the following yearly implementation schedule is provided:

January	Intensive vegetable production campaign. Training first group of farmers with draft animals. Animal revaccination. Intensive small projects activity.
February	Vegetable production harvest begins. Animal health - supervision of village volunteers.

March	End of vacccination campaign in animal health.
April	End of cold season vegetable campaign. Beginning of limited hot season vegetable production. Dry season maintenance begins - animal health.
May	Beginning field preparation for cereal cultivation. Begin animal traction training sessions to prepare for rainy season field cultivation.
June	Preparation of cereal production fields and identification of participating peasants. End of small project activities. End of hot season vegetable production. Intensive animal traction training in field preparation. Animal health - provide food supplement for pre-rainy season crisis.
July	Begin intensive cereal cultivation campaign. Limited rainy season vegetable campaign. Animal health - provide food supplement for beginning rainy season crisis. Begin anti-parasite campaign.
August	Cereal cultivation. Animal traction training for hauling and weeding.
September	Final weeding and crop protection for cereal campaign.
October	Begin cereals harvest and crop protection. Begin vegetable nursery. Plan cold season vaccination campaign.
November	Begin planning small projects season. Intensive preparation for vegetable campaign. Begin training second group of farmers with oxen. Begin vaccination campaign.
December	End of cereals harvest. Begin small projects season. Intensive vegetable campaign.

IMPLEMENTATION SCHEDULE

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
Cereal Production				\	field prep		intensive		crop protection harvest		/	
Vegetable " "	cool season campaign \transplant		harvest /		limited hot season \production /		limited rainy \season production/			nursery \preparation		cool season campaign /
Animal traction	\ carting and hauling water /				\field preparation/		\hauling and weeding				hauling harvest /	
Animal health	cold season \vaccination campaign /			dry season \ maintenance /		pre-rainy season \crisis /				cold season vaccination \campaign /		
							\anti-parasite campaign /					
	\ supervision of village colunteers and sale of veterinary products /											
Small projects	\ intensive activity /										\ planning /	

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XI. MANAGEMENT

A. GIRM

The GIRM currently has in place a team of qualified and interested agents who have been working for this project for 3-4 years. The majority of these civil servants have received specialized training relating to the primary goals of this project: animal traction, parasitology, agricultural extension, project evaluation, agricultural research. In addition to these managerial and technical personnel who are already integrated into this development effort, there are trained animal trainers and extension workers.

The GIRM supports the horizontal integration of technical services at the local level which DRIG has been instrumental in bringing about. It is still too early to tell whether the operating structure of DRIG will be transplanted to other important agricultural regions of Mauritania but the government is definitely interested in maintaining a similar structure for the Guidimaka agricultural extension project.

This project will absorb all DRIG technical staff in the livestock, agriculture and logistics divisions of DRIG. The forestry division will merge with the agriculture division and its agents will be trained to come polyvalent extension agents able to extend the project's animal traction/cultural practices package. They will continue to work closely with the regional Nature Protection Direction of the Ministry of Agriculture on tree planting activities but these duties will assume a secondary role relative to extending the project's technical package.

Management of this project will be similar to that under DRIG. An expatriate chief of party will be recruited by USAID to function as co-director with the present Mauritanian co-director. Direction of project activities will be by mutual consent, as is currently practiced. Ultimate responsibility for the project will continue with the Directorate of Agriculture in the Ministry of Agriculture. The expatriate co-director will be responsible for financial accounting.

An expatriate extension management specialist will be recruited to supervise agricultural extension, field confirmation, varietal trials, and the credit and extension training programs. A third highly qualified Mauritanian technician will be recruited to manage the project's logistics division in Selibaby. The project will continue to maintain a two person Mauritanian staff in Nouakchott to ensure timely procurement of supplies.

B. USAID

USAID will have a responsibility to monitor project activities. The designated USAID project officer will be responsible for liaison with the Ministry of Agriculture and for periodic (at least two times per year) visits to the Guidimaka to observe project activities and provide advice as necessary.

XII. BUDGET/FINANCIAL PLAN

The project calls for expenditures in local currencies totaling 137.8 million uguiyas or 2.76 million dollars in current prices over three years beginning in FY84. An additional $1.09 million will be needed from proposed project (682-0231) (see Annex E) to cover expatriate technical assistance required for successful implementation of this sub-project.

F. Project Title: Rural Roads Improvement
Implementation Period: Two years
Life of Project Funding: $1.2

I. PROJECT DESCRIPTION

A. Background

One of the basic constraints inhibiting the movement of production input packages and of domestically produced crops from surplus production areas to markets are high transportation costs, due in large measure to the poor condition of existant rural roads and the lack of access by vehicles to many productive areas. This situation increases the effective isolation of producing areas which are completely inaccessible during and immediately after the rainy season, roughly July to October. This prevents the OMC grain purchasing campaign from reaching many farmers who produce marketable surpluses. Collection costs are significantly greater in less accessible zones. Storage and inventory carrying costs of agricultural inputs are also increased since these items must be transported and stockpiled at the place of use prior to the rains. In addition, agricultural research and extension are made difficult.

B. Project Activities

This project proposes the use of local currencies generated by the Title II-206 project to extend the number of kilometers improved under the proposed Rural Roads Improvement Project 682-0214. This dollar-funded project is a collaborative effort between USAID/Mauritania and the United Nations Sahel Operations (UNSO). The Section 206 local currency will make it possible to upgrade additional road surface than would be possible under the 682-0214 project alone. Construction will be undertaken by teams formed as part of the USAID/UNSO project and technical assistance will be provided by three experts funded by the Development Assistance Project. The funds will be used to provide local currency costs needed to make two major arteries passable year-round.

A major improvement effort will be undertaken on the 45 kilometers connecting Selibaby and Gouraye while a less extensive rehabilitation effort will be made on the stretch between M'Bout and Kaedi (118 km.).

The M'Bout-Kaedi link is estimated to cost $2.25 million of which $649,000 is local currency costs to be covered by the Section 206 Program. The Selibaby-Gouraye link is estimated at $2.373 million of which the Title II, 206 Program will cover $558 of local currency costs.

This project should be reviewed in tandem with the Rural Roads Improvement Project (682-0214) which was originally proposed to improve the M'Bout-Selibaby-Gouraye road. The Title II Section 206 sub-project for road improvement originally proposed to upgrade the M'Bout-Kaedi road. Since these roads are part of the same road network and are both vital links in the transportation system, their financing should be considered together. The M'Bout-Kaedi road requires foreign exchange inputs unavailable through the PL 480 Title II Section 206 local grain sales proceeds. The M'Bout-Selibaby-Gouraye road also has requirements for the use of local currencies. Thus this represent project proposal, Rural Roads Improvement, (682-0214) includes the provision of foreign exchange required for rehabilitating the M'Bout- Kaedi road. Likewise, local currency requirements for the M'Bout- Selibaby-Gouraye road will be primarily met with PL 480 sales proceeds as indicated in the financial section of this Project Paper. However, since PL 480 local currency will not be available until FY 1984, there is also a local currency element to the Rural Roads Improvement Project (to cover requirements prior to FY 1984).

C. Project Goals

The proposed route passes through the Gorgol Region recessional agriculture zone. It will also provide all-weather access to the 3600 ha irrigated agriculture project on the Gorgol Noir (Black Gorgol).

The proposed road will provide a year-round route for the supply of essential inputs and evacuation of production towards urban market areas for this major GIRM and international multi-donor project (World Bank, Kuwaiti Fund, et. al.). Finally, the completion of the M'Bout-Kaedi section will connect the regional roads being constructed by the USAID/UNSO project to link the Guidimaka Region with the Kaedi market and provide access to northern cereal deficit areas, both rural and urban. Completion of this road network will allow surplus cereals from the Guidimaka cereals production areas to be transported and marketed at a much more competitive price than is now possible. Most important, it will assure timely delivery of agricultural inputs to the Guidimaka and Gorgol Regions and facilitate a much more vigorous agricultural extension effort. This should encourage more rapid increases in crop production than would be possible without completion of the road network.

D. Linkage to Country Development Strategy

A major objective of USAID/Mauritania's country development strategy is increased food availability and production. Rehabilitation of the M'Bout-Kaedi road will contribute to this objective by improving marketing access to food producing areas, including the dryland regions in which USAID food production activities will be implemented. The improved road will also promote rural development in a broader sense by permitting greater access for the delivery of other economic and social services.

USAID/Mauritania also proposes to fund construction of a major segment of the Selibaby-M'Bout road. Rehabilitation of the M'Bout-Kaedi link is essential to realizing the benefits of the Selibaby-M'Bout link.

E. Linkage to Policy Reform

USAID/Mauritania policy reform initiatives center on the upward adjustment of food prices to stimulate increased domestic marketed production. The economic viability of the entire road improvement effort is linked to this price policy reform. Additionally, the reform in prices will permit the Mauritanian Cereals Office to function independently of GIRM and donor subsidies. The improvement in the road system will reduce transport costs and will lower OMC costs and thereby contribute to developing the OMC as a financially self-sustaining institution. These savings can also lower producer input costs and reduce the level to which OMC wholesale prices must be raised under the price reform program criteria.

F. Beneficiaries

USAID is concentrating its financial resources on two economic groups — small agriculturalists who engaged in some associated animal raising, and herders who also farm. These groups have substantial needs, with fair to good potential to become increasingly productive under favorable circumstances. These groups suffer severly from the periodic Sahelian droughts.

Beneficiaries will largely be those working in food production. As this sector absorbs the vast bulk of Guidimaka's productive labor, the project has the potential of reaching up to 64,000 people (68% of the regions's population, representing rural farmers). If roads open markets for agricultural products, they can also impact positively on women. Women have their own fields in the Guidimaka on which they grow crops for sale. Roads have the potential of raising women's incomes by providing them with greater access to markets, a direct production incentive.

The direct beneficiaries, as described in more detail in the 682-0214 Project Paper (p.7), are local workers, workers on the roads themselves, private transporters, farmers, and private merchants.

G. Impact on Development Constraints: High transport costs and isolated production and consumption regions.

As previously mentioned, a major constraint on the development of the agriculturally productive Gorgol and Guidimaka Regions is the rudimentary quality and seasonal utility of the road system. The Title II-206 resources will permit improvement of additional kilometers of the rural road network being constructed by the USAID/UNSO Rural Road Improvement Project. As a whole, this network will address the predominant constraints of high transport costs and lack of all-weather access for key inputs and for agricultural extension services.

II. ANALYSIS

A. Current Status

The 118 kilometer M'Bout-Kaedi segment proposed for improvement with Title II-206 resources is part of the National Highway #2. The road surface itself is graded laterite of acceptable quality and is capable of supporting year-round traffic. However, problems are caused by the route which the road follows through the Gorgol Valley. By paralleling the course of the Gorgol River, the road section bisects many small and medium-sized watercourses which during the rainy season become swift-flowing streams feeding the Gorgol River and its tributaries. Some of these channels are not controlled by drainage structures at points of intersection with the National Highway, although two major bridges and about 50 structures do exist. Passage is frequently impossible during the rainy season for several days at a time, and difficult and expensive even during the dry season because of the deteriorated condition of the roadway, originally constructed in 1963-64.

B. Outputs

1. M'Bout-Kaedi

The proposal calls for the rehabilitation of drainage structures and bridge approaches to adequate design standards and appropriate for future as well as present traffic levels. The required new structures will be permanent and will not need to be replaced in the event of further improvements to the road surface itself. The drainage structures will provide year-round service at minimum cost, allowing delays only in the event of flash-flooding which follows only the heaviest rains. In this way primary damage to the roadbed by the watercourses and secondary damage from the passage of vehicles over previously inundated or washed-out sections will be held to a minimum.

The projected improvements will consist of:

- construction of ford crossings where no structures exist now. The fords or "raidiers" are the most suitable type of oued or stream crossing structure in the area because of the shallow river beds which are predominant along this road.
- repair of existing structures and embankments/causeways including the raising of the level of these embankments to prevent overtopping by runoff water.
- addition to a few corrugated metal pipes, 80 cm in diameter to match the required culvert openings.
- road resurfacing wherever it will be deemed necessary and in particular in the vicinity of Kaedi.

2. Selibaby-Gouraye

In view of the various impediments to the all-weather flow of traffic on the Selibaby-Gouraye link, as well as the whole system, improvements will be made to:

- Provide year-round service at minimum cost, allowing delays of up to one or two days when heavy thunderstorms occur (i.e. fords rather than bridges).
- Reflect the presently low traffic volumes which will gradually increase over time.
- Build drainage structures to adequate design standards which are appropriate for the present as well as future traffic levels and will not require upgrading when traffic will warrant a better roadway (i.e. widening and/or paving). This means that the roadbed as well as the structures will be built to a width of 5.5m according to the standards being used in the UNSO construction.

On the 45 km Selibaby-Gouraye section, specific outputs will include repair of three bridges, improvement of fords (285m) and culverts (122 cubic meters by volume), as well as improvement of the 45 km of roadbed.

For precise technical information on this road link, please refer to the 682-0214 Project Paper - both the main text and annexes.

The cost estimate of rehabilitation for the Kaedi-M'Bout road has been devised based on the assumption that work will be performed by the Special Autonomous Brigade with all the equipment available for M'Bout-Selibaby-Gouraye.

C. Economic Rationale

The proposed road rehabilitation will reduce the costs and increase the efficiency of both agricultural input delivery and food marketing. It will also increase the general level of commercial activity in the area and result in higher private farmgate prices, which will provide an incentive for increased production. Finally, the road will increase the effectiveness of the agricultural research and training institutes based in Kaedi, and encourage more frequent visits throughout the region by extension agents.

The computed benefits comprise a) road user savings from existing and generated traffic on the three road links, M'Bout-Selibaby, Selibaby-Gouraye and M'Bout-Kaedi; b) road user savings on traffic diverted from the Nouakchott-Kiffa-Ould Yenge-Selibaby road to the completed Nouakchott-Kaedi-Selibaby road; c) savings in storage and inventory costs on goods formerly stockpiled in M'Bout and Selibaby before the onset of the rainy season and the value added from additional crop production induced or made possible through the reduction in transport costs; d) savings from guaranteed input supplies at a lower cost and in a timely manner and the facilitation of agricultural research and extension.

The IRR calculated for the basic scenario of traffic growth and production increase in 5%. A second scenario, with more optimistic diverted traffic estimates, but more conservative estimates of increased production, also yields an IRR of 5%.

For a more detailed economic analysis, see Project Paper 682-0214, Economic Section as well as the Economic Annex.

D. Social Impact

The systems exist concomitantly in the Selibaby area, The modern system administratively consists of a regional governor, department prefects and the head of governmental services such as agriculture, health, and public works who are representatives of the respective ministries in Nouakchott but under the immediate authority of the governor. Juxtaposed to this are the traditional communities and ethnic groups and their hierarchical class structure.

The area's population is comprised of several sub-groups. However, because of their strong attachment to the region and to agriculture, and in general their possession of the best land, the social dynamics of the Soninke clearly dominate the situation. In reality, it is almost impossible to predict the exact effects of a road, since the road itself creates a new, dynamic and continously changing situation.

It is precisely because of this that socio-economic monitoring of communities along the road should occur during the life of the project. However, it is possible to at least outline the socio-economic pressures that make up the situation. As will be seen, these pressures - somewhat unique given the region's historic adjustment to male outmigration - seem to indicate no clearly discernable negative effects from the introduction of new all-weather transportation but to the contrary seem to be overwhelmingly positive in nature.

For a detailed analysis of the various ethnic groups in the region and the effects of the road effort on outmigration of work-age males and the women and children that remain, refer to the Project Paper 682-0214, pp. 55-56.

III. IMPLEMENTATION SCHEDULE

The activities to be financed by Title II-206 resources will be completely integrated into the USAID Rural Roads Improvement Project 682-0214. Implementation will therefore depend on the rate of completion of precedent road sections and the availability of construction teams. A complete implementation schedule is included in the 682-0214 project paper.

In summary, this schedule is as follows:

ROAD	(KMS) DISTANCE	EXTERNAL FINANCING	TIMETABLE
1. M'Bout-70 kms towards Selibaby	70	UNSO/OPE	3/82 - 5/83
2. 70 kms from M'Bout - Selibaby	46	AID-682-0214/ PL 4840	5/83 - 2/84
3. Selibaby-Gouraye	45	" "	2 - 11/84
4. M'Bout-Kaedi	118	" "	11/84 - 8/85

IV. MANAGEMENT

Supervision of construction activity and financial accountability will be assured by the USAID Project Manager, the Comptroller's Office and engineering consulting services. Oversight responsibilities will be assumed by the USAID/Office of General Development. Disbursement of funds will be determined by the PL 480, Section 206 Management Committee.

V. BUDGET/FINANCIAL PLAN

Total costs of the road improvement effort to be met by USG contributions are $6,017,000. $4,810,000 will be financed under the Rural Roads Improvement Project (682-0214) and $1,207,000 in local currencies under Section 206.

FINANCIAL SUMMARY
(000 $)

	FX	LC	TOTAL
FY82	350	-	350
FY83	1,334	333	1,667
FY84	1,661	649**	2,254
FY85	1,132	558**	1,746
TOTAL	4,477	1,540	6,017

Amount to be programmed from PL 480 Local Currency **	1,207
Total amount to be obligated under 682-0214	4,810

* 330,000 in local currency provided by Project 682-0214.

** $1,207,000 to be made available to project for LC requirements by PL 480 Title II Section 206 funds.

In FY84 and FY85, PL 480 Title II Section 206 - generated local currency will be made available for local costs requirements. These will be provided through the GIRM's Rural Development Fund administered by the Ministry of Finance.

QUARTERLY ESTIMATES EXPENDITURES SCHEDULE BY FISCAL YEAR

(Current $000)

	FY84												FY85											
		2nd Q					3rd Q			4th Q			1st Q			2nd Q			3rd Q			4th Q		
	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
	Selibaby - Gouraye												M'Bout - Kaedi											
Equipment																								
Materials																								
- FX	165										330													
- LC	40										55													
Evaluation																								
Operating Costs																							35	
- FX	319			339			349				229		371			382			510					
- LC	102			152			156				60		156			162			174					
Consultants																								
Contingency																								
- FX																							205	
- LC	84																						66	
Subtotal																								
- FX	484			416			349				554		371			425			510				240	
- LC	226			152			156				115		156			162			174				66	
TOTALS	710			568			505				674		527			587			684				562	
TOTAL LC (for 206 funding)				UM		$649												$558	UM					

@ 50 UM = $1.00

Evaluation

In accordance with the Section 206 evaluation procedures, the Management Steering Committee will receive and analyze reports from the contract technical and evaluation consultants funded by project 682-0214 to determine progress on the road links funded by Section 206 local currencies. A formal evaluation will be conducted jointly by the USAID and GIRM at the end of FY 1985.

PROVISIONAL OPERATING BUDGET: GUIDIMAKA AGRICULTURAL EXTENSION SUB-PROJECT

	FY83: Funding Source to be determined (000 UM)		FY84		Title II Section 206 Funds Available (000 UM) FY85		FY86	
	USAID	GIRM	USAID	GIRM	USAID	GIRM	USAID	GIRM
Technical Assistance[1]								
-Project Co-director	(5000)		(5000)		(5000)		(5000)	
-Agricultural Extension Manager	(5000)		(5000)		(5000)		(5000)	
-Mechanic/Logistics	(5000)		(5000)		(5000)		(5000)	
T.A. Sub-Total	(15000)		(15000)		(15000)		(15000)	
MDR Personnel (Project Co-director Division Chiefs (2), Technical Agents (6))								
-Salaries		12000		12000		12000		12000
-Indeminities		1670		1670		1670		1670
-Headquarters (Ministry, Directorate)		5237		5237		5237		5237
MRD Sub-Total		18907		18907		18907		18907
Project Personnel								
-Office (Selibaby (NKT))	930		930		930		930	
-Extension Agents (12)	1350		1350		1350		1350	
-Animal Trainers (11)	1150 \		1150 \		1150 \		1150 \	
-Trainer's Aides (11)	790 >	1962	790 >	1962	790 >	1962	790 >	1962
-Construction (2)	800 /		800 /		800 /		800 /	
-Mechanics (2)	350		350		350		350	
-Drivers (8)	675		675		675		675	
-Other (7)	500		500		500		500	
Project Sub-Total	6585	1962	6585	1962	6585	1962	6585	1962

Vehicles								
-Land Rovers (7)								
-Motorbikes (15)			900 (ht)	1023				
-Bicycles (15)			150 (ht)	150				
-Tractor (1)								
-Truck - 10 MT (1)								
Vehicle Sub-Total			1050	1173				
Operational Support								
-POL	7000 (ht)	4000	7000 (ht)	4000	7000 (ht)	4000	7000 (ht)	4000
-Repairs, Insurance, Supplies, Local Per diem	12000		12000		12000		12000	
Operational Sub-Total	19000	4000	19000	4000	19000	4000	19000	4000
[1] To be covered by Project (682-0231) - not added to totals								
Materials								
-Small Infrastructure Projects	2000	6000	2000	6000	2000	6000	2000	6000
-Seeds	100		100		100		100	
-Miscellaneous	1500		1500		1500		1500	
Materials Sub-Total	3600	6000	3600	6000	3600	6000	3600	6000
Revolving Funds								
-Credit	1000		1000		1200		900	
-Veterinary Medicines	250							
Revolving Sub-Total	1250		1000		1200		900	
Training Program Sub-Total	500		500		500		500	
PerDiem (NKT) Sub-Total	300		300		300		300	
ITEM TOTAL	31195	30869	31995	32042	31145	30869	30845	30869
Contingencies 10%	3120		3200		3115		3085	
	34315		35195		34260		33930	
Inflation Factor	1.10	1.10	1.21	1.21	1.33	1.33	1.46	1.46
TOTAL EXPENDITURE	37746	33955	42586	38770	45658	40055	49538	45068

NOTE:

(1) Differences between tax free (Nors-Tax) purchase and full-tax (TTC) have been included as GIRM contribution.

(2) GIRM contribution for Small Infrastructure projects is really local village participation.

Evaluation Plan

Project evaluations will take place at the end of each year of project activity to enable evaluations/USAID to compare progress and results from year to year.

The first and third year-end evaluations will be small in USAID in-house evaluations while the second year-end evaluation will be major joint USAID/GIRM evaluation which includes responsible USAID staff, members of the Ministry of Agriculture which have responsibility for development activities, and independent technical specialists.

VII. ECONOMIC IMPACT OF SECTION 206 IN MAURITANIA

The 206 program will, through its OMC sub-components increase resources available for investment by reducing subsidies on consumption. The other sub-components are financed from the proceeds of the OMC sub-component and give rise to a set of returns that partially determine the return to the local currency generated by the project. There are additional induced private sector investments and income transfers that have economic value and secondary benefits in the form of increased potential economic returns to a wide variety of public sector investments now planned for increasing agricultural production.

The actual costs of this 206 project depend on what the alternatives are. If, in the absence of a 206 program, Mauritania would receive emergency food aid in an equal amount then, in economic terms, the CAF price of the grain delivered to Nouakchott is not a cost, since these costs would be increased regardless. On the other hand, if this is a take it or leave it proposition then the CAF price of the grain is indeed a relevant economic cost from the perspective of the U.S. government.

ECONOMIC COSTS AND BENEFITS OF TITLE II, SECTION 206 INVESTMENT PACKAGE

(000 UM)

	YEAR 1	2	3	4	5	6	7	8	9	10
Project Benefits:										
Guidimaka Agricultural Extension	5169	2707	5501	6401	6652	7732	10796	12969	10763	24475
Crop Protection	4960	3968	14136	24304	23312	-	-	-	-	-
Rural Roads Improvement										
OMC Support	435600	431600	508450	66605	71210	60465	67630	69775	67540	81230
TOTAL BENEFITS										
Operating Costs:										
Guidimaka Agricultural Extension	a/	a/	a/	a/	a/	a/	a/	a/	a/	a/
Crop Protection	760	608	2166	3724	3572	-	-	-	-	-
M'Bout-Kaedi Road										
OMC Support	113085	109885	113285	5530	6085	6435	7000	7000	7000	7000
TOTAL OPERATING COSTS										
Investment Costs:										
Guidimaka Agricultural Extension	26260	25420	25420	-	-	-	-	-	-	-
Crop Protection	6000	8000	7500	2000	1500	-	-	-	-	-
M'Bout-Kaedi Road										
OMC Support	76980	76360	820	820	550	-	-	-	-	-
TOTAL INVESTMENT COSTS										
Net Benefits with Emergency Food Aid Alternative										
CAF Cost of Grain	240000	240000	240000							
Net Benefits with no Emergency Food Aid Alternative										

a/ Included in sub-component operating budget - benefits are not of operating costs.

TABLE OMC-1
ECONOMIC COSTS AND BENEFITS OF OMC SUB-PROJECT
(000 UM)

ASSUMING EMER. PGRM AS ALTERNATIVE:	YEAR 1	2	3	4	5	6	7	8	9	10
Project Benefits:										
OMC Sales Receipts	250,000	246,000	242,000	0	0	0	0	0	0	0
Reduced CAA distribution costs	130,000	130,000	130,000	0	0	0	0	0	0	0
Port bulk handling facility	0	0	80,850	45,375	49,830	53,625	57,750	57,750	57,750	57,750
Increased private investment in agricultural production	0	0	0	5,630	5,780	6,840	9,880	12,025	9,790	23,480
Income redistribution benefits for:										
Producers	15,600	15,600	15,600	15,600	15,600	0	0	0	0	0
Consumers	40,000	40,000	40,000	0	0	0	0	0	0	0
Total benefits	435,600	431,600	508,450	65,605	71,210	60,465	67,630	69,775	67,540	81,230
Operating Costs:										
OMC distribution costs	107,000	103,800	102,200	0	0	0	0	0	0	0
OMC buying campapign	6,000	6,000	6,000	0	0	0	0	0	0	0
Bulk handling	0	0	5,000	5,445	6,000	6,435	7,000	7,000	7,000	7,000
Radio maintenance	85	85	85	85	85	0	0	0	0	0
Total operating costs	113,085	109,885	113,285	5,530	6,085	6,435	7,000	7,000	7,000	7,000
Investment Costs:										
Bulk handling facility	75,000	75,000	0	0	0	0	0	0	0	0
Warehouses	990	990	450	450	450	0	0	0	0	0
Warehouse equipment	270	270	270	270	0	0	0	0	0	0
Training	100	100	100	100	100	0	0	0	0	0
Vehicles	520	0	0	0	0	0	0	0	0	0
Electric Equipment	100	0	0	0	0	0	0	0	0	0
Total investment costs	76,980	76,360	820	820	550	0	0	0	0	0
TOTAL COSTS:	190,[illegible]	186,245	114,105	6,350	6,635	6,435	7,000	7,000	7,000	7,000
Net benefits:	245,535	245,355	394,345	60,255	64,575	54,030	60,630	62,775	60,540	74,230

Gross Benefit/Cost Ration @ 15% = $\frac{\text{Benefits}}{\text{Costs}} = \frac{1,411,343}{459,569} = 3.07$

Annex A: 1) OMC ASSESSMENT

I. INTRODUCTION

The current OMC mandate includes: (1) maintenance of sufficient food grain stocks to ensure regular supply to the domestic market; (2) maintenance of security stocks to meet extraordinary foodgrain needs caused by disruption in production and distribution; and (3) operation of a producer price support program through crop purchases at "floor prices." The long term objective is increased local production and reduced reliance on external assistance.

The OMC has proven itself a viable institution during the past year. In a short period of time it has become an important influence in the foodgrain market. It has established branch offices (for sale and purchases) in the primary food deficit and production regions, developed a sound commodity management program and maintained a good working relationship with the donor community. The OMC has identified its problem areas — primarily financial and accounts management — and is seeking solutions to these problems.

Given its initially modest role in grain marketing and the rapid rate at which it has had to expand its duties, USAID is satisfied that the OMC is competent to manage Title II emergency relief commodities. Further, USAID is confident that the OMC can effectively manage its role in the Section 206 program.

II. ADMINISTRATIVE PROFILE

A. Discussion

The OMC is headed by an appointed Director who reports to the Commisair, head of the CAA. The Deputy Director is primarily concerned with administrative matters, leaving the Director free to work with division heads on program management and planning.

Through tight supervision, the Director and the Division heads are fully knowledgeable of the strengths and weaknesses of the OMC and are developing new and improved systems to ensure that the OMC does fulfill its mandate.

There are three divisions with responsibilities as follows:

1. Financial Division - responsible for bookkeeping, accounting, banking and personnel matters.
2. Marketing Division - responsible for the buying, selling, storage, quality control of commodities and market development studies.
3. Transport - responsible for the maintenance of the OMC garage and truck fleet.

B. Problems

Primary problems are discussed by topic elsewhere in the assessment. Summarized they are:

1. Manpower - The OMC is understaffed in most of its organizational units.
2. Training - There is a need for mid-level management training to improve the effectiveness of the OMC.
3. Technical Assistance - TA will be required for the foreseeable future for financial, commodity quality control and transport management.

C. Solutions under way

1. The FRG is furnishing technical assistance for financial, commodity and transport management.
2. The Director, OMC, is recruiting qualified personnel to staff the financial and commodity management divisions.
3. USAID and other donors are exploring means for providing training at required levels of management.

III. FINANCIAL MANAGEMENT

A. Discussion

Prior to the receipt of sales proceeds during 1980-1981, the OMC lacked sufficient operating funds. As part of its Title II Emergency Program, USAID concurred in a request that the OMC be advanced up to 5.7 million UM to cover operating costs until such time as an adequate cash flow could be realized. During this operational period, the OMC gained experience which has led to reassessment of its financial systems with adjustments where necessary.

Sales proceeds are deposited with local financial institutions or the Postal System in the sales area. On a regular basis deposits are transferred to the joint OMC-USAID account at the Societe Mauritaniene de Banque (SMB). The OMC verifies sales proceeds by matching branch purchase chit numbers with the corresponding bank deposit receipts.

In the budget planning for the handling of 20,000 MT of Title II commodities for the period June 1981 - May 1982, the Finance Division made one major miscalculation. Based on a sales branch quota system, the amount of budget allocated for transport costs was tied to anticipated tonnage to be delivered. Based on actual sales and resupply needs, as they became known, the quota system was replaced by a call-forward system. As it turned out the greatest needs were in the areas most costly to service, hence a budget item overrun. The experience gained during this exercise has strengthened the Finance Division budget planning process.

B. Problems

1. Late transfer of sales proceeds to OMC accounts.
2. Instances of fraud at sales centers.
3. Budget costs overruns for transportation.

C. Solutions

1. The Finance Division has instituted a follow-up and claims process to ensure that the sales proceeds transfer system works and that the deposits are handled in a timely manner.
2. In each instance cf fraud, the OMC has taken legal action to prosecute and recover the funds. Aware that this could be a recurrent problem, a Control Section has been established responsible for regular audits and surveillance at the branch level.
3. In order to prevent recurrent transport costs overruns, it has been determined that the call-forward system as a response to need is far better than quota supply (averaging) which results in misallocations of stocks requiring subsequent expensive redistribution.

IV. COMMODITY MANAGEMENT

A. Discussion

The OMC is responsible for the receipt, storage, quality control, transport and marketing of the Title II grant food aid to the GIRM. Since 1980, when the OMC was transferred from the Ministry of Rural Development to the CAA, it has developed a commodity management system as follows:

1. Port Handling. The OMC receives Title II commodities at the Nouakchott Wharf. Actual stevedoring and Wharf management are performed under contractual arrangements with the OMC taking possession at the adjacent bagging and storage area. To ensure that OMC interests are best served, the Market Division has a permanent staff member assigned to the port area. Prior experience has shown that significant improvements are needed to reduce port losses, now at about 2.0% The Mauritania Development Bank is planning to support installing bulk grain handling facilities including improved bagging and port storage.

2. Storage. The OMC has a good warehouse system in place with additional units in the pipeline. The primary units (1,000 MT capacity) number 16 at Nouakchott, 3 at Rosso and 1 at Nouadhibou, and are of Dutch design, construction and finance. The Germans have financed the construction of four 600 MT capacity units at sales branch offices and have furnished mobile silos for temporary use. The Africa Development Bank has agreed to finance the construction of 32 1000 MT units in the selling and buying regions. To augment needs as they arise, OMC rents or leases additional space.

3. Quality Control. The German technical assistance team furnishes leadership and training in warehouse management and quality control. Stock rotation on a first in/first out basis is a standard practice. There are regular samplings to determine the grain condition and treatment requirements. Fumigation is carried out using modern techniques and EPA approved chemicals.

4. Transport. The OMC owns a small fleet of trucks, one 12 ton and six 10 ton units. These are reserved for short haul and buying campaign purposes. Regular transport requirements are met through contractual arrangements with private truckers. The Germans provide technical assistance for garage and private contracting management.

B. Problems

1. Port losses. The current rate of loss is about 2.0%.
2. Poor warehouse facilities in the sales and procurement regions.

C. Solutions

1. The bulk grain port handling facility should greatly reduce port losses as well as reduce overall port costs.

2. The OMC rents or leases about 6500 MT of storage facilities in the regions. These are to be gradually displaced through construction of new facilities.

The only outstanding issue is in private trucker's freight rates. They have organized a Federation of Mauritanian Truckers to force an increase in rates paid by the OMC. To date the OMC has been able to negotiate rates at an acceptable level.

V. MARKETING AND PURCHASE CAMPAIGN

A. Discussion

During FY 1981-1982, the OMC operated 18 sales centers with coverage over most of the regions. Sales were not initiated or were curtailed in areas where the CAA was expected to make or known to be making distribution. At the sales centers, clients could purchase as little as one bag or as much as one ton. During this period, OMC sales totaled 13,500 MT of Title II grain valued at $3.8 million (188.5 million UM).

The marketing system, in its earlier days, was based on a "quota allocation" basis for the regions, i.e. some for all. The OMC soon discovered that marketing needed to be predicated on a call-forward arrangement based on need and sales opportunity. This call-forward system has enabled the OMC to concentrate the grain in areas of sale, limit stocks in areas of domestic production and help prevent wide price fluctuations in the non-producing areas.

The OMC buying campaign runs from mid-December through May. The campaign has concentrated in four production zones this year. The OMC has assigned five professionals and about 46 non-professionals to the buying campaign. Additionally, commissioned agents are appointed in several zones to buy on behalf of the OMC. The campaign this year has netted about 2200 MT.

B. Impact on Consumer and Producer Prices

This is an area where more reliance must be placed on judgement than on empirical data. Theoretically, OMC regional centers collect weekly market price data and then report monthly on the maximum, minimum and most representative price over the month. However, most persons reporting the prices do not understand this. Maximum and mimimum seem to be yearly rather than monthly figures. In addition, there is clear confusion over whether to report wholesale or retail prices and often these are intermingled within the same series. There is also little follow-up from control headquarters when monthly reports are shipped, with the result that since November few of the centers have continued reporting prices and the previous months are sporadic. The official explanation is that OMC agents are too busy with the buying campaign. This work needs to be given much higher priority within the OMC as does monthly reporting on receipts, stocks and sales. This information is absolutely essential for proper market analysis and for following the impact of the OMC on grain markets.

In analyzing those price series which appear to be the most reliable, prices began falling when OMC centers opened in May and June, the usual hungry season, and then continued falling into September and October as the harvest began. Post harvest prices for local sorghum have recovered somewhat in most markets and quite sharply in those where local cereal crops were poor. However as of February-March, prices had not yet attained prices present the previous June.

Interpreting price changes is not clean-cut. Prices normally continue rising between March and June-July so they still may go higher. This is uncertain however, since the past years harvest was better in most areas than the previous year's and local stocks are higher. Taking everything into account, lower hungry season prices are expected. In addition, there is not much evidence of price stability.

On balance it does appear from the price data the OMC is having some limited effect on consumer prices and this effect is not at the expense of producer prices in production areas. OMC market agents and local administrative authorities readily note the greater stability of prices since OMC intervention but this is no doubt partly due to the availability of a fixed price commodity in the market rather than some stable local cereal prices. On the average, available data suggest a reduction of no more than 2 UM in the maximum retail price of local sorghum varieties, though better and larger series market price data will be necessary to feel confident in this conclusion.

VI. DONOR COORDINATION

A. Discussion

The coordination of donor interests in the GIRM food sector begins with the annual multi-donor mission. This exercise establishes the food deficit to which the individual donors respond.

Coordination of donor responses takes place at several levels. First, the OMC Director has a weekly meeting attended by donors and Division Chiefs. Program implementation and management issues are discussed openly and recommendations are made for solutions, if required. Second, WFP acts as an informal coordinator among the donors, collecting relevent information on activities related to food aid programs.

B. Donor Contributions to OMC

1. FRG provided technical assistance for commodity management, including a transport advisor, an accountant, a civil engineer and a proposed rice milling expert. The FRG has also contributed 5,000 MT of grain to the Security Stock.
2. USAID furnished 20,000 MT of sorghum in 1981 and has 10,000 MT in the pipeline for 1982. USAID also provides OMC operational advice and guidance through the Food for Peace Officer.

3. WFP signed a multi-year agreement to provide up to 24,000 MT of foodgrains, the proceeds of which are to support the domestic production procurement revolving fund.
4. Belgium signed a multi-year agreement to provide up to 4,500 MT over a 3-year period.
5. The Dutch financed the construction of 20,000 MT of storage capacity.
6. Sweden provided infrastructure support to the OMC, primarily funds for tarps, scales and fumigation equipment.
7. EEC furnished the OMC 5,000 MT of foodgrain in 1981 for security stocks.

The EEC, Canada, France and the Dutch have all expressed interest in joining the OMC's Grain Stabilization Program.

In summary, coordination among the donors through the OMC is excellent. USAID anticipates that the relationship will continue and improve as the OMC becomes a more viable influence on the food sector.

Annex A: 2) OMC LOCAL CURRENCY ACTIVITY ANNEX - COST ANALYSIS

OMC OPERATING COSTS

Table 2 compares the amount budgeted for the first year of OMC operation under the commercial sales of the food-aid program with projected fiscal year expenditures. The last column of the table adjusts projected fiscal year expenditures for certain costs that were not charged to USAID, such as ammortization of warehouses, or those which can be attributed to mistakes that are not likely to recur, or expenditures which cover more than a 12-month period. It represents a more accurate basis from which to project next year's costs. These costs are summarized on a tonnage basis in Table 1 and are not much different for CAA or SONIMEX.

TABLE 1

Financial and Economic Costs of
Port Clearing, Storage and Handling, Transport
and Overhead Per Ton of Grain Marketed by the OMC
(UM)

Item	Costs	
	Financial	Economic
Port clearing	880	840
Storage and Handling	1210	1090
Transport	2840	2700
Overhead	800	720
TOTAL COSTS	5730	5350

Source: Table 3

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Table 2: Actual and Projected Operating Expenses
for PL 480 Grain Sales by the OMC, 1981/82
(00 UM)

Expenses	Amount Budgeted	Expenditures to Date (a)	Projected (b) FY Expenditures	Adjusted (c) FY Expenditures
Warfage	20,757	9,392 (d)	16,728	17,680
Transport	37,463	52,009	63,974	56,780
Storage/ Handling	21,331	13,779	19,954	24,210
Overhead	12,950	13,308	18,637	15,990
TOTALS	92,501	88,488	119,293	114,660

Financial Costs:

Average Cost of Tranport/ton	3.46 (e)	2.84 (f)
Average Total Cost/ton	6.46 (e)	5.73 (f)

Economic Costs: (g)

Average Cost of Tranport/ton	2.70
Average Total Cost/ton	5.35

Source: OMC Monthly reports to USAID

NOTES:

(a) Generally as of 2/28/82. Some expenses began on 5/1/81.

(b) From beginning of project on 5/1/81 until 6/30/82.

(c) Assuming 12 month fiscal year, 20,000 tons of grain and inclusion of all OMC costs.

(d) Includes expenses as of September 12 only. At that time 10,624 tons had been deleivered.

(e) Based on 18,471 tons actually received by the OMC out of 18,922 manifested.

(f) Assuming 20,000 tons shipped.

(g) With wharfage and transport priced at 95% of financial costs and storage and handling at 90%. These percentages were built up from equipment (100%), construction (90%), transport (95%), skilled (100%) and unskilled (80%), utilities (100%) and miscellaneous (90%) sub-components.

The costs in Table 1 represent only base year costs. Over the next four years transport costs to Bogué, Kaedi and Selibaby will decline as new roads now under construction, or to be constructed under this 206 proposal, are completed. In addition, the OMC should be able to shift a bit more of its transport to the private sector thereby reducing transport costs. There are limits on the extent to which this can be carried further, however, since it is not uncommon for private truckers to decline a contract during the time, or for the destinations, required by the OMC. This forces OMC to use its own trucks and bear the cost of an empty backhaul. Moreover as the OMC tries to increase its sales, it will have to open more centers in more remote areas, thereby increasing average transport costs. On balance it seems unlikely that average transport costs will decline.

A similar situation arises for storage and handling. Costs per ton in existing centers will decline as sales increase, especially if the amount of grain passing through the CAA is reduced accordingly. However, small volumes will be handled by the new centers in more remote areas. Thus, there is not much hope for a decline in average storage costs over time.

Overhead costs per ton should decline as the OMC increases its annual sales from the present 20,000 tons to 40,000 by the first year of the project. Currently, USAID is negotiating a basis for allocating overhead to other donors channeling their grain through the OMC and it appears that a flat fee per ton will be levied with USAID then picking up the remainder. It is anticipated that this fee will reflect average overhead costs per ton. The OMC estimates that increases in total overhead will amount to about 1/2 as much as increases in sales.

Finally, port clearing charges should decline somewhat as the new bulk handling facility proposed for 206 local currency financing is completed, probably in 1985. The amount of decline is difficult to estimate since the feasibility study for that project is not yet complete. We assume these costs will decline by around 20% (see justification, Annex G).

Table 3 projects expected OMC operating costs over the next four years in constant values taking into account these charges. It also applies a 10% inflation factor to each in order to arrive at estimated current costs for each year. In constant terms, financial and economic internal distribution costs are projected to decline by about 8% by 1985/86. These estimates are used in a following section to estimate the long run financial and economic costs to Mauritania of imported cereals handled by both the OMC and SONIMEX.

COMPARISONS WITH PRIVATE SECTOR OPERATING COSTS

Internal distribution costs for the OMC, CAA and SONIMEX are clearly higher than they would be for private importers. Large control headquarters staff, segration of functions and operations, empty back-hauls for OMC trucks and certain other operating procedures all escalate the costs of the parastatals relative to the private sector. Some of these differences are being addressed but others are proving more tractable and difficult to change. Thus, even over the longer term private sector internal distribution costs should be lower than those for parastatals.

Table 4 gives an indication of the difference in transport costs between the OMC and private truckers for individual towns in Mauritania. In those towns where private truckers carry most of OMC's goods, the costs are essentially the same. In those towns where the OMC does most of the transport, costs are more than double those of private transporters.

These costs differences are not as great as they appear at first glance. The OMC figures include the cost of transhipping a portion of the grain from the port to Nouakchott warehouses prior to final distribution upcountry. At the same time, OMC charges are based on estimated operating costs which fully depreciate its vehicles over four years and assume repairs equal to vehicle acquisition costs over that period. Its actual costs may be considerably lower than estimated at this time. Finally, the OMC has no choice but to use its own trucks in some situations where an immediate trip is necessary and no private transporters are available.

TABLE 4

Comparison of Private Trucker and OMC
Transport Costs from Nouakchott to Selected Inland Locations
(UM/ton)

Financial Costs

Destination (d)	Private Truckers (a)	OMC (b)	Expected Medium Term OMC Costs (c)
Nouakchott	N.A.	365	365
Boutilimit	950	2230	1080
Aleg	1230	2350	1400
Magta-Larhar	2000	2400	2280
Kiffa	2400	2820	2740
Aioun	3000	2850	3430
Nema	5190	5190	5190
Atar	3330	3400	3400
Rosso	600	2445	1080 (e)
Boghe	1800	2380	1870 (f)
Kaedi	2560	6090	2650 (g)
Selibaby	4500	6100	4440 (h)
Ould Yenge	N.A.	7065	5390 (i)
Weighted averages (j)		2840	2470

NOTES:

(a) Transport rates offered by Mauritania Truckers in 1981 for transporting bagged grain from Nouakchott. Taken from Charles Vandervoot, 1981, "Transport of PL480. Grain for Mauritania; A Review of Current Problems and Analysis of Proposals for Reducing Transport Costs." Nouakchott, USAID mimeo (Annex G).

(b) Calculated from OMC monthly reports of shipments and charges over the period May 1, 1981 to February 28, 1982. Upcountry destinations include costs of transhipping from Nouakchott warehouses. About 30% of total sales are transhipped while 70% are shipped directly to the destination from the port. Transhipment adds an average of 4.3% to average costs per ton.

(c) These are costs which are expected to prevail assuming greater use of private transport by OMC and completion of Aleg-Salibaby road.

(d) From the wharf to OMC warehouses.

(e) Based on Boutilimit rate. Rate for private truckers was apparently uneconomic.

(f) Assuming 6.00 UM/ton/km as average financial cost to the OMC after completion of new road.

(g) Assuming 6.35 UM/ton/km as average financial cost to the OMC after completion of new road.

(h) Assuming 6.85 UM/ton/km as average financial cost to the OMC after completion of Aleg-Selibaby roads.

(i) Assuming same difference in transport cost between Selibaby and Ould Yenge as currently exists and lower costs for Selibaby.

(j) Weighted by the Distribution of OMC sales between the various centers.

The last column of Table 4 estimates medium term transport costs for existing OMC centers assuring maximum possible use of private transporters while recognizing a need to maintain a reserve fleet and given expected declines in transport costs to Bogue, Kaedi, and Selibaby once the new roads are complete. The potential reductions are not that significant over private transport when previously mentioned factors are considered.

Potential savings in overhead and storage are probably similar to those in transport. At this time, however, there is no indication that the government of Mauritania is willing to return the grain trade to the private sector and our economic cost calculations must recognize this political reality.

Annex A: 3) OMC: MARKETING STUDY - SCOPE OF WORK

A. SUMMARY

A Marketing Study will be contracted out by the OMC Marketing Division in order to evaluate the structure, conduct, and performance of agricultural markets in Mauritania and the effect that the OMC stabilization effort is having on market performance.

The OMC Development Support Project will pay the local currency cost of the marketing study. The foreign exchange costs of technical assistance will be provided either by AID or other appropriate agencies of the USG or through coordination with one of the other donor organizations which have expressed interest in such a study.

The Marketing Study will gather and analyze both macro and micro data. It will cover 18 months from the start of data collection to submission of the final report.

B. MACRO-LEVEL COMPONENT

1. Description of the cereals marketing chain to include the following:

   - number of links/agents
   - levels of participation and amounts handled at each level.
   - costs/ease of entry
   - profit margins
   - prices at each level in marketing chain
   - producer, wholesale, and retail prices in principal markets and producing areas by month and season
   - ethnic/sex identification of principal market agents.

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C. MICRO-LEVEL STUDIES

Description of Marketing activities and dynamics in four villages in producing regions. Two of these villages will grow and market irrigated rice and two will grow and market dryland sorghum and millet. In each cereal group, one of the villages will have access to OMC purchases, the other will not. The following information will be collected:

- procedures for bulking and/or otherwise carrying grain to village market centers or buyers
- timing of market sales and gifts during the year
- monthly and seasonal price fluctuations for village level grain sales
- quantities produced, marketed, and consumed
- storage losses and costs of grain storage
- who stores grain - ethnic group, size of operation
- quantities of grain in storage at the end of the dry season

BUDGET

Local Currency Costs ($)

3,600	Per Diem for employees: 15 x 4 x 60
1,000	Public transport for employees
1,000	Wages for part-time locals
19,200	Salaries for 4 full-time enumerators /interpreters @ $400/month
1,000	Internal transport (gas & oil)
3,000	Internal transport (repairs & mntn)
11,000	Vehicle (L.R. - to USAID at end)
5,400	Living allowance/housing @ $300/mo
1,500	Supplies/equipment (scales, for office, etc.)
2,000	Air freight for personal effects
$ 48,700	SUBTOTAL

Foreign Exchange ($)

2,500	Airfare (2,000); pre-departure expenses and excess baggage ($500)
18,000	Base salary @ $1,000/mo
4,500	25% of base salary for hardship and post differential
2,700	15% of base salary for hardship and post differential
27,700	SUBTOTAL
$76,400	TOTAL

Annex A: 4) OMC: ECONOMIC ANALYSIS

The OMC assistance component of this 206 program makes possible the entire program in that the OMC is the structure through which imported food aid is commercially marketed in Mauritania. Without the OMC or a similar organization, food-aid grain would continue to be distributed by the Commisariat of Food Aid (CAA) and no local currency for development would be generated. With the project CAA distribution costs, estimated at 6.5 UM per kilo in economic terms, become a benefit to offset OMC costs. In the same vein, the FAS value of the grain and ocean transport costs are not economic costs to this project if, without this Title II Section 206 program, Mauritania will continue to get the same amount of food aid under other sections of the Title II legislation.

On the benefit side, all the benefits which arise from the local currency development projects can justifiably be attributed to this component of the program. An alternative, the one chosen here, is to use gross sales receipts for the US grain as a benefit and then treat the net returns to the entire 206 package in a separate analysis.

In addition to direct sales receipts, the benefits from channeling US food aid through the OMC, according to the terms and recommendations of the 206 project paper, would accrue both in terms of increased aggrgate incomes and from improved income distribution. Increased aggregate incomes would arise from three sources:

1. Shifting resources from consumption to investment by reducing subsidies on consumption. This leaves greater revenues in public sector coffers for development purposes and has social value to the extent that investment is preferred over consumption. The difference between OMC sales plus CAA operating costs minus OMC operating costs is a measure of this transfer.
2. Profitable investments. Increasing the rate of investment by

reducing consumption of public sector capital only creates the potential for higher incomes and faster economic growth. Only if invested resources yield a positive rate of return will this potential be realized. This return is treated in the overall analysis of the 206 program which includes costs and benefits for all projects to be financed from the proceeds of the US grain.

3. Drawing additional domestic resources into productive employment by raising producer incentives to economic levels. This arises from reduced consumer subsidies which translate into higher free market producer prices. In addition the OMC purchasing campaign will lower risk by providing a more reliable market for producers' output.

Improved income distribution would also arise from three sources:

1. Shifting income from middlemen, speculators and producers now profiting from excessively high hungry-season prices, to consumers in the form of lower consumer prices at this time of the year.

2. Shifting income from middlemen and speculators profiting from depressed harvest season prices to producers who have no alternative but to sell at harvest time. Rural Mauritania's social structure is such that harvest period sales simply cannot be avoided by certain groups of the population.

3. Shifting income from persons now receiving low cost food aid who do not need it, such as the military and civil servants, to the government for development purposes. There will continue to be a need for free distribution of food to indigent groups and individuals but it is very clear that the bulk of food aid in Mauritania does not go to such people.

In addition to these direct benefits of the proposal to channel increasing quantities of food aid in general, and US food aid in particular, through the commercial channels of the OMC, the project has

indirect benefits in the form of policy reforms related to this project and specific investments to be financed by it that will increase the benefit streams and potential development impact of other agricultural development investments in Mauritania.

On the cost side, this sub-project will finance a portion of the costs for a new grain bulk handling facility at the Nouakchott port. This new facility will permit reception and bulk unloading of larger ships than at present with consequent substantial savings in ocean transport and internal handling costs. The whole bulk handling project has an economic rate of return of over 26% using very conservative assumptions. Details are discussed in the Bulk Handling sub-project. This sub-project will provide three of an estimated nine million ouguiya needed to finance investment costs for the port. It will cover the local cost component. One third of the cost and benefit streams of this facility are assigned to this sub-project.

The induced private sector and other investment caused by getting producer incentives to economic levels through the market support operations of the OMC is more difficult to quantify. The anticipated increase in real farm-level sorghum prices anticipated over the life of the project, arising from the policy changes induced by the project, will be diffused over a wide production area. More farmers in the southern Hodhs, where animal traction was once profitable will be induced to take up animal traction once again. Farmers in the well watered bas fonds and walo lands will find fertilizer and animal traction economic propositions. Though this project does not provide animal traction services of fertilizer to other parts of the country, indeed the latter not even to the Guidimaka, the policy changes induced by it will make other investments in extension and input suppy more economic from a private point of view and substantially expand the potential payoff of such projects when they do occur.
Also the inputs and varieties identified under the Guidimaka sub-project may find their way to other parts of the country and be spontaneously adopted by farmers with profitable results.

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As a measure of such diffuse benefits we assume that from year four of the project onward, the year when market prices faced by producers finally attain free market level reflecting import parity plus internal handling and transport costs, farmers outside of the Guidimaka begin adopting animal traction and improved varities. The net benefits arising from both activities are assumed to total an amount equal to the net economic benefits of each of those activities within the Guidimaka from year four to year ten. This seems to be a reasonable assumption since the area covered by that project will represent only 5-10% of the nation's dryland cereal production areas.

In measuring the benefits of the project on improving income distribution within the country we assume that excessive margins accruing to middlemen and speculators have zero social value. Any reduction in excessive consumer price margins or increase in abnormally depressed harvest season producer prices are assumed to have social income value equal to the change brought on by the project for all quantities actually traded at those prices. The value of home consumption is not included in this benefit stream, even though in strict economic terms the value of on-farm comsumption is determined by farm gate price at the time of consumption whether or not it is purchased, and this will have increased as a result of OMC intervention as well.

The problem in measuring these income redistribution benefits is in determining what constitutes excessive margins. High prices may reflect genuine supply related shortages rather than hoarding or marketing imperfections. In a bad crop year high producer prices merely offset part of the decline in farm income due to lower overall cereal production.

In the absence of better information we assume that all support of producer prices up to the OMC floor price and all reductions in consumer prices from price levels prevailing prior to OMC intervention in excess of 1 1/2 times the OMC wholesale price of 13 UM are economic benefits to this OMC sub-component. Since the OMC does not buy all of

the sorghum marketed, and much of what is marketed is sold outside of OMC's sphere of influence, we assume that economic producer benefits amount to 20% of the OMC purchase price for twice the quantity of grain actually purchased by the OMC. Harvest season prices this year averaged 8-12 UM per kilo prior to OMC intervention at 13 UM for sorghum and 12.5 UM for paddy. OMC purchases are projected at a constant 3000 tons per year since the objective of OMC pricing policy will be to leave as much actual trading to the private sector as possible. These benefits accrue only during the first five years of the project since that is the period over which the project supports OMC buying campaign costs.

Estimating reductions in consumer prices brought about by OMC intervention are more difficult. As is discussed elsewhere, OMC market price reporting leaves much to be desired both with respect t constancy of coverage as well as quality. The depression in consumer prices seems to have been most pronounced in producing areas where price differentials are already low but the cause of this is not clearly attributable to the OMC as opposed to higher production and on-farm stocks. We will assume that one ouguiya per kilo of OMC grain sold plus an equal amount of privately traded grain reflects the economic benefit from greater consumer price stability. The actual maximum effect across high and low margin areas is 2 UM per kilo. However, by assumption we consider margins only above 6.5 UM to be excessive.

The value of shifting income away from persons now getting low cost food aid distributed by the CAA is assumed to be zero. In effect, the cost of income losses to needy low income people losing access to the CAA grain is offset by the benefits of eliminating the income gains of well-off people who also benefit from such sales.
Thus the costs and benefits cancel each other. The former will continue to be served by the CAA.

On the cost side, there are a few costs that need to be counted

over and above the operating costs of OMC associated with distributing the food aid through commercial channels. There are of course investment and operating costs associated with the bulk handling unit. Also, the OMC needs additional training for intermediate level staff and a couple of trucks to carry grain from the wharf to the OMC warehouse so that existing trucks are freed for the buying campaign. The OMC also has variable costs associated with its buying campaign that may not be able to be covered entirely in the spread between buying and selling prices at current subsidized consumer prices for food aid grains. In order to keep a more appropriate relationship between producer prices for local sorghum and their long-run import parity in Selibaby, the project envisions paying 2.0 UM per kilo purchased until 1985 when consumer and producer prices begin their two year transaction to import parity and producer and consumer prices begin to reflect actual differences in handling and transportation costs. This is charged against economic costs. There are also minor expenditures for electrical equipment and radio maintenance that are particular to the OMC's price stabilization activities. The economic cost of warehouses and warehouse equipment is assumed to be 90% of financial costs.

The costs and benefits of the entire project are summarized in Table OMC-1. The benefits include OMC sales receipts, reduced CAA distribution costs, transport cost savings from the bulk handling facility plus the aggregate income and income redistribution benefits described above. Project costs include all operating and investment costs associated with the OMC sales campaign, the bulk-handling unit and incremental costs associated with the price stabilization objectives of the OMC. They do not include grain purchase or ocean transport since these costs would be borne in any case if one assumes Mauritania would get emergency food aid if not 206 food aid. On this basis, the OMC sub-project has a gross benefit cost ratio of 3.07. It is not possible to calculate an internal rate of return since there are no years with negative benefits.

TABLE OMC-1
ECONOMIC COSTS AND BENEFITS OF OMC SUB-PROJECT
(000 UM)

ASSUMING EMER. PGRM AS ALTERNATIVE:	YEAR 1	2	3	4	5	6	7	8	9	10
Project Benefits:										
OMC Sales Receipts	250,000	246,000	242,000	0	0	0	0	0	0	0
Reduced CAA distribution costs	130,000	130,000	130,000	0	0	0	0	0	0	0
Port bulk handling facility	0	0	80,850	45,375	49,830	53,625	57,750	57,750	57,750	57,750
Increased private investment in agricultural production	0	0	0	5,630	5,780	6,840	9,880	12,025	9,790	23,480
Income redistribution benefits for:										
Producers	15,600	15,600	15,600	15,600	15,600	0	0	0	0	0
Consumers	40,000	40,000	40,000	0	0	0	0	0	0	0
Total benefits	435,600	431,600	508,450	66,605	71,210	60,465	67,630	69,775	67,540	81,230
Operating Costs:										
OMC distribution costs	107,000	103,800	102,200	0	0	0	0	0	0	0
OMC buying campapign	6,000	6,000	6,000	0	0	0	0	0	0	0
Bulk handling	0	0	5,000	5,445	6,000	6,435	7,000	7,000	7,000	7,000
Radio maintenance	85	85	85	85	85	0	0	0	0	0
Total operating costs	113,085	109,885	113,285	5,530	6,085	6,435	7,000	7,000	7,000	7,000
Investment Costs:										
Bulk handling facility	75,000	75,000	0	0	0	0	0	0	0	0
Warehouses	990	990	450	450	450	0	0	0	0	0
Warehouse equipment	270	270	270	270	0	0	0	0	0	0
Training	100	100	100	100	100	0	0	0	0	0
Vehicles	520	0	0	0	0	0	0	0	0	0
Electric Equipment	100	0	0	0	0	0	0	0	0	0
Total investment costs	76,980	76,360	820	820	550	0	0	0	0	0
TOTAL COSTS:	190,065	186,245	114,105	6,350	6,635	6,435	7,000	7,000	7,000	7,000
Net benefits:	245,535	245,355	394,345	60,255	64,575	54,030	60,630	62,775	60,540	74,230

Gross Benefit/Cost Ration @ 15% = $\frac{\text{Benefits}}{\text{Costs}} = \frac{1,411,343}{459,569} = 3.07$

Annex B: BACKGROUND ON GRAIN MARKETING: MARKET CONDUCT AND PERFORMANCE

Mauritanian grain markets exhibit an unusual combination of within market integration and between market differentiation. The within market integration is reflected in the close relationship between price movements in related commodities within the same market location. Unusual amounts of one kind of grain coming into the market or suddenly absent from it cause sharp movements in other cereals' prices. On the other hand, price differentials for the same commodity between market centers frequently cannot be explained by differences in transport costs or availability of supplies in other market centers alone. Differences in retail mark-ups, reduced grain movements during the rainy season and weak arbitrage between rural markets appear to be contributing factors. Large movements of the nomadic population at certain times of the year may also contribute to such apparent anomalies.

DOMESTICALLY PRODUCED CEREALS

These comments do not reflect a thorough study of farm level marketing of domestically produced cereals but spot checks to several important market and production centers in the southern third of the country and discussions with officials concerned did yield some interesting information.

A good deal of domestically produced grain moving into markets is sold by women, tenants and others in need of cash immediately following the harvest. Some of the crop is even sold before harvest either in the form of advance payments against the harvest once its magnitude is assured or in the form of credit obligations which have been incurred over the year which are payable in kind at harvest time. Most of this grain is purchased by local merchants or creditors who either buy for their own account or who bulk grain for shipment to other areas.

Many farmers hold grain stocks until the state of the next harvest is assured and then move them to the market.

Prices for sorghum generally begin declining before the harvest but producers themselves, nonetheless can reap substantially higher prices than if they had sold at harvest. If the harvest is bad, prices continue to rise through the harvest period and into the next year. In such cases, returns to producers may be more fictitious than real, however, since farmers have less grain for sale or consumption.

Much of the grain purchased at harvest time is moved to consuming centers shortly after purchase, or purchased by camel caravans from the north seeking supplies for household consumption. Apart from on-farm food reserves and quantities needed for petty cash purchases over the year, speculative stocks do not appear to be held in producing areas. The poor state of roads in many of the producing areas means grains for speculative purposes must be in place before the rains when prices begin to rise sharply.

RETAIL PRICES

In observing retail prices in regional markets across Mauritania, one is struck with the wide differences in retailing margins between markets. The case of OMC sorghum and wheat sales is a good case in point since the purchase price ex-depot is the same for all retailers.

Figure 1 shows the relationship between end of month prices for OMC U.S. red sorghum in those regional markets for which price data were available. The series are not very up-to-date for most of the centers but they do give an indication of retail margins. These vary from 5 UM at Boutilimit to 7 UM at Aioun. The reasons for these divergencies are unclear but OMC sales policies seem to be an important contributing factor in some markets.

In Boutilimit, for example, the OMC depot sells sorghum and wheat in any quantity over one bag. Thus, individual families can pool resources and buy a sack at 13 UM as an alternative to buying from retailers. This, coupled with the fact that Boutilimit is a high volume market, keeps retail margins low.

Similar wide variations occur in rice prices. Such differences in rice are more easily explained by differences in the extent to which price controls are enforced in different localities. In general, however, it seems that regional markets are highly segmented.

QUALITY DIFFERENCES

The same data in Figure 2 show that Tagbalit commands a large price differential over U.S. sorghum. Only in Selibaby is there no difference. Differences widen as production moves down the river and closer to towns and large concentrations of non-producing households. The premium is at its highest in the eastern part of the country from Magta-Lahjar to Nema, amounting to over 50% in all OMC regional centers during all but the immediate harvest period.

Differences exist between U.S. sorghum and other local varieties but these are less pronounced. Bichne is next in price after Taglalit, followed by R'Haye. Each is popular in selected markets and command an average premium of 15 - 50% depending on the product and the market.

OMC BUYING CAMPAIGN

The OMC has become an effective force in rural grain markets. In the traditional cereal producing areas it competes with local merchants and others for available supplies. It buys partly through stationary agents selected by villagers themselves. These agents are paid on commission of 4 UM for each kilo of grain they purchase for the OMC. In larger villages the OMC operates a set of fixed buying points from which mobile teams foray into surrounding smaller villages for periods ranging from two days to one month, depending on available supplies. During the 1981 rainy season harvest, the OMC had stationary buying agents in 15 villages and mobile buying teams operating out of another seven villages. For the flood recession season, the total number of buying points operated by the OMC was the same except that eight rather than seven were fixed points from which mobile teams operated.

Because of the expense of mounting a marketing campaign and the need to ensure a sufficient volume of purchases, the OMC waits until the main harvest before entering the traditional cereals market. In the case of Selibaby, the OMC did not begin buying until two months after harvest because of the poor state of the roads and the lack of grain storage facilities in the villages. Short season local sorghum varieties such as R'Haye and Bichne are generally less important in quantity and mature about 1 1/2 months before the longer season, more popular Tagbalit - a time when the rains are not yet finished. Thus even with an effective OMC buying campaign, there will be substantial quantities of grain dumped on local markets at prices well below those prevailing during the OMC buying campaign.

Prices paid to producers by OMC vary between 13-15 UM for sorghum and millet and 13-17 for maize, with OMC supplying the bags. In reality the average price paid was not much above the lower end of those ranges and the OMC declined to enter some markets where prices were marginally above it. All transactions are in cash and farmers voice no complaints about OMC buying practices. One village did indicate however that the OMC could have bought twice the 30 tons it purchased had it offered higher prices, while another expressed no interest in selling to the OMC at the price being offered.

As the OMC traditional cereals buying campaign becomes better established local, speculators should become more active in the immediate post harvest market and bid up pre-OMC buying campaign prices in anticipation of quick sales to OMC when the buying campaign begins. Thus except for the long delay experienced in the Guidimaka, the OMC buying campaign for traditional cereals should provide considerable support to prices throughout the harvest period once its presence in the market is firmly established.

The OMC rice purchase campaign is operated separately from its traditional cereals buying campaign. One mobile team covers the entire paddy producing zone.

The team visits each village and installs itself until purchases are complete. Only when purchases in one village are complete does the team move onto a new village. As with the traditional cereals, the paddy buying campaign is announced on national radio. Villages are visited in advance to notify them of the date that the buying team will arrive.

The OMC paddy buying campaign is completely separate from its traditional cereals buying campaign. The paddy campaign has been plagued with cash and vehicle shortages. As a result, this season's purchases will fall about 250 tons short of some 600 tons originally expected. Farmers seem quite pleased both with the price and with receiving cash for their sales. Rice appears to be seen as more of a cash crop than other cereals. Apparently high on-farm consumption (low levels of marketing) is partially explained by illegal sales of paddy in Senegal where prices are higher. For the majority of farmers growing rice, it is a relatively new activity. Rice cultivation techniques and yields should increase with time and better extension support.

Unlike the practices for the traditional cereals campaign, the paddy buyers charge farmers the equivalent of one kilo of paddy if they do not have a suitable bag of their own. Producers are paid in cash at 12.5 UM per kilo for their production. Paddy purchased by the OMC is milled on a contract basis at mills operated by SONADER and Mpourrie and then sold to SONIMEX at a price fixed by the government.

IMPACT OF CAA ON LOCAL MARKET PRICES

The impact of the CAA on local market prices is more clear cut. Several price series and monthly observations indicate a depression in market prices and cessation of sales when prefects make a local distribution of CAA grain. Local distributions are generally cash sales at 8 UM per kilo for a fixed amount of grain, often 25-50 kgs per person. These sales are not related to need but are simply sales of surplus stocks that generate cash for financing local government operations.

The prefects maintain separate programs of free distribution to indigents of CAA grain and food for work type projects but these amount to only 10-20% of CAA grain supplies.

This type of intervention in the market by CAA is beginning to pose problems for OMC. Unless CAA grain is held back from the market, the OMC will have increasing difficulty selling the quantity of grain it envisions. Cost projections for the OMC assume sales of 40,000 tons per year, almost double 1981 sales levels. Even without competing with low cost CAA grain, OMC will have to open more centers in smaller towns, increasing storage, transportation and handling costs over present levels. This is a desirable objective from an equity point of view and maximizing sales in those centers will be imperative if average costs are to be minimized. The CAA should be restricted to the role of supplying food to persons in genuine need and commercial sales left to the OMC.

Annex C: BACKGROUND ON PRICE ANALYSIS

TABLE 1
PROJECTED OMC WHOLESALE PRICES REQUIRED
TO ATTAIN CAF PLUS INTERNAL TRANSPORT
AND HANDLING BY 1987

	YEAR							
	1982	1983	1984	1985	1986	1987	1988	
Constant Costs:								
Sorghum FAS Gulf Port	6.5	6.5	6.5	6.5	6.5	6.5	6.5	
Freight to Nouakchott	10.5	10.5	10.5	10.5	5.5	5.5	5.5	
OMC Internal Distribution								
Port Losses	.3	.3	.3	.3	.0	.0	.0	
Warfage	.9	.9	.9	.9	.7	.7	.7	
Storage/Handling	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
Transport	2.8	2.8	2.8	2.8	2.8	2.8	2.8	
OMC Overhead	.8	.6	.5	.5	.5	.5	.5	
	6.0	5.8	5.7	5.7	5.2	5.2	5.2	
Total CAF plus Internal Handling and Transport	23.0	22.8	22.6	22.7	17.2	17.2	17.2	
Current Costs:								
Inflation Expansion Factor		1.10	1.21	1.33	1.46	1.61	1.77	
Current Costs: CAF plus Internal Transport/Hand.	23.0	25.1	27.3	30.2	25.1	27.7	30.4	
OMC Wholesale Price to be Negotiated:								
U.S. Sorghum	13.0	14.5	16.0	17.5	22.0(b)		27.5(c)	30.5
U.S. Wheat	15.0	16.5	18.0	19.5	24.0(b)		29.5(c)	32.5
Single Price (a)	14.0	15.5	17.0	18.5	23.0(b)		28.5(c)	31.5
OMC Producer Price for Sorghum	13.0	14.0	15.0	16.0	20.0(b)		25.0(c)	27.5
Minimum OMC Wholesale Price for Local Sorghum	17.0	18.5	20.0	21.5	26.0	31.5	34.5	

(a) assuming OMC sales are 50% wheat and 50% sorghum
(b) beginning of two year import parity adjustment period
(c) import parity attained

EXPLANATORY NOTES

TABLE 1

"Sorghum FAS Gulf Port" -- see Table 2; this also show values for rice, wheat and maize.

"Freight to Nouakchott" -- reflects U.S. freight rates from Gulf ports; for calculating import parity pricing adjustments, freight rates contracted with European shipping agents for non U.S. bottoms may be used. This will reduce freight costs by about half. The sharp drop in freight cost from 1985 to 1986 reflects savings accruing from use of the proposed bulk handling facility.

"Inflation Expansion Factor" -- 10 percent per annum.

"OMC Producer Price for Sorghum" -- To determine the appropriate OMC producer price for local sorghum, one must first determine the economic value of sorghum relative to import parity prices. This is defined as the FAS value at the U.S. Gulf ports plus ocean transport to Nouakchott, plus internal transport and handling costs to Kiffa and Aleg. Kiffa and Aleg are the northernmost points of consumption for domestically produced sorghum. Based on Table 4, the long term, 1987 prices for sorghum delivered to Kiffa and Aleg are 17.7 UM/kg and 17.2 UM/kg respectively; a 17.5 UM/kg average is used as a nationwide free market equivalent price based on import parity.* This average is also equal to the average cost for the entire country.

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*Prices are expressed in 1982 constant prices.

The OMC producer price of sorghum in 1987 is calculated as average import parity plus internal costs to Kiffa and Aleg less private sector transport costs from Selibaby and Kaedi (the major domestic grain-producing areas) to Kiffa and Aleg, respectively. The long run difference in private sector transport costs between Kaedi and Aleg and between Selibaby and Kiffa is given in Table 4. The costs are defined as the difference in the economic costs between these points divided by .95, to raise economic prices to free market prices.

Kaedi ——— Aleg = (17.2 - 16.0)/.95 = 1.26
Selibaby — Kiffa = (18.9 - 17.2)/.95 = 1.79

The Selibaby figure is consistent with what traders in Selibaby reported having to pay to ship to Kiffa. In large ten ton trucks, the rate can be as low as 1.0 UM/kg. Assuming an average 2 UM/kg allowance for private sector transport costs, the OMC producer price would be 15.5 UM/kg.

OMC should set its wholesale price for local sorghum such that the producer wholesale price margin would cover its buying campaign costs. These costs are about 4 UM/kg and should be no less than this amount. Thus the OMC wholesale price would be 19.5 UM/kg in Selibaby and Kaedi.

Kiffa and east wholesale prices for local and U.S. sorghum will differ as local sorghum and U.S. sorghum are imperfect substitutes; local varieties command a 25-75% premium over U.S. sorghum. For this reason, a 4.0 UM/kg average differential is assumed in Kiffa and east. Thus, the wholesale price for local sorghum would be 21.5 UM/kg in Kiffa and east compared to 17.5 UM/kg for U.S. sorghum.

Given the above, the producer and wholesale pricing structure would be as follows:

OMC producer price for local sorghum	15.5
OMC wholesale price for local sorghum, Selibaby & Kaedi	19.5
OMC wholesale price for local sorghum, Kiffa and east	21.5
OMC wholesale price for U.S. sorghum	17.5

The 4 UM margin between purchase and sale price for local sorghum in Selibaby amd Kaedi covers OMC buying campaign costs but not transport costs. Thus, if the OMC has to ship to Kiffa, it will lose 2.0 UM/kg at 19.5. Private traders could buy and transport to Kiffa at 3 UM/kg. Storage costs will be the same for U.S. sorghum and local sorghum for both the OMC and the private sector. Therefore, the OMC should maintain a policy of not shipping U.S. sorghum to producing areas and instead control the floor and ceiling prices of 15.5 and 19.5 respectively in producing areas.

If OMC does not accumulate substantial surplusses in Selibaby because of market imperfections (see marketing paper) then the OMC should transport it to Kiffa for sale and either absorb the loss on transport or charge a higher wholesale price. It should not be allowed to pass higher operating costs on to the producer in the form of lower producer prices. The markets in Kiffa, Aioun and Nema should be able to support the higher wholesale price necessary.

The 4.0 UM margin between the OMC buying and selling price for local sorghum is enough of a margin for local traders to make money hauling local grain between Selibaby and Kiffa. In addition, wholesale prices of local sorghum in Kiffa and points east are usually 8 to 11 UM higher than U.S. sorghum. Thus, there are enormous profits to be made in moving grain between Selibaby and Kiffa even now.

TABLE 2

PRICE SERIES USED TO ESTIMATE MEDIUM TERM FOB AND CAF PRICES FOR SORGHUM, WHEAT, MAIZE AND RICE

Price per Ton

YEAR	SORGHUM (a)	WHEAT (a)	MAIZE (a)	RICE (b)
1977	94	112	102	270 (c)
1978	93	126	100	300
1979	106	155	109	266
1980	129	175	129	392
1981	132	177	136	382
1982 (d)	116	174	116	300 (e)
Estimated Long run equilibrium Price in 1982	130	170	130	320

Sources: For sorghum, wheat and maize: FOOD OUTLOOK, No. 1, Jan. 26, 1982. Food and Agriculture Organization, Rome: For rice, SONIMEX.

(a) Export price F.O.B., U.S. Gulf ports.

(b) C.A.F. prices computed from SONIMEX import statistics for 100% broken rice using average exchange rates prevailing during each year. These were 1978 = 45.58; 1979 = 45.06; 1980 = 45.15; 1981 = 46.68.

(c) Estimated based on relationship between white rice 5% FOB Bangkok between 1977 and 1978.

(d) Average prices prevailing during January 1982. Current Chicago Board of Trade near term future prices are about 4% lower for wheat and 2% higher for maize than existed in Jan.

(e) Long term contract price from Nov. 1, 1981, to Oct. 3, 1982. Current CAF prices for the same kind of rice imported into Senegal in larger, more economical shipments are reported to to be 250/ton.

TABLE 3

COMPARISON OF EQUILIBRIUM CAF PRICES OF
RICE, WHEAT, RED SORGHUM AND MAIZE
DELIVERED TO NOUAKCHOTT in 1982
(U.M.)

Cost Component	Cost per Kilo			
	Rice	Wheat	Sorghum	Maize
F.O.B. Gulf Port	-	8.5	6.5	6.5
Ocean Transport (a)	-	5.5	5.5	5.5
TOTAL C.A.F.	16.0	14.0	12.0	12.0

(a) Assuming new bulk handling facility is built at Nouakchott allowing grain to be transported on larger vessels at a savings of $100.00 per ton. Current PL 480 transport costs are $210.00 per ton delivered to Nouakchott.

TABLE 4

ESTIMATED FINANCIAL AND ECONOMIC COSTS
OF PL 480 U.S. RED SORGHUM DELIVERED
TO SELECTED OMC DEPOTS
(UM/kg)

Destination	Cost per Kilo (a) Financial	Economic (b)
Nouakchott	15.3	15.0
Boutilimit	17.1	15.7
Aleg	17.2	16.0
Magta-Larjar	17.3	16.8
Kiffa	17.7	17.2
Arioun	17.7	17.9
Nema	20.1	19.6
Atar	18.3	17.6
Rosso	17.3	15.7
Boghe	17.3	16.4
Kaedi	21.0	17.2
Selibaby	21.0	18.9
Ould Venge	22.0	19.8
OMC Average	17.5	17.0

(a) Based on average F.O.B. Gulf port price of $130 per ton plus $110 ocean freight ex ships tacked, Nouakchott. The cost for imported maize delivered to the same destination is the same. The cost per kilo for wheat and rice is 2.0 and 4.0 UM more, respectively.

(b) These are real costs expected to prevail in 1985 after completion of Aleg - Salibaby roads.

Annex D: ASSUMPTIONS USED IN ECONOMIC ANALYSIS OF GUIDIMAKA AGRICULTURAL EXTENSION PROJECT

For the individual farmer, financial and economic analysis input-output coefficients in Table D-1 were used. Average yields were assumed to be 650 Kg/ha based on reported 1981 yields of 540 kgs with 78% of normal rainfall in the Guidimaka region reported by the Multi-Donor/GIRM joint commision created to evaluate the production campaign. This compares with national average procution per hectare of somewhere around 400 kgs/ha as reviewed by Enger (see annex) and reflects Guidimaka's generally more favorable agricultural climate as well as the fact that since the drought much production has shifted into valleys where excess runoff collects and soil water infiltration is greater.

The yield for above average farmers was assumed to be 800 kgs/ha based on measured yields on control plots in the fields of farmers participating in the DRIG agricultural extension program. Control yields average 1300 kgs/ha, well above the 800 assumed here for above average farmers.

Incremental labor was valued at 100 UM per day. There is a great deal of dispute in Mauritania concerning the opportunity cost of labor with estimates ranging from about 40 UM per day based on national average returns to labor in dryland agriculture, to 160 UM for average daily remittances from migrants, up to 210 UM per day based on the value of the incremental labor (and management) required to produce 6.0 tons of paddy versus 3.5 tons on an irrigated perimeter. The official minimum wage in the urban sector is currently just under 200 UM per day.

In arriving at the 100 UM per day figure we have assumed that:

1. Only a part of the local population has the real opportunity to migrate - i.e. most males between the ages of 15 and 55.

Other age/sex groups and a core group of the prime male group must remain in Guidimaka in order to maintain control over their land, care for family members and avoid the hassle and the risks of migration. The lack of education in Guidimaka also may inhibit migration. It is estimated that about half of all males in the 15-55 age group have migrated. Unfortunately, available data do not differentiate between seasonal and permanent migration and it is not known what percentage of migrants return during the cultivating season.

2. Work on irrigation perimeters is not an option for the bulk of farmers in Guidimaka at this time and will not be over the next ten years. Many of those who do work on the perimeters have simply built dikes around what was formerly rainfed land. As a result most of the small perimeters do not create employment for villages not located along the river.

3. Many farmers in Guidimaka have ample slack time during the dry season such that labor used for transport activities and feeding oxen has a lower opportunity cost. The highest realistic estimate for the average product of labor in dryland agriculture during the rainy season is around 120 UM per day. If this is the value of labor during the peak labor season, the value must be considerably below this during the dry season.

4. The unusually high free market wage observed in Guidimaka of 150 - 200 UM/day does not reflect income opportunities forgone but rather, a very high level of remittances, as well as income from livestock. These two combine to make income from agriculture a minor portion of average, region-wide incomes.

Annex Tables D-2 to D-4 give the economic and financial cash flow analysis for the animal traction package for average and above-average farmers. In the economic analysis, output was valued at 15.5 UM. This is the import parity value of grain delivered to Kiffa from Selibaby by the private sector, the basis for establishing economic producer prices.

Grain fed to oxen was valued at 75% of the value used for output on the assumption that lower quality feed and cheaper substitutes such as peanut-cake are usually available. The financial analysis uses the current OMC buying price of 13 UM to value output.

Insurance/death is the actual loss in value of meat caused by an animal dying. It is assumed that mortality for an individual animal is 5% and most of these are actually slaughtered before dying and the meat is salvaged at 2/3 its regular value. Mortality risk on the other hand is the risk of losing out on one year's gross margin because one of two oxen dies and the other is therfore unable to work. Thus mortality risk is 10% since each oxen has a 5% death probability.

Costs for yokes and harnesses are calculated at a rate lower than that practiced under the DRIG project. The design of yokes currently used by the project is defective requiring replacement every two years. The new project will adopt yoke designs from Senegal which use thicker wood. It will also copy Senegalese designs for yokes for a single oxen in order to facilitate weeding with oxen.

Table D-6 includes the assumptions underlying the calculation of overall project benefits and Table D-7 details the net-benefit/cost flows over the 10 year life of the project.

ANNEX D: TABLE D-1

AREA CULTIVATED, YIELDS, INCREMENTAL PRODUCTION AND THE FINANCIAL AND ECONOMIC VALUE OF INCREMENTAL OUTPUT ARISING FROM ADOPTION OF ANIMAL TRACTION PACKAGE BY AVERAGE AND ABOVE AVERAGE FARM HOUSEHOLDS IN GUIDIMAKA

	AVERAGE FARM HOUSEHOLD				ABOVE AVERAGE FARM HOUSEHOLD			
	YEAR				YEAR			
Variable	1	2	3	4-10	1	2	3	4-10
Without Project:								
Area Cultivated (ha)	1.5	1.5	1.5	1.5	2.0	2.0	2.0	2.0
Production (kgs)	975	975	975	975	1600	1600	1600	1500
With Project:								
Area cultivated (ha)								
Manual	1.0	1.0	-	-	1.0	.5	-	-
Animal Traction	.5	1.0	2.0	2.0	1.0	2.0	3.0	3.0
Production (kgs)	1138	1625	1950	1950	2000	2800	3600	3600
Incremental Production								
Grain	163	650	975	975	400	1200	2000	2000
Transport (days)	50	100	100	100	50	100	100	100
Value of Incremental Production:								
Financial								
Grain (13 UM/kg)	2119	8450	12675	12675	5200	15600	26000	26000
Transport (300 UM/day)	15000	30000	30000	30000	15000	30000	30000	30000
TOTAL	17119	38450	42675	42675	20200	45600	56000	56000
Economic								
Grain (15.5 UM/kg)	2527	10075	15113	15113	6200	18600	31000	31000
Transport (300 UM/day)	15000	30000	30000	30000	15000	30000	30000	30000
TOTAL	17527	40075	45113	45113	21200	48600	61000	61000

ANNEX D: TABLE D-2
FINANCIAL CASH FLOW ANALYSIS OF ANIMAL TRACTION/CULTURAL
PRACTICES PACKAGE ADOPTED BY AVERAGE FARM HOUSEHOLDS IN GUIDIMAK

COSTS AND BENEFITS	1	2	3	4	5	6	7	8		10
Value of Incremental Benefits	17119	38450	42675	42675	42675	42675	42675	42675	42675	42675
Operating Costs:										
Forage	4800	4800	4800	4800	4800	4800	4800	4800	4800	4800
Grain supplement	3900	6000	6600	6600	6600	6600	6600	6600	6600	6600
Labor:										
Training oxen	6000				6000					
Plowing/harvest	1000	2000	4000	4000	4000 \					
Transport	5000	10000	10000	10000	10000 \					
Feeding	2000	2000	2000	2000	2000 >	19270	19270	19270	19270	19270
Vaccinations	600	600	600	600	600 /					
Repairs	2670	2670	2670	2670	2670 /					
Insurance/death loss	390	480	570	660	1140	1290	570	660	750	840
TOTAL OPERATING COSTS	26360	28550	31240	31330	37810	31960	31240	31330	31420	31510
Gross Margin	-9241	9900	11435	11345	4865	10715	11435	11345	11255	11165
Mortality Risk	920	-990	-1140	-1130	-490	-1070	-1140	-1130	-1130	-1120
Mortality adjusted G.M.	-8321	8910	10295	10215	4375	9645	10295	10215	10125	10045
Investments Costs:										
Oxen	13000				13000	-28000				-28000
Harness and yoke	2200			2200			2200			
Plow and weeder	3950	2075	2075							-2500
Cart	6150	5675	5675							-8000
Working capital	6000	1000	300							-7300
TOTAL INVESTMENT	31300	8750	8050	2200	13000	-28000	2200	-	-	-45800
Net Benefits	-39621	160	2245	8015	-8625	37645	8095	10215	10125	55845
Cash Flow	-25231	14640	18815	24675	14515	54935	24665	26875	26875	72685

IRR = 18%

ANNEX D: TABLE D-3
FINANCIAL CASH FLOW ANALYSIS OF ANIMAL TRACTION
PACKAGE ADOPTED BY ABOVE AVERAGE FARM HOUSEHOLDS IN GUIDIMAKA

COSTS AND BENEFITS	YEAR 1	2	3	4	5	6	7	8	9	10
Value of Incremental Benefits	20200	45600	56000	56000	56000	56000	56000	56000	56000	56000
Operating Costs:										
Forage	6480	6480	6480	6480	6480	6480	6480	6480	6480	6480
Grain supplement	4000	6200	7000	7000	7000	7000	7000	7000	7000	7000
Labor:										
Training oxen	6000				6000					
Plowing/harvest	2000	4000	6000	6000	6000	6000	6000	6000	6000	6000
Transport	5000	10000	10000	10000	10000	10000	10000	10000	10000	10000
Feeding	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700
Vaccinations	600	600	600	600	600	600	600	600	600	600
Repairs	2670	2670	2670	2670	2670	2670	2670	2670	2670	2670
Insurance/death loss	390	480	570	660	1140	1290	570	660	750	840
TOTAL OPERATING COSTS	29840	33130	36020	36110	42590	36740	36020	36110	36200	36290
Gross Margin	-9640	12470	19980	19890	13410	19260	19980	19890	19800	19710
Mortality Risk	960	-1250	-2000	-1990	-1340	-1930	-2000	-1990	-1980	-1970
Risk adjusted G.M.	-8680	11220	17980	17900	12070	17330	17980	17900	17820	17740
Investments Costs:										
Oxen	13000				13000	-28000				-28000
Harness and yoke	2200			2200			2200			
Plow and weeder	7500									-2500
Cart	17000									-8000
Working capital	6900	1100	400							-8400
TOTAL INVESTMENT	46600	1100	400	2200	13000	-28000	2200	-	-	-46900
Net Benefits	-55280	10120	17580	15700	-930	45330	15780	17900	17820	64640

IRR = 28%

ANNEX D: TABLE D-4
ECONOMIC ANALYSIS OF ANIMAL TRACTION PACKAGE
ADOPTED BY AVERAGE FARM HOUSEHOLDS IN GUIDIMAKA

COSTS AND BENEFITS	YEAR 1	2	3	4	5	6	7	8	9	10
Value of Incremental Benefits	17527	40075	45113	45113	45113	45113	45113	45113	45113	45113
Operating Costs:										
Forage	4800	4800	4800	4800	4800	4800 \				
Grain supplement	4572	7200	7920	7920	7920	7920 \				
Labor	14000	14000	16000	16000	22000	16000 >	31990	31990	31990	31990
Vaccinations	600	600	600	600	600	600 /				
Repairs	2670	2670	2670	2670	2670	2670 /				
Insurance/death loss	390	480	570	660	1140	1290	570	660	750	840
TOTAL OPERATING COSTS	27032	29750	32560	32560	39130	33280	32560	32560	32740	32830
Gross Margin	-9505	10325	12553	12463	5983	11833	12553	12463	12373	12283
Mortality Risk	920	-1030	-1260	-1250	-600	-1180	-1260	-1250	-1240	-1230
Mortality adjusted G.M.	-8555	9295	11293	11213	5383	10653	11293	11213	11133	11053
Investments Costs:										
Oxen	13000				13000	-28000				-28000
Oxen Training	7000									
Harness and yoke	2200			2200			2200			
Plow and weeder	7500									-2500
Cart	17000									-8000
Working capital	6300	1300	400							-8000
TOTAL INVESTMENT	53000	1300	400	2200	13000	-28000	2200	-	-	-46500
Net Benefits	-61555	10595	10893	9013	-7617	38653	9093	11213	11133	57553

IRR = 16.5%

ANNEX D: TABLE D-5
ECONOMIC ANALYSIS OF ANIMAL TRACTION PACKAGE
ADOPTED BY ABOVE AVERAGE FARM HOUSEHOLDS IN GUIDIMAKA

COSTS AND BENEFITS	YEAR 1	2	3	4	5	6	7	8	9	10
Value of Incremental Benefits	21200	48600	61000	61000	61000	61000	61000	61000	61000	61000
Operating Costs:										
Forage	6480	6480	6480	6480	6480	6480 \				
Grain supplement	4800	7440	8400	8400	8400	8400 \				
Labor	15700	16700	18700	18700	24700	18700 >	36850	36850	36850	36850
Vaccinations	600	600	600	600	600	600 /				
Repairs	2670	2670	2670	2670	2670	2670 /				
Insurance/death loss	390	480	570	660	1140	1290	570	660	750	840
TOTAL OPERATING COSTS	30640	34370	37420	37510	43990	38140	37420	37510	37600	37690
Gross Margin	-9440	14230	23580	23490	17010	22860	23580	23490	23400	23310
Mortality Risk	940	1420	2360	2350	1701	2290	2360	2350	2340	2330
Mortality adjusted G.M.	-8400	12810	21220	21140	15310	20570	21220	21140	21060	20980
Investments Costs:										
Oxen	13000				13000	-28000				-28000
Oxen Training	7000									
Harness and yoke	2200			2200			2200			
Plow and weeder	7500									-2500
Cart	17000									-8000
Working capital	7300	1300	500							-9100
TOTAL INVESTMENT	54000	1300	500	2200	13000	-28000	2200	-	-	-47600
Net Benefits	-62400	11510	20720	18940	2310	48570	19020	21140	21060	68580

IRR = 28%

ANNEX D: TABLE D-6
SUMMARY OF INPUT-OUTPUT AND AREA COEFFICIENTS USED
TO CALCULATE ECONOMIC AND FINANCIAL COSTS OF
GUIDIMAKA AGRICULTURAL EXTENSION PROJECT

DESCRIPTION	YEAR 1	2	3	4	5	6	7	8	9	10
Extension agents & extension centers	11	11	11	11	11	11	11	11	11	11
Animal traction trainers	11	11	11	11	11	11	11	11	11	11
Antrack Farmers										
New	55	110	110	-	-	-	-	-	-	-
Cumulative	55	165	275	289	303	318	333	350	368	386
Demonstration Farmers										
New	55	110	110	-	-	-	-	-	-	-
Cumulative	55	165	275	289	303	318	333	350	368	386
Total area cultivated by										
Antrack Farmers	100	330	610	720	790	830	870	910	960	1010
Demonstration Farmers	100	300	500	530	550	580	610	640	670	710
TOTAL	200	630	1110	1250	1340	1410	1480	1550	1630	1720
Total area planted by improved seed	55	200	630	1110	1250	1380	1520	1670	1840	2020
Tons of Vegetables Produced	10	25	35	40	40	40	40	40	40	40

ANNEX D: TABLE D-7
ECONOMIC BENEFITS AND COSTS OF THE GUIDIMAKA AGRICULTURAL EXTENSION PROJECT
(000 UM)

BENEFITS & COSTS	YEAR 1	2	3	4	5	6	7	8	9	10
Incremental Benefits:										
Animal traction	-3416	-6264	-4735	3053	2872	3629	6346	8146	5515	18777
Demonstration Plots	85	256	426	448	470	493	516	543	570	598
Vegetable production	100	250	350	400	400	400	400	400	400	400
Distribution of Improved Seed	130	465	1460	2580	2910	3210	3534	3880	4278	4700
Village Infrastructure	8000	8000	8000	-	-	-	-	-	-	-
TOTAL BENEFITS	4252	3115	6418	6428	6432	7341	10729	12924	10716	24949
Project Costs:										
Technical Assistance	11000	11000	11000							
MDR Personnel	1670	1670	1670							
Project Personnel	5890	5890	5890							
Vehicles	1500	660	660							
Materials	3240	3240	3240							
Training	500	500	500							
Per Diem	270	270	270							
Contingencies	2190	2190	2190							
PROJECT COSTS	26260	25420	25420	-	-	-	-	-	-	-
Net Benefits to Project	-21368	-22272	-19403	6478	6632	7341	14759	12934	10716	24429

IRR = 6%

Annex E: PID for Development Assistance Dollar Support to Section 206

To: F Ruddy, AA/AFR

Your approval is required to authorize a total of $1,269,000 from the USAID/Mauritania proposed ABS for fiscal years 1983, 1984, and 1985. This dollar amount will be utilized to supplement proposed local currency activities to be financied by the PL 480, Title II Section 206 sales proceeds.

These dollars from the Sahel Budget are required to cover goods and services essential to Section 206 sub-project components which are not available for procurement within Mauritania and therefore for which local currency (UM which are non-convertible) cannot be used. These dollar supplements are necessary for three sub-projects to achieve the goal of integrating the food aid program into the bi-laterial development program, a stated priority of the Administrator.

The following summary budget is proposed:

TOTAL	FY 1983	FY 1984	FY 1985
1,269,000	282,000	425,000	562,000

Required Dollar Supplements for Local Currency Activities

Detailed descriptions of the following sub-projects can be found in the local currency section of the main test. These Sub-project identification documents include budget breakdowns of local currency costs.

Crop Protection - It is proposed that a total of $73,000 be budgeted for fiscal year 1985 to cover procurement of US-manufactured commodities to include pesticide equipment, protective clothing for spraying teams, and other equipment required for crop protection activities not available in Mauritania. Dollar requirements for FY 1983 and 1984 are being met by the AID Regional Crop Protection Project.

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OMC Infrastructure Project - A supplement of $106,000 is required for training of OMC mid-level management personnel in grain storage and marketing, such as is provided by Kansas State University. The proposed training program has the following components:

a) Short-term training for six (6) OMC Mauritanian Staff members. This would take place in the US or in third countries offering the appropriate training capabilities. Two staff members would be trained each year for three years - FY 1983, 1984, and 1985 each year for a total cost of $46,000.
b) Long-term training for three additional OMC staffers. Each of the three would attend an African institution to obtain degrees in Commercial Studies or Accounting at a cost of $20,000 each for a total of $60,000. As not all three staffers could be absent from the OMC at the same time, training would be staggered; the first staffer would start in 1983 and the second and third would begin in 1984 and 1985 respectively.

Guidimaka Agricultural Extension Program - A total of $1,090,000 over the three years is proposed to cover nine person years of expatriot technical assistance. This would finance salaries for three technicians for the proposed three years of the project (FY 1983, 1984, 1985). The proposed technicians include one Chief of Party, an Extension Management Specialist, and a Logistics Specialist. Descriptions of the responsibilities of involved and justifications for these technical positions can be found in the Guidimaka Sub-project Identification Document. Local currency costs associated with the employment of these contractors will be covered by the Section 206 project.

The annual breakdown of the US dollar requirements for the expatriot technical assistance for the Guidimaka Sub-project is as follows:

1983	1984	1985
$250,000	$390,000	$450,000

Annex F

MAURITANIA FOOD FOR DEVELOPMENT PROGRAM

(PL 480 Title II, Section 206)

Submitted to: Patricia Rader
Agency for International Development
AFR/DR/SWAP
2733A New State
Washington, D.C. 20523

Submitted by: Devres, Inc.
2426 Ontario Road, N.W.
Washington, D.C. 20009

Warren J. Enger

AID Contract #AID/SOD/PDC-C-0223 - Work Order #10

27 April 1981

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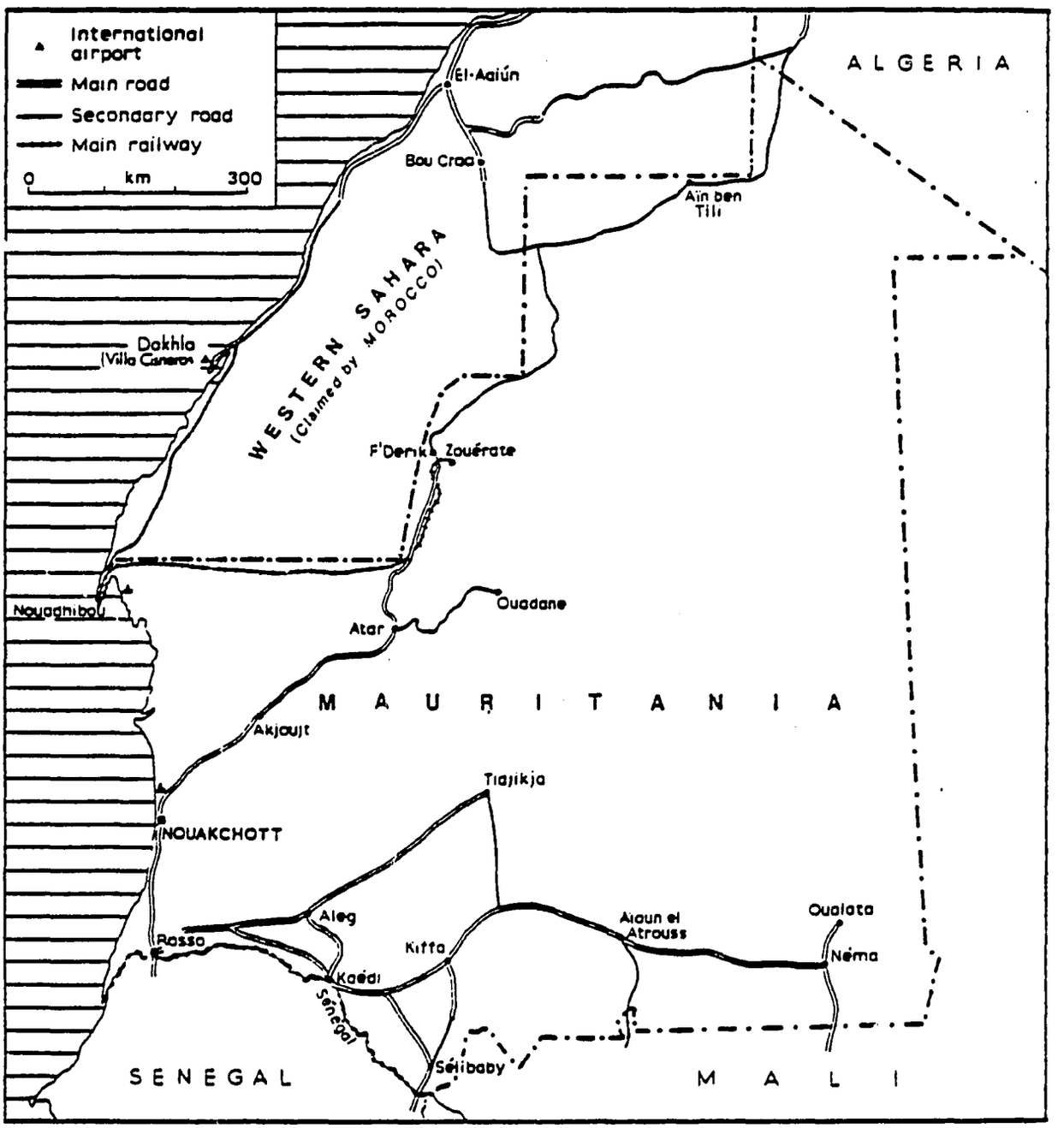
MAURITANIA



Map 1: Mauritania

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Map 2 - Regional Map - Mauritania 6

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TERMS/ABBREVIATIONS/ACRONYMS

Land Types

Falo	river bank
Walo (Ouaio)	land flooded by high water
Fonde	natural levee along river
Dieri (Jeeri)	upland sandy soils
Collenqal	part of walo best for farming
Rakhe	low lands found within upland (dieri) soils

Abbreviations

CAA	Commisariat d'Aide Alimentaire
CAF	Coute, Assurance, Fret (CIF)
CIF	Cost, Insurance, Freight (CAF)
CILSS	Comite Inter Etat pour Lu He Centre le Seeheresse aux Sahel
CRED	Center for Research on Economic Development University of Michigan
CRS	Catholic Relief Services
FAO	Food and Agriculture Organization, United Nations
FAS	Free Along Side
FED	Fonds European de Developpement
FAC	Fonds d'Arde et Cooperation
GIRM	Government of the Islamic Republic of Mauritania
IMF	International Monetary Fund
Kg	Kilogram
MDR	Ministere du Developpement Rurale
MT	Metric Ton
PAM (WFP)	Programme d'Alimentation Mondiale
OMVS	Office de la Mise en Valeur du Fleuve Senegal
PL 480	Public Law 480
RAMS	Rurale Area Manpower Survey/USAID
SONADER	Developpement Rurale
SONIMEX	Societe Nationale pour les Imports et Exports
USAID	United States Agency for International Development
USDA	United States Department of Agriculture

I. EXECUTIVE SUMMARY

A. Purpose

This study is background material for the development of a Project Paper for a PL 480 Title II Section 206 project for Mauritania.

B. Procedures

A five-man team consisting of an AID design officer, a USDA PL 480 specialist, a Food for Peace officer, a marketing consultant and an agricultural economist undertook the analysis of Mauritania's food grain situation over a five-week period in January - March 1981. This study constitutes the analysis conducted by the agricultural economist as background for the Project Paper Development.

Due to the paucity of good data it was impossible to conduct a quantitative supply and demand analysis of cereals. Therefore, a more subjective approach is used in reviewing the various estimates made. Wherever studies appear to be more scientifically conducted their results were preferred over other estimates. However, there is a risk of choosing the data to fit predrawn conclusions. In this study almost all the available estimates are presented, therefore the reader must exercise extreme caution in using the data. The conclusions and projections derived from this analysis are presented as general trends.

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C. Conclusions

1. There is an extremely limited potential for increasing supplies of cereals through local production.

   a. Irrigation represents the best potential for increasing production of local cereals, but it is extremely expensive to develop.

   b. Land that will give yields that are remunerative to the farmers are fully utilized.

   c. Unused lands can only produce very marginal yields and do not appear to be attractive for labor employment.

   d. Opportunities for labor employment outside of cereals production, generally through labor migration, have extremely limited the available labor on the producing zone.

2. Increasing producer prices could have some impact upon production of rice, but it is doubtful if price increases would stimulate greater production of millet and sorghum unless the levels were two to three times their present levels.

3. Present wholesale price levels for food aid have little or no relationship to consumer price levels. Therefore the proposed price adjustments should only affect the profit margins of grain merchants.

4. The proposed project will have more impact on stabilizing cereals prices and rationalizing the GIRM's cereals marketing system than upon local production.

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5. Overall food aid needed to meet minimum cereals requirements should average 60,000 tons over the next few years, and could rise to 80,000 tons by the end of the decade.

D. Recommendations

1. That the proposed project provide 20,000 tons of cereals per year on a three-year basis with extension based upon review of the project after year two.

2. That consideration for emergency grain shipments be considered on an annual basis but such shipments be channelled through the same structure as the annual 20,000 tons.

3. That the formulas for establishing wholesale prices and eliminating subsidies be adopted as part of the project agreement.

4. That the proposed system for setting farmgate floor prices be adopted both in terms of purchases and sales and that annual price levels be set before the planting seasons.

5. That a mechanism be established within the OMC to monitor the cereals markets and collect data on quantities and prices of grain in Mauritania's markets.

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II. SUPPLY OF CEREALS

Accurate data on production of cereals in Mauritania is virtually non-existent, with the exception of rice production. The latter, being the area of greatest food production potential is of interest to the Government and foreign donors, and having more closely controlled marketing is more accurately reflected in the data. The following discussion of production therefore draws from a wide range of estimates by several sources. Although some attempt has been made to test the accuracy of these data, the reader is cautioned when using them that they are for the most part estimates that have not been substantiated by either field measurements or statistical samplings of a scientific nature.

A. Cropped Area

Mauritania has a very limited amount of area that is favorable to agriculture, due to the low rainfall and lack of permanent water sources suitable to agricultural use, with the exception of the Senegal River. Traditionally, Mauritania has practiced rainfed cultivation called Dieri in the extreme southern part of the country bordering Senegal in the West and Mali further East. This Zone is generally in the 600 to 300 mm rainfall belt and rainfed agriculture is almost exclusively millet. Further, only a very small area in Region 10 can be assured of rainfall of over 400 mm per year. This

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area, as noted on Map 1, covers only about 1/3 of the Guidimaka. Within the 600 to 300 mm zone, farmers also practice flood recession farming called Oualo (walo). This is primarily the production of sorghum along the Senegal and Gorgol Rivers or in natural depressions in the zone.

Irrigated agriculture is being promoted along the Senegal River. Projects include small-scale areas which are built with labor-intensive methods, as well as large irrigated perimeters. Irrigation is primarily used for rice production although some sorghum and corn are grown by irrigated methods.

Area cropped and expected production are given from FAO data in Table 1. These estimates are derived from a "normal" year apparently determined by conditions in the 1970's. The "normal" definition of rainfall, etc. is not given, but it appears to relate to more recent averages than those of previous decades.

The amount of land cultivated under recessional cropping varies annually according to the total area flooded. Where the land is flooded by overflow from the Senegal River, the area cultivated may be a function of rainfall over the entire River Basin. Yields as well as acreage are affected by flooding levels; lower flooding causes premature declines in soil moisture before plants reach full maturity.

The rainfed acreage is estimated at 138,000 hectares.[1/] Given that virtually no systematic measurements or estimates have been made,

1/ The FAO Food Aid Mission noted only 81,000 ha's of rainfed cropping in 1980. However, we have not included their figures for barrage, (land cropped below small dams) 14,000 ha's and bas fonds, (land cropped around natural depressions), 35,000 ha's, which were in addition to the Oualo of 50,000 ha's.

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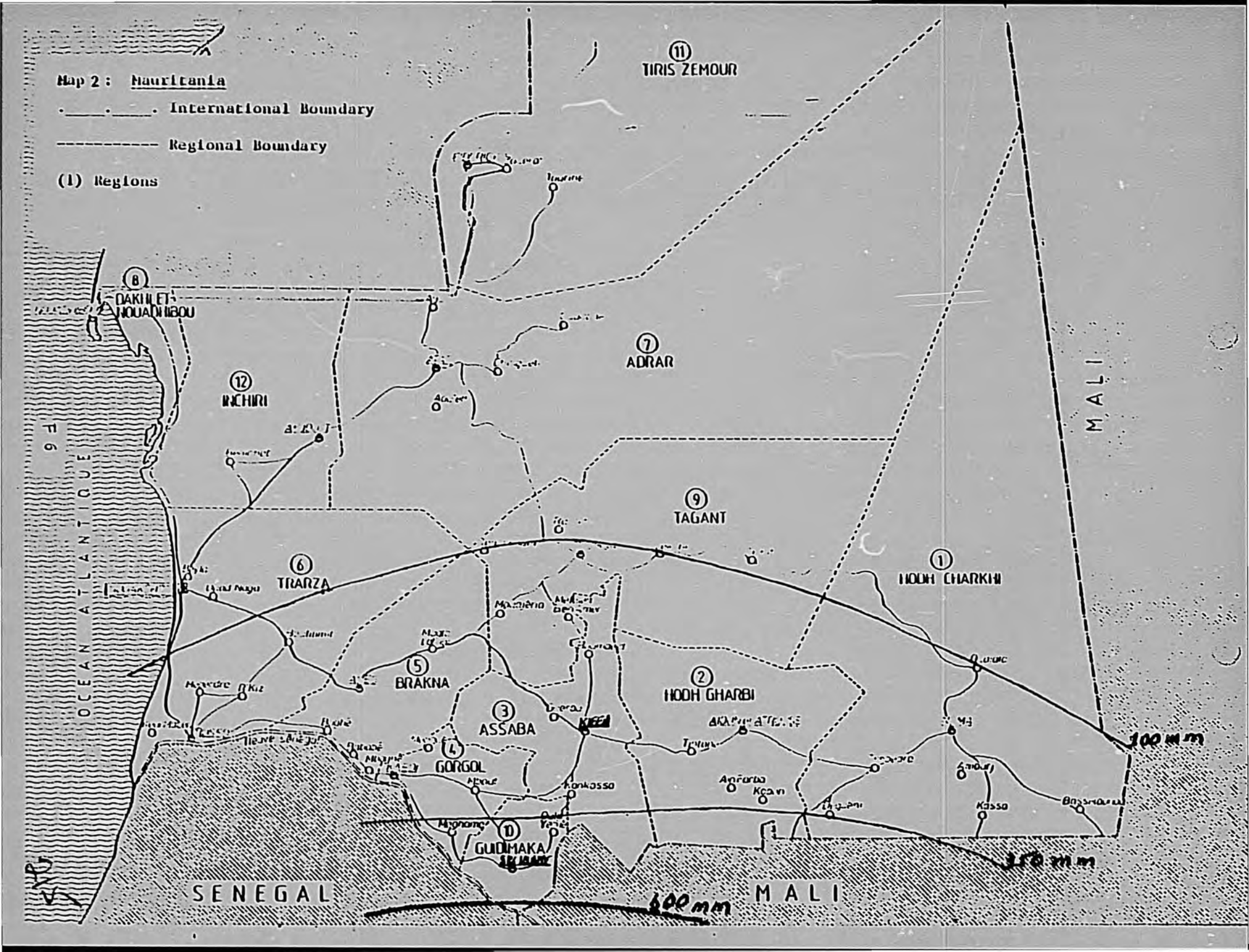
Map 2 : Mauritania
International Boundary
Regional Boundary
(1) Regions
11 TIRIS ZEMOUR
8 DAKHLET NOUADHIBOU
7 ADRAR
12 INCHIRI
9 TAGANT
6 TRARZA
1 HODH CHARKHI
5 BRAKNA
2 HODH GHARBI
3 ASSABA
4 GORGOL
10 GUIDIMAKA
OCEAN ATLANTIQUE
MALI
SENEGAL
MALI
100 mm
350 mm
600 mm

TABLE 1.

Estimations of Area Cultivated by Types of Cropping Systems, and Expected Production in a Normal Year by Region - FAO

Region		Average Area Cultivated Hectares Rain-fed 1/	Recessional 2/	Irrigated 3/	Average Harvested M.T. 4/
Hodh Chargui	1	20,000			5,000
Hodh Gharbi	2	(18,500) 16,500			4,000
Assaba	3	(14,000) 16,000			4,600
Gorgol	4	23,500	(14,000) 20,500	466	17,150
Brakna	5	(16,000) 20,000	20,000	917	15,100
Trarza	6	8,000	7,500	2,739	7,900
Adnar	7	(2,000) 3,000			600
Nouadhibou	8				
Tagant	9	(8,000) 3,000			600
Guidimaka	10	28,000	(6,500)	599	14,950
Tiris-Zemour	11	-			
Inchiri	12	-			
Nouakchott		-			
		138,000 5/	48,000	4,721	69,900
		Total Ha's 190,721			Yield = 366 kgs./ha

1/ "Politique de Stockage des Cereales Alimentaires en Mauritania"; in parenthesis corrected by Ministre de Developpement Rural ( ).
2/ "Securite Alimentaire en Mauritania", and ( ) MDR.
3/ "Situation Actuelle due Secteur des Cultures Irriguee". Though multiplied by 1.5 to get annual Ha. due to double crop.
4/ Presumably in whole grain equivalents, author.
5/ Multidonor mission differentiates between rainfed and barrage land. See section on Prod. Projections.

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this figure must be viewed with caution. Only Regions 1,2,3,4, and 10 as noted on Map 1 receive a rainfall adequate for moderately assured cultivation of millet (approximately 350 mm), and then only in the extreme southern parts of the regions. Table 2 shows average rainfall data for 13 stations in the cereals-producing (or near) zones for the last five decades. In virtually every case, the rainfall average, for the decade of the 70's, has been consistently below the earlier decades by at least 20-40%. Even worse, the probability of the 300 mm of rainfall needed for millet production has decreased. In Guidimaka, five out of ten years in the 70's, rainfall exceeded 400 millimeters. In nine of ten years in the 60's and ten of ten years in the 50's, rainfall exceeded 500 mm per year. In Region 1 at Timbedra, only two of ten years in the 1970's did rainfall exceed 300 mm, while it did so five of ten times in the 1960's and seven of ten in the 1950's. The same pattern can be seen in Aioun (1 of 11, 1970's; 5 of 10, 1960's; 7 of 10, 1950's) and Kiffa (3 of 10, 1970's; 6 of 10, 1960's; 7 of 10, 1950's), in Regions 2 and 3 respectively. This reduction in rainfall not only results in decreased yields, but also reduces potential cropland in an adequate rainfall zone. This reduction in arable land puts pressure on the southern part of the zone as people seek less risky cropping conditions and better livestock feed. In many cases, in addition, it has also meant population movement to the towns and cities and away from the agriculture sector.

Table 2.

Rainfall, Mauritania Producing Zone, Cereals, Average by Decades and 1970's as % of Preceding Decades, Millimetres (S.D. in parentheses)

Region	Location	1970-79	1960-69	% of 60's	1950-59	% of 50's	1940-49	% of 40's	1930-39	% of 30
1	Amourj	291.6 (146.8)	290.0 (29.4)	100.5						
1	Nema	242.9 (74.5)	234.8 (45.7)	88.4	380.5 (82.4)	63.8	268.6 (37.3)	90.4	275.4 (99.2)	88.2
1	Timbedra	250.9 (62.3)	300.0 (94.1)	83.6	367.6 (133.2)	68.3	312.1 (68.0)	80.4	276.2 (79.8)	90.8
2	Aioun	178.3 (72.5)	290.7 (68.5)	61.3	335.5 (113.4)	53.1	250.0 (58.2)	71.3	-	
3	Kankossa	318.7 (50.4)	409.6 (128.3)	77.8	472.4 (71.1)	67.5	-		-	
3	Kiffa	241.2 (102.3)	339.6 (130.3)	71.0	392.6 (113.7)	61.4	287.8 (117.0)	83.8	392.6 (157.8)	61.4
4	Kaedi	244.2 (76.2	324.3 (78.4)	75.3	429.1 (72.7)	56.9	353.2 (120.1)	69.1	424.2 (155.1)	57.6
4	M'Bout	314.1 (136.3)	392.8 (79.3)	80.0	518.5 (89.5)	60.6	406.7 (89.5)	77.2	-	
5	Aleg	195.6 (88.9)	199.2 (89.5)	98.2	270.5 (135.7)	72.3	238.5 (86.7)	82.0	288.0 (67.8)	67.9
5	Boghe	226.6 (77.2)	334.5 (95.2)	67.7	339.1 (46.7)	66.8	320.0 (87.5)	70.8	309.3 (75.7)	73.3
6	Maderdra	205.6 (98.9)	264.7 (102.8)	77.7	280.5 (78.5)	73.3	229.9 (121.9)	89.4	245.2 (60.6)	83.8
6	Rosso	197.3 (101.4)	295.4 (54.9)	66.8	321.6 (89.4)	61.3	268.6 (154.9)	73.5	193.7 97.3	101.9
10	Selibaby	421.6 (99.0)	623.4 (151.9)	67.6	691.2 (126.4)	61.0	579.5 (157.2)	72.8	680.2 (165.2)	62.0

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The land area under irrigation, as noted in Table 1, was given by FAO as 4,721 hectares. Although much of this land was originally intended for double cropping, this has not often proven successful. Problems with land tenures, maintainence of irrigation structures, and the high cost of pumping water when the river is low, have limited the full exploitation of the irrigated areas. OMVS* gives coefficients of cultivation ($\frac{\text{total area cropped/year}}{\text{total area of irrigation land}}$) for three types of areas for 1976-78, as shown in Table 3. As can be seen these coefficients are extremely low, with only 2 of 6 exceeding 1.0. Hopefully the situation will improve when the proposed Manantali Dam permits a more regular flow in the river assuring water supply and lowering pumping costs. Also the Diama Dam will prevent salt water intrusion in the lower River thus making irrigation possible in the Lower Valley during low flood periods. This will be important for increasing the irrigated acreage in Mauritania.

B. Yields

With the exception of irrigated fields, yield measurements have not been taken systematically in Mauritania. Several estimates have been made, but these are often of doubtful validity, especially when compared with data from other Sahelian countries. For example, the commission

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* OMVS Office du Mise en Valeur du Valley Senegal (Senegal River Valley Authority)

TABLE 3.

COEFFICIENTS OF CULTIVATION OF SOME IRRIGATION SCHEMES, MAURITANIA

	1976-77		1977-78		1978-79	
	Ha.	Coef.	Ha.	Coef.	Ha.	Coef.
Small perimeters FED extension	248	1.18	357.5	1.38	465	.91
Small perimeters SONADER extension			63.9	.9	74.7	1.27
Gorgol			180.4	.82	709.6	.5

Source: OMVS Etude Socio Economique du Basin du Fleuve Senegal, Part C, April, 1980

to determine agricultural prices[2/] used upper and lower figures for dryland millet production of 500 and 800 kg/ha, for recession sorghum - 800 and 1200 kg/ha and 900 and 1500 kg/ha for corn. The yields for sorghum and corn appear reasonable on a consistent basis only if annual flooding maintains soil fertilities on the recessional lands. The above estimated millet yields differ greatly from those in the other Sahelian countries.[3/] As is noted from Table 1, the average cereal yield is 366 kgs/ha under a "normal" year. These figures assume yields of about 200-250 kgs/ha for rainfed millet with the exception of Region 10 which could expect "normal" yields of 400 kgs/ha and 400 kgs/ha for recessional sorghum. Given that the 69,000 tons of production estimated by the FAO in a "normal" year has seldom been reached in the 70's (See Table 9) it is probable that yields of 250 kgs/ha of rainfed millet are an upper limit with present rainfall patterns (again, excepting Region 10). The IMF estimates yields of 300-400 kg/ha millet and sorghum[4/]. Stryker[5/] gives millet/sorghum yields as 360, from 1961-65,

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2/ "Elements pour une Prise de Devision Relative Aux Prix de Reference des Cereales Produits en Republique Islamique de Mauritanie Pour la Compagne 1979-80", Ministre de l'Economie et des Finances, Direction des Etudes et de la Programation, Mimeo, March 6, 1980.

3/ See Enger, et al, Niger Agricultural Sector Assessment, 1979, USAID.

4/ IMF, "Recent Economic Developments", various issues.

5/ Stryker, "Food Security, Self-Sufficiency, and Economic Growth in the Sahelian Countries of West Africa."

and 219, 1972-74. Table 4 gives estimates of the yields for rainfed millet, recessional sorghum and rice for FAO's normal year.

C. The Influence of Rainfall

As a crude estimate of the effect of rainfall on millet production an annual index of rainfall by Region was constructed and used as a percentage basis for the normal year yields of Table 1. The "normal" year was estimated as an average of all the reporting stations in each Region for the period 1960-1979. Using this as the base of 100, the index of the years 1970-79 divided by 100 is used as an annual multiplier for "normal" yields by Region. Table 5 was constructed to include the production estimates by Region and total millet production.

As was noted earlier, sorghum is grown as the recessional crop. Rainfall over the entire river basin determines area and yields for most recession crops, as well as rice. Due to unavailability of data for years under consideration, sorghum production is held constant in Table 5 in estimated total millet and sorghum production.* Rainfall indices for Regions 7 and 9 were not calculated because rainfall data was unavailable in the producing zone, therefore, these Region's production is held constant.

Two things should be noted concerning Table 5. First, the estimation of cultivated acreage by FAO is used for all years. This may be misleading because acreage as well as yields would be lower in low

---

* See "Impact of River Flooding on Production of Recessional Sorghum," following section.

Table 4.

Yield Estimates for Major Cereals in Mauritania
Average of Regions kgs/ha, "Normal" year

Region	Rainfed Millet	Récessional Sorghum	Rice
1	250		
2	250		
3	207.5		
4	300	425	3 ton
5	200	400	2.3 ton
6	200	290	1.5 ton
7	200		
9	200		
10	400	425	6.25 ton

Source: Extrapolated from Table I (FAO)

TABLE 5

ESTIMATION OF RAINFED MILLET YIELDS AS A FUNCTION OF INDEXES OF RAINFALL BY REGION

REGION/Year	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
1. Rain mm	194	263	290	213	195	266	322	180	499	262
Index	70	96	105	77	71	97	117	65	181	95
nor.yield	250	250	250	250	250	250	250	250	250	250
exp.yield	175	240	262	192	177	243	293	163	426	238
hectares	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000
tot. yield	3500	4800	5250	3850	3550	4850	5850	3250	8510	4750
2. R	250	146	142	141	159	311	112	116	278	130
I	106	62	60	60	68	132	48	49	118	55
N Y	240	240	240	240	240	240	240	240	240	240
E Y	254	149	144	144	163	317	115	118	283	132
HA	16500	16500	16500	16500	16500	16500	16500	16500	16500	16500
T Y [MT]	4191	2459	2376	2376	2690	5231	1898	1947	4670	2178
3. R	376	228	184	245	319	328	230	170	310	155
I	115	70	56	75	98	100	101	52	95	47
N Y	288	288	288	288	288	288	288	288	288	288
E Y	330	201	161	216	282	287	290	150	273	135
HA	16000	16000	16000	16000	16000	16000	16000	16000	16000	16000
T Y [MT]	5280	3216	2576	3456	4512	4592	4640	2400	4368	2160
4. R	223	217	108	173	396	329	217	115	120	192
I	70	68	34	54	124	103	68	36	38	60
N Y	300	300	300	300	300	300	300	300	300	300
E Y	210	204	102	162	372	309	204	108	114	180
HA	23500	23500	23500	23500	23500	23500	23500	23500	23500	23500
T Y [MT]	5700	4160	1800	4360	6300	4800	5100	2660	5400	4560
5. R	273	199	87	207	301	230	243	126	259	218
I	114	83	36	87	126	96	102	53	108	91
N Y	250	250	250	250	250	250	250	250	250	250
E Y	285	208	90	218	315	240	255	133	270	228
HA	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000
T Y [MT]	5700	4160	1800	4360	6300	4800	5100	2660	5400	4560
6. R	172	147	70	147	250	343	232	110	291	253
I	71	61	29	61	104	142	96	96	121	105
N Y	200	200	200	200	200	200	200	200	200	200
E Y	142	122	58	122	208	284	192	192	242	210
HA	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000
T Y [MT]	1136	976	464	976	1664	2272	1536	1536	1936	1680
10. R	388	554	290	444	435	490	356	365	584	310
I	74	106	55	85	83	94	68	70	112	59
N Y	400	400	400	400	400	400	400	400	400	400
E Y	296	424	220	340	332	376	272	280	448	236
HA	28000	28000	28000	28000	28000	28000	28000	28000	28000	28000
T Y [MT]	8288	11872	6160	9520	9296	10528	7616	7840	12544	6608

TABLE 5 [cont.]

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Subtotal Regions 1-6&10 M T	33030	32277	21023	28345	36754	39535	31434	22171	40170	26166
Regions 7&9	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
Rainfed Subtotal	34230	33477	22223	29543	37954	40735	32634	23371	41307	27366
Recession a/ Sorghum	18888	18888	18888	18888	18888	18888	18888	18888	18888	18888
Subtotal M & S	53118	52365	41111	48431	56854	59623	51522	42259	60195	46254
Paddy b/	2000	3000	3000	3000	4000	4000	5000	7000	7300	10062
Total Grain M T	55118	52365	44111	51431	60854	63623	56522	49259	67495	56316

SOURCE: Calculated from Table 1 and rainfall data.

a/ See Section on Impact of River Flood.

b/ 1970-77 from K.W. Gall, Agroprogress Senegal, 1978.
1978-79 estimates calculated from OMVS Socio-Economic study, Part C, April 1980.

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rainfall years, as reduced rainfall limits areas in which millet can be grown. Because some of these Regions are on the marginal line of rainfall in a "normal" year, several thousand hectares would not produce when rainfall drops. Therefore, a straight percentage relationship between rainfall and yield is probably not justified as an assumption. Secondly, the influence of rainfall distribution has not been included. This is because of a lack of precise data. It is likely that distribution will be worse in low rainfall years which would compound the yield declines estimated.

D. Impact of River Flooding on Production of Recessional Sorghum

As was noted, production levels of recessional sorghum have been held constant for the years estimated. This can be misleading when overall production estimates are made. The main factor that determines the acreage planted in recessional cropping is the level of the river which in turn determines the amount of land flooded. Unfortunately, data over the entire period was not available to include this factor in our model. OMVS has studied decrue agriculture[6/] in the Valley in relation to river floods. Their "normal" year allows Mauritania approximately 48,300 ha's of recessional cropping, which corresponds to FAO's normal year estimates of 48,000 as shown in Table 1. OMVS notes, however,

6/ OMVS, Direction de la Planification et de la Coordination, "Cultures De Decrue Et Hauteurs Des Crues Du Fleuve Senegal", Dakar, January, 1981.

that in a 100 year[7/] low flood year such as occurred in 1972, the total area cropped would be 4,500 ha's. In a ten year[8/] low flood, as occurred in 1973, the area cropped would be 34,900 ha's. 1980 was estimated at 26,000 ha's cropped. Total production of sorghum would then be reduced by the acreage. If we assume that yields will remain the same as those that FAO calculates for a "normal" year (393.5 kg/ha), then projected production would be as follows:

Normal year kgs. prod.	100 yr. low (1972)	10 yr. low (1973)	1980
18,887,500	1,770,750	13,733,150	10,231,000
—	-17,116,750	-5,154,350	-8,656,500

Therefore, the production model proposed here should reduce figures for 1972 by 17.1 thousand tons, for 1973 by 5.2 and for 1980 by 8.7. Unfortunately, data was not available to make the same adjustments for the other years. In order to develop a complete model of cereals production for future use, rainfall and level of river flood should both be taken into consideration. This could then give rough production estimates which could be adjusted for exceptional years where factors such as insect infestations or exceptional rain distributions alter general predictions.

7/ Probability of the lowest flood in a 100 year period.

8/ Probability of the lowest flood in a 10 year period.

E. Production Estimates

Production estimates have been made by several agencies since 1970. Prior estimates are rare and those that do exist are seldom systematic. Occasional references have been made to production of up to 100,000 tons of cereals in the 60's.[9/] Other references to exports from producing Regions, particularly the Guidimaka, imply large productions.[10/] Tables 6,7, and 8 give estimates from different sources of cereals production for the years 1965-1979.

Combining all the various estimates, in Table 9 we can note the wide disagreement in production estimates.

It should be noted that our estimates based on rainfall indices seem to overstate production, particularly in the years 1975 and 1976 relative to other sources and should be adjusted downward. This is probably because we did not take into account the effects of insect infestation or a lower river flood. It is not clear if the estimate of the Ministry of Rural Development includes rice.

It also appears that Government agencies and institutions which rely on GIRM for production statistics have been consistently underestimating cereals production since 1971-72. This is due in part to a conservative attitude in response to fear of food shortage since the drought.

The highest and lowest estimate in Table 9 above are used for high

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9/ Pierre Bonte, "Etudes du Changement Social", RAMS, Sept., 1980.

10/ Bonte, Ibid.

Table 6: IMF and FAO Cereals Production Estimates (1000 m.t.)

Year	Millet & Sorghum	Corn	Rice*	Wheat & Barley	Total Cereals	Pulses & Other	Source of Estimates
1973	50	1.5	3.0	.150	54,650	n/a	
1974	45	2.5	3.834	.400	51,734	n/a	
1975	36	2.0	3.96	.350	42,310	n/a	I M F
1976	21	1.5	5.0	.300	27,800	n/a	
1977	14	1.2	6.0	.350	21,550	n/a	
1975	30	4	4	n/a	39.4	17.5	
1976	28	5	5	n/a	36.9	20.0	
1977	21	4	9	n/a	33.6	22.5	F A O
1978	30	5	12	n/a	49.5	24.5	
1979	35	5	4	n/a	28.0	26.0	

*Presumably in milled rice equivalent

Table 7: Sonader and Multi-Donor Mission Estimates

Year	Rice	Other Cereals	Total
		Sonader	
1969	70		
1970	470	80,000	80,470
1971	1200		
1972	1500	37,000	38,500
1973	2200	31,000	33,200
1974	2300	50,000	52,300
1975	2350	36,000	38,350
1976	2650	21,000	23,650
1977	3530	30,000	33,650 a/
		Multi-Donor Mission	
1976	2250	21,000	23,250
1977	3900	30,000	33,900
1978	4420	43,500	47,920 b/
		52,625	57.045 c/

a/ 120 kgs in error
b/ low estimate
c/ high estimate

Table 8: CILSS and MDR Estimates: Cereals Production
(1000 Metric Tons)

Year	CILSS*	Min. of Rural Develop.**
1965	50	
1966	81	
1967	96	
1968	84	
1969	114	
1970	85	57
1971	83	47
1973	34	50
1974	57	45
1975	38	36
1976	69	21
1977	54	26

*Presumably includes milled rice

**Presumably does not include milled rice

CILSS for Nouakchott Colloque

Table 9: Total Cereals Production Estimates (Various Sources)
(1000 Metric Tons)

	Table 6		Table 7		Table 8		Table 5	Other	
Year	IMF &	FAO	Sonader	Multi-Donors	CILSS	MDR	Calculated	2/	3/
1965					50			105	
1966					81			96	
1967					96			105	
1968					84			54	
1969					114			105	
1970			80.5		85	57	55.1	88	
1971					83	47	55.4	-	57
1972			38.5		54	15	44.1	42	47
1973	54.70		33.2		34	50	51.4	30	15
1974	51.70		52.3		57	45	60.9	54	50
1975	42.3	39.4	38.4		38	36	63.6	34	45
1976	27.8	36.9	23.7	23.3	69	21	56.5	45	36
1977	21.6	33.6	33.7	33.9	54	26	49.3	47	50
1978		49.5		47.9(1)			67.5		55
1979		28.0					56.3		28

1/ Low estimate see Table 7

2/ K.W. Gall, Agroprogress, Senegal, 1978

3/ Jaqueline Mondot-Bernard, "La Situation Alimentaire et Nutritionnelle en Mauritanie," November 1980. Appears to exclude rice.

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and low total availability figures to construct our food balance. This is somewhat arbitrary, however it is done because the methodologies used to produce the estimates are unknown. Therefore using the extreme high and low estimates for any given year assures encompassing all estimates made in that year. This should help to derive the "best" and "worst" case scenarios and a "probable" position relative to food balances.

F. Cereal Imports

Cereals are imported through four major channels: the national trading company, SONIMEX, imports rice; large private merchants inport wheat flour; private traders import cereals from neighboring countries — depending on price differences, they also export cereals; and cereals arrive through food aid channels. An attempt has been made here to construct a time series for imports, in spite of the inconsistencies found in the various source documents. These differences between sources may be the result of the following: (1) inclusion or exclusion of unrecorded cross border movements in estimates, (2) reporting cereals as imports or as sales thereby mixing carryover stocks included in sales with imports, (3) the inclusion or exclusion of food aid channeled through PVO's, or (4) whether conversions to grain equivalents are made or not, for example in the imports of wheat flour or processed corn or sorghum products. Table 10 gives cereals imports from various sources.

As can be seen, Levy's estimates of food aid and PAM's reports

Table 10: Cereals Imports (Various Sources)

Year	CRS 1/ M T	CRED 2/ Rice 000's Tons	PAM 3/ Bilat. & Multi-Lateral M T	A. Levy 4/ Food Aid M T	SONIMEX Reports 5/ Rice Sales 000's M T	Estimates by R. Hirsch 6/ Thousands Metric Tons: Rice	Wheat Flour	Corn	Millet Sorghum	Total
1965						.4	.6			1.0
1966						1.6	.8			2.4
1967						11.1	.2			11.3
1968		12.1				13.1	1.1			14.2
1969		19.9				18.8	9.7		22.0	50.5
1970		10.6				11.0	6.9		45.0	62.9
1971		27.4				16.7	8.8		50.0	75.5
1972		30.1				20.0	11.1	1.7	50.0	82.8
1973		22		63,000		28.0	12.5	2.0	60.0	102.5
1974		31.1		107,071		32.0	19.4	5.0	70.0	126.4
1975		27.0		26,372	15.6	8.0	13.9	5.0	71.7	98.6
1976				29,451	23.2	23.3	23.6	5.0	73.4	125.3
1977			23,000	31,134	31.3	34.0	26.4	5.0	75.1	140.5
1978			59,992	68,633	25.1					
1979			33,950		46.5					
1980	6970		70,000		60.0 7/					

1/ CRS, AID PL 480 allocations in equivalents calculated by the author. Other years may or may not be included in other estimates.

2/ CRED, Marketing, Price Policy and Grain Storage, 1977

3/ PAM, Nouakchott, February 1980, personal conversations, data are for years 1976/77, 77/78, 78/79, 79/80.

4/ Daniel Levy, OECD - Club du Sahel, Paris 1979.

5/ Annual Reports - SONIMEX

6/ Robert Hirsch, FAO, Rome, 1979

7/ From discussions SONIMEX February 1980

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show about 9,000 tons discrepancy. Much more critical, however, are Hirsch's estimates of sorghum and millet imports, which appear far above any other estimates although the source given is FAO Trade Annuals. It is not clear if FAO has attempted to estimate traditional border trade with neighboring countries when establishing import volumes.

Wheat flour estimates by Hirsch are somewhat higher than those given by Mauritanian officials. This could be due to the large shipments of whole wheat in recent food aid shipments, which may be milled into flour, and a concomittant decrease in wheat flour or conceivably Hirsch may have converted flour to whole grain equivalents. However, it is probably useful to retain a 20-25 thousand ton import figure for the years 1977-1980, as the actual quantities imported are unavailable and we assume that demand for flour would rise with increased urbanization, not decline.

G. Production Potential - Acreage and Yields

1. Rainfed

The amount of land devoted to rainfed agriculture in Mauritania has little possibility of expansion, primarily due to the low levels of rainfall. As was seen above, average rainfall has fallen over the past decade relative to previous decades. Additionally the probability of receiving even the lower averages has declined, thus increasing the risks to the farmers and the uncertainties of reaching national produc-

tion targets. Because much of the rainfed farming is in the 300 mm rainfall zone, a relative decline in rainfall as was seen in the 1970's (See Tables 2 and 5) causes yields to fall, but also large areas would not support cereal production at all.

2. Recessional

The acreage and yields of cereals grown under recessional cultivation will be affected by rainfall over the southern part of Mauritania as well as over the entire Senegal River watershed. The quantity of water stored in natural depressions (bas fonds) and behind small dams (barrages) will be less during years of low rainfall than will be the case in years of higher rainfall. This local rainfall effect can reduce both acreage and yields on these lands. As was previously noted, the flood level of the Senegal River has a major impact on the total area cultivated under recessional cropping in the Valley. At present this is a function of rainfall patterns over the Senegal River watershed. Construction of the Diama and Manantali Dams will remove the wide variations presently recorded but we are unsure of the impact this will have upon area under flood recession farming. At present this area is fully utilized, and although some improvement could possibly be made in yields with improved technology or use of fertilizer, the major constraint remains the extent of the flood.

3. Irrigated farming

Given the limited potential for production increases from dry-land or recessional agriculture Mauritania is relying on an expanded area under controlled irrigation to assure future food requirements. Three factors will be predominant in the execution of this program within a time frame that can have a major impact upon food balances. These are cost of land development, yields and price incentives.

Mauritania presently has between 4,000 and 5,000 ha's of irrigated land. In addition, about 6,000 ha's are under development.[11/] A further 37,200 ha's have been or are under study, and 71,000 ha's have been identified for study.[12/]

Tables 11,12,13, and 14 show the irrigation situation as of July, 1979, with planned projects. If the proposed projects are realized, there would be over 100,000 hectares of land under irrigation. Even under the assumption of modest yields (e.g., 1.5-2 tons/ha.), Mauritania could come close to attaining self-sufficiency by the end of this century.

Mauritania recently negotiated financing for the Gorgol Noire project covering about 3500 hectares.[13/] The cost of that project is

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11/ See Tables 11 and 12. Since the date of the OMVS Report, some areas have been completed, notably petit perimeter.

12/ See tables 13 and 14.

13/ The major source of financing was the World Bank apparently with assistance from other donors such as the U.N. Discussions with the General Director of FAO/Mauritania, February, 1981.

Table 11 - Irrigation Lands Presently Under Production - Mauritania, July 1. 1979

Area			Hectares
1. Rosso		M'Pourre	1800
		Small Perimeters	410
2. R'Kiz		Small Perimeters	320
3. Boghe			390
4. Kaedi			
	GNRADA		85
	Gorgol		700
	Small Perimeters		250
		Total	4015

Source: OMVS, Etude Socio Economique, Part E, Annex.

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Table 12 — Irrigation areas in process

Areas	Hectares	costs millions of CFA	Financing: Obtained	Financing: search-ing	source: financing	provisional calendar		
1. Boghé	975	6110	6110		RFA/FAO	79/80		
2. Gorgol Noir	3600	17255	15087.5	2167.5	FED/RFA Bird fida FAC/Hollande/BID	80/83	cost over $90 agreement Jan. 81	millions BIRD signed
3. 3. 15 P.P.* FAC	300	233	233		FAC	79/82		
4. 30 P.P.* Holland (Rosso)	600	540	540		Holland	80/81		
5. 30 P.P.* IDA Kaedi								
6. Extension 14 per Perimeters FED	500	240	240		FED	79/80		
7. 10 P.P.*	200	331.5	209	122.5 CCCE	FAC/RIM	1980		
8. Perm. prevalu au CNRDA Belinabe Sylla	200	250	82	168	PNUD OMVS RIM	1980		
*petite perimeters (small irrigation areas)	6975 $ 102.9 millions	25738 $ 102.9 millions $ 14,760/Ha	23280	2458			Actual appears $ 25000 Gorgol Noir $ 26389	cost to be to $27,000/ha equals or $95 millions
	cost may be 104 millions							

8 Ton/year = $ 164/ton over 20 years

Source OMVS, Etude Socio-Economique du Bassin du Fleuve Senegal, Part E., pour Ed. April 1980.

Table 13 Mauritania, Irrigation Projects Studied or Studies in process

	Ha's	Cost of studies in millions of CFA			Finance	Provisional Calendar		
		Total	obtained	searching	Source	detailed study	summary study	
1. Aftout-es-Sahel	10000	105	105		FAC/RIM		1978	
2. Koundi III	4500	400	-	400			80/81	
3. Lac R'Kiz	7000	65	65		FAC	80		
4. Sugar Area	7000	225		225	BIRD/CCCE		80	
5. Bababéor M'Bagne I								
6. Plain of Boghé	4000	-	-	-	CEAO	82		Detailed study exists
Total	37200	890	265	625				

Source : OMVS, Etude Socio-Economique, Annexe E. 3.5, April 1980.

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Table 14 Mauritania, Irrigation Projects for Identification/preliminary studies

	Area Ha's	Cost of study in Millions of CFA			Source of finance	calendar previsional	Observ.
		Total	Obtained	to get			
1. Bababé/M'Bagne	20000	95	95		CEAO	1980	
2. Maghama	30000	750	250	500	Italy	Prelim. survey 1981 for 8000 Ha	
3. Koundi III	17000	1200	400	800	AAD	detailed for 5000 Ha.	study 1980
4. 200 petite perimeters	4000	325	325	-	FAC		After survey reconaissance immediate execution
	71000	2370	1070	1300			

Source: OMV.: Etude Socio Economique, Part E.

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reportedly about $90 million for a per hectare cost of over $25,000 per hectare. If the cost of development of the 37,200 hectares under study remain at that level, almost $930 million will be needed to finance their development. It is doubtful if that level of financing could be arranged before the end of the century.

Rice yields vary greatly on irrigated fields in the Senegal River Valley. OMVS made an in-depth study of yields and the factors influencing them in the overall socio-economic study of the valley.[14/] Their study included a sample of 786 individual fields on a total of 589.86 ha's. Their sample had an average yield of 4.3T/hectare compared with 3.8T harvested on 7,672 total ha's in the valley. Table 15 gives the breakdown of the sample by yield class.

Of note was the fact that in the middle valley, the small perimeters averaged 4.4T/ha. However, the small areas had 16.3% classed as high yields (over 6T/ha) and 19.3% low yields (under 3.5T/ha) while the large perimeters had .6% and 34% respectively. The small perimeters are usually built by hand by the farmers and are managed by village groups with advice from technical services. The large schemes are constructed by contractors and are managed by government services.

The study notes that there appears to be a relationship between the size of the fields and yields and availability of manpower with yields. The former relationship is apparently due to water distribution problems, the latter to labor intensity. However, OMVS notes

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14/ OMVS - Etude Socio-Economique du Basin du Fleuve Senegal, Part C, April, 1980.

Table 15: Distribution of Rice Yields, Senegal River Valley

(in metric tons)

Class of yields per hectare	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7+	Total
Number of parcels	13	62	85	168	192	150	77	39	786
Percentage of class in sample	1.6	7.9	10.8	21.4	24.4	19.1	9.8	5.0	100

Source: OMVS

that organization and cultural homogeneity also have influences on yields.

Other factors affecting yields are:

(1) Depth of land leveling: When land leveling requires moving 11-15 cms. of soil, yields drop .9T/ha and 1.3T/ha yield declines occur when over 16 cms. of soil is moved as opposed to moving 0-10 cms. of soil.

(2) External irrigation problems, pumps, etc.

(3) Agricultural calendar, planting time, etc.

(4) Age of plants at transplanting with the optimum being 26-30 days; and

(5) The labor time spent on some operations, particularly weeding.

(6) Fertilizer: high responses to fertilizer, particularly urea, were noted, up to 250 kgs/ha with correlations of .88.

Labor input is very important, particularly in certain operations, as can be seen in Table 16. Returns to labor are 224.4 UM* per labor day for the high yields and 229.9 UM per labor day for the low yields. In either case, the value of the gross production is above the minimum wage (SMIG). The above calculations have not taken into account production costs. As large irrigation areas are more highly mechanized than the small areas, OMVS breaks down the sample into the two groups. Considering all costs except depreciation on the land and buildings, general overhead and expatriate advisors, but including 10% general

*Um = ouiguiya = currency of Mauritania approximately 45 um = 1 dollar

Table 16: Correlation Between Labor Input and Yields
(Survey: Entire River Valley)

	Plow hand	Level	Trans-plant	Spread Fert.	Weed	Care Nursery	Total
Coef. of Corr	+.62	+.57	+.49	+.75	+.90	+.81	+.92
Aver. days per hectare, yields aver. 6 ton	30.6	16.7	85.3	3.4	118.4	13.0	267.4
Aver. days per hectare, yields aver. 3.5 ton	24.7	13.7	74.3	1.0	75.5	8.6	152.2

Source: OMVS

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Table 17: Returns to labor according to yield and size of irrigation area, Senegal river Valley

Class of Yields M.tons/ Ha	Small Irrigation Areas (1)			Large Irrigation Areas (2)		
	Number of Fields	% of fields	Returns per day labor U.M.	Number of fields	% of fields	Returns per day labor U.M.3
7 +	32	7.4	154	8	2.3	164.3
6-7	55	12.7	118.5	23	6.5	130.4
5-6	91	21.0	95.4	52	14.8	95.7
4-5	116	26.7	72.2	78	22.2	62.6
3-4	92	21.2	49.1	73	20.7	28.7
2-3	33	7.6	25.9	58	16.5	-
1-2	13	3.0	1.9	49	13.9	-
less 1	2	.4	-	11	3.1	-

Source : OMVS - Etude Socio-economique.
(1) Small irrigation areas, hand constructed and farmed non-mechanised
(2) Large irrigation areas constructed by contract and using large amounts of mechanisation in farming
(3) U.M. (ouguiya) converted from CFA at rates of 250 CFA = $ 1 U.S., 46.24 U.M. = $ 1 U.S.
Compare with SMIG Line.

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costs on small areas for management and extension, the overall costs of production were calculated by OMVS. Using these cost factors for large and small areas, Table 17 gives returns to mandays of labor for each level of production according to their survey.

In the above study, comparison of net returns on ¼ ha of rice shows a considerably higher return per hectare on the small irrigated areas than on the large irrigated areas. However, due to the large labor input on small areas compared with the mechanized large areas, the returns per day of labor are similar in the upper yield classes. In the below five tons yield classes, the mechanized methods rapidly become uneconomical due to the high cost of equipment operations.

From Table 17, we note that 267.4 days of labor were used on fields yielding 6T/ha, and 152.2 on fields averaging 3.5T/ha. Using our returns (net) per day of labor calculated for small areas, we have:

Table 18: Returns to Labor by Yield Group (U.M.)

Group	Days Labor	Returns per Day	Total Return/ha.
6 ton	267.4	118.5	31,696.9
3.5 ton	152.2	49.1	7,473.0
	115.2		24,213.9

The returns per day for the 115.2 days required for the higher yields over lower yields equals 210.2 UM/day. It should be noted on Table 16 that the correlations between labor input and yields were based on hand labor activities and are therefore valid for mechanized

as well as non-mechanized areas, but with slightly different returns.

The calculation above shows that the value of the Marginal Physical Product of Labor (VMPPL) is high in irrigated agriculture. More importantly, it is well above the minimum wage (SMIG) of 120 UM/day. It also implies that as long as irrigation facilities are expanded, there will be labor opportunity in the Valley and thus the opportunity cost of labor, at least during peak loads of the irrigation season, can be equated with that value, i.e., VMPPL/irrigation equals the wage rate.

It should be pointed out that for the large areas, the cost of land development has not been factored in. Doing so would obviously lower the wage rate by the "rent" value of the land. In the small areas, this is not the case. Thus returns to labor on the large areas are being, at least in part, subsidized by foreign aid or loans.

The most expensive item among the non-labor cost of production is water pumping. This represents 36% of these costs, or 5093 UM/ha on large schemes and 64% or 7870 UM/ha on small schemes. This suggests two possibilities relative to cereals pricing policy. One, if paddy prices are held constant at the present 10 UM per kg., returns to labor will be reduced in the face of rising fuel and equipment costs. The second, and more likely possibility, is that farmers may decide to switch to corn or sorghum production under irrigation due to the lower water and labor requirements for these crops. Labor

requirements should be half of that for rice and water requirements 1/3 to ½ less. More importantly, especially in the small areas where pump breakdowns are more common, the loss of water for short periods has much less of a negative impact upon corn and sorghum yields than upon rice yields. Although it would probably be rare that corn or sorghum yields would reach 6000 Kgs/ha (approx. 95bu./acre for corn), 4000 kgs yields should be possible. Given the lower costs of pumping water and the lower labor requirements net returns should be favorable when compared to rice.

The above discussion suggests that price incentives are adequate to induce farmers to produce cereals under irrigated cultivation providing high yields can be obtained. High yields will require farmers to closely follow recommended production techniques, which necessitates good supervision/agricultural extension, at least in the early years of irrigation farming. High yields will also be dependent upon good irrigation practices which requires adequate facilities and water. In effect then, agricultural extension and management will be limiting factors on expanding production from irrigation even given adequate capital for construction.

Finally, expanding acreage in irrigation will of necessity be offset by declining acreage in Oualo or recession crops, as most large irrigation areas will be on Oualo land. For purposes of projections, however, the most optimistic growth assumptions can be made for an annual expansion of 2,000 ha's per year while holding Oualo

land constant. The more conservative assumption expands irrigation by 1000 ha's per year, with slightly lower average yields, 3 ton/ha versus 4 ton/ha.

H. 1980 Estimates - Food Balances

The report of the 1980 multidonor mission[15/] estimates 1980 cereals production at 41000 tons. Stocks at the end of 1980 were put at 14300 tons with committed food aid for 1981 at 8700, with commercial imports by SONIMEX of 54000[16/] tons of rice and private merchants of 15000 tons of flour.[17/] The mission report gives total availability as follows:

production, all grain*	41000
stocks	14300
committed aid	8700
imports - commercials	
SONIMEX rice	54000
private - flour	15000
total available 1981	133000

*includes 6556 tons of milled white rice equivalent to 12140 tons of paddy.

15/ "Rapport sur l'Evaluation de la Situation Agro-Sylvo-Pastorale (campagne 1980-81)" Mission Conjointe Gouvernement/Donateurs, December 1980.

16/ Rice imports should equal 83000 tons paddy equivalent.

17/ Assumed flour, this should equal 20,000 tons of grain equivalent at 75% conversion.

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The grain equivalent of CRS planned imports of 6970 tons should be added to this for a total of 139969 tons. The Mission noted a grain need of 195000 tons (as compared with our lower estimates of 189400 tons, see Table 32). This would leave a 1981 deficit of 55,031 tons.

I. Projections - Production

In projecting the cereals deficits for our food balance sheet we have made both high and low estimates. The high estimate assumes an expansion of irrigated production by 2000 has/yr to 1990 with an average yield of 4T. The low estimate assumes expanding irrigation by 1000 has per year with average yields of 3T. Our estimates put the average area cropped in each type of non-irrigated production for high and low projections as seen in Table 19 below.

For the purposes of projections we hold these acreages and yields constant for the next decade. The main reason for this is that available land is limited and most investment in extension work and production inputs is in irrigation. Therefore our main variations will occur in acreage and yields under irrigated agriculture. With our previous projections of irrigation under high and low estimates Table 20 makes high and low production estimates.

Thus the worst case scenario would produce in 1990's slightly less than the FAO "normal" year production but with an additional 10000 hectares under irrigation. This would represent extremely dry years with extremely low river floods throughout the decade. Our

Table 19: Projections of Acreage, Yields and Production in Dryland Agriculture, Mauritania

	High Estimate			Low Estimate		
	ha's[1/]	Yield	Tot. Prod.	ha's	Yield	Tot. Prod.
rainfed	81000	250	20250	60000[3/]	200	12000
small dams	53000	400	21200	10000[4/]	400	4000
recessional	48000	450	21600	20000[5/]	400	8000
other dryland (corn)	10000[2/]	800	8000	5000	400	2000
total dryland	192000		71050	95000		26000

1/ from multi-donor normal year projections
2/ extra decrue or irrigation crop in exceptional year
3/ assumes some planted acreage would not be harvested in dry year
4/ low estimate made in 1980 multidonor report
5/ from median between 100-yr low flood and 10-yr low flood, see "Impart of River Flooding on Production of Recessional Sorghum"

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Table 20: High and Low Possible Cereals Production 1981 - 1990

	High Estimate			Low Estimate		
		Metric Tons			Metric Tons	
Year	Cereals	Paddy	Total	Cereals	Paddy	Total
1981	71050	24000	95050	26000	9000	35000
1982	71050	32000	103050	26000	12.000	38000
1983	71050	40000	111050	26000	15000	41000
1984	71050	48000	119050	26000	18000	44000
1985	71050	56000	127050	26000	21000	47000
1986	71050	64000	135050	26000	24000	50000
1987	71050	72000	143050	26000	27000	53000
1988	71050	80000	151050	26000	30000	56000
1989	71050	88000	159050	26000	33000	59000
1990	71050	96000	167050	26000	36000	62000

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high projections assume a regular development of irrigation reaching 26000 ha's by 1990. However this is modest in terms of GIRM hopes and quite conservative in terms of double cropping potential. It is, however, realistic in terms of agricultural extension capabilities and management levels.

In their preliminary report on the "analysis of selected aspects of Mauritania's agricultural sector", the RAMS Project projected cereal production under high, medium and low hypothesis.[18/] The following assumptions in Table 21 were made.

Table 21: Assumptions For Production Projections by 1990

	rainfed ha's	yield	ha's rice	yield	intensity*	weather
high	200000	450	24000	7.0	1.750	favorable
med.	150000	400	16000	6.0	1.50	mod. favorable
low	110000	300	10000	5.0	1.0	persistent rain deficit

source: RAMS Project *refers to cropping coefficients.

Under their assumptions, the projected 1990 food balances are given in Table 22, showing import requirements.

Table 22: Cereals Import Requirements in 1990

1990	tot. requirements	production	imports req.	per cap. consump. kgs.
high	314000	258000	56000	165
med.	295000	156000	139000	155
low	275000	83000	190000	145

source: RAMS Project

18/ "Analysis of Selected Aspects of Mauritania's Agricultural Sector", RAMS, USAID Nouakchatt, January 1981.

This compares with our estimates given in Table 23 below.

Table 23: Summary of Estimates of Cereals Imports in 1990

1990	tot. requirements	production	imports req.	per cap. consump. kgs.
high	250500	167050	83450	124.5
low	250500	63000	187500	124.5

source: author.

The RAMS Consumption study[19/] took into account the income elasticity of demand for cereals (calculated at .44) where high estimates had an average income increase of 2% and a 2.5% population growth (4-5% total) medium, 1% income increase and 2.5% for population (3-4% total) and low, income grows at the same rate as population. Table 24 gives the projections according to the consumption study for cereals 1980-85, 1990-95 and 2000, for the rural population.

Table 24: Projection of Demand for Cereals, Rural Population

(1000 Tons)

	1980	1985	1990	1995	2000
high	147	167	192	220	254
med.	147	162	184	207	234
low	147	162	179	197	223

source: Quan, RAMS table 38, 1980.

19/ "La Consommation des produits alimentaires et non alimentaires dans le secteur rural Mauritania" Dinh Xuan Quan, RAMS, Dec., 1980

Table 25: Projections of Cereals Availability

	High (metric tons)			Low (metric tons)		
Year	Prod.	Commercial Imports	Total	Prod.	Commercial Imports	Total
1981	95050	80000	175050	35000	80000	115000
1982	103050	80000	183050	38000	80000	118000
1983	111050	80000	191050	41000	80000	121000
1984	119050	80000	199050	44000	80000	124000
1985	127050	80000	207050	47000	80000	127000
1986	135050	80000	215050	50000	80000	130000
1987	143050	80000	223050	53000	80000	133000
1988	151050	80000	231050	56000	80000	136000
1989	159050	80000	239050	59000	80000	139000
1990	167050	80000	247050	62000	80000	142000

Sources: Table 20 and estimates

J. Import Projections

To the high and low estimations of production on the supply side are added projected commercial imports. Mauritania now carries a large foreign debt with heavy foreign exchange requirements for debt servicing. In addition, rising world prices for oil, food items and manufactured goods will require increasing amounts of foreign exchange, and the prospects for earning foreign exchange do not appear very optimistic. Baring some unforeseen discovery of mineral or oil resources, it is doubtful the foreign exchange earnings will increase substantially. For these reasons, we have decided to project commercial imports of cereals at 60,000 tons of rice and 20,000 tons of wheat flour, which is approximately the present import level. Table 25 combines projected commercial imports with high and low estimates of production. It should be re-emphasized that production estimates are considered to be the outside parameters for any given year of production potential. The likelihood of obtaining the upper estimates is considered to be less than 10%, or one year out of ten. On the lower end, the historical data would indicate that four of ten years low estimates will be real. Thus our probability distribution is skewed toward lower production potential.

K. Total Supplies

Given the questionable accuracy of production and import figures, constructing a food balance sheet is of dubious value. However, the highest and lowest estimates of both production and imports for previous years are presented here to indicate a possible range of food balances. Carryover stocks are totally ommitted as no estimation of on-farm stocks exists and official grain handling agencies do not maintain precise inventory figures. Confusion over inventory figures arises because inventories may be considered held or drawn down at differing stages in the distribution and marketing system, i.e., food aid may be considered drawn down when it is transferred to regional officials. Food sales may result in stock depletion even though merchants may hold the grain for later sale. Projections of supplies are drawn from the high and low estimates of production presented in previous sections added to the constant import estimates noted above (see Table 25). This gives us a high and low cereals availability as noted in the Cereals Balance Sheet in Table 32.

III. Demand for Cereals

A. Population

According to the January, 1977 official census,[20/] the population of Mauritania was 1,419,939. Of this total population figure, an estimated 66,863 nomads were on temporary migration outside the country - primarily in Mali. The entire nomad population was estimated at 36% of the total, or approximately 514,000 persons compared with a sedentary population of 906,000. Table 26 gives the population estimates broken down into sedentary/nomadic and rural/urban populations for Mauritania for various years.

Three main trends in the population data can be observed: (1) A high population growth rate which is approximately 2.72% per year from 1965 to 1977; (2) an increasing sedentarization (decreasing nomadism), in almost inverse proportions, of the population between 1965 and 1977 as well as changes in absolute values and, (3) increasing urbanization rising from about 8% of the population in 1961 to 21% in 1977 and estimated to reach 30% in 1982[21/]. The three trends will have an impact

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20/ RIM, Ministere du Plan et des Mines, Bureau Centrale du Recensement de la Population, "Seconds Resultants Provisiers du Rencensement General de la Population." (Population au 1 Janvier, 1977).

21/ Ibid

Table 26: Population of Mauritania 1920-1977 and by Category, Rural-Urban

Year	Total Population	Nomad	%	Sedentary	%	Rural Sed.	Urban Sed.[d]
1920[a]	260,000	N/A		N/A		N/A	N/A
1950[a]	560,000	N/A		N/A		N/A	N/A
1961[b]	924,172.7[e]						
1965[b]	1,028,900	668,705 (715,100)	65	360,115	35	253,115[c]	107,000[c]
1977[b]	1,419,939	513,522	36	906,417	64	1,113,122	306,814

a/ 1920 and 1950, Bonte, Pierre; RAMS, 1980 (colonial data)
b/ 1961, 1965, 1977, RIM Provisional Census 1977
c/ Estimated from trend 1961-1977
d/ Urban center over 5,000 population
e/ Est. from 1965-77 trend

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upon demand for cereals, both in terms of volume and type, and ultimately on cereals prices, as well. Table 27 gives population estimates from different sources and combines these with population census figures for 1965 and 1977 with projections to the years 1990 and 2000. The calculated estimates from the 1965-1977 trend appear to be in line with other sources for comparative years and therefore are used for the food balance projections.

The trend toward sedentarization will affect the demand for cereals due to the different food availabilities and therefore consumption patterns among nomad and sedentary peoples (see Section III.B. on consumption patterns). Therefore the 1965-1977 trend toward sedentarization has been projected to the year 1990. These projections should be employed with extreme care. The causes of sedentarization are several, including the drought of the early seventies and the resulting heavy losses of livestock. The 1977 census[22/] makes projections to 1982 based on differing rates of sedentarization in each region. These rates will depend upon factors such as the terms of trade between livestock products and cereals or other purchased necessities, employment opportunities in urban areas, or carrying capacities of the pasture land.

In connection with the 1977 census, an evaluation was made of the tendency toward sedentarization. In Pierre Bonte's[23/] analysis of this trend, it is of note that about one-quarter of the heads of nomadic

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22/ RIM, Ministere du Plan et des Mines, Bureau Centrale du Recensement de la Population, "Seconds Resultants Provisiers du Rencensement General de la Population." (Population au 1 Janvier, 1977).

23/ Bonte, Pierre; "Etudes du Changement Social, Movements de Population et Migrations en Mauritania"; RAMS, 1980, pg. 82.

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Table 27: Population estimates, various sources 1920-2000 (millions)

Year	IMF[a]	Census[b]	Calculated[c]	Sonader[d] (CILSS)	Nouakchott Colloque Robert Hirsch[e] Hypothesis I	Nouakchott Colloque Robert Hirsch[e] Hypothesis II	Agroprogress[f]	RAMS[g]
1920			.260[h]					.260[h]
1950			.560[h]					.560[h]
1965		1.0289	1.0289					
1966			1.0568					
1967			1.0856					
1968	1.12		1.115					
1969	1.14		1.145	1.232				
1970	1.16		1.177	1.262				
1971	1.19		1.209	1.293				
1972	1.21		1.242	1.324				
1973			1.275	1.357				
1974	1.40		1.310	1.391				
1975	1.36		1.346	1.425				
1976			1.382	1.437			1.485	
1977	1.42	1.420	1.420	1.471	1.496	1.496		1.3397
1978			1.459	1.507				
1979			1.498					
1980			1.539		1.588	1.635		1.443
1981			1.581					
1982		1.599	1.624					
1983			1.668					
1984			1.713					
1985			1.760					1.636
1986			1.808					
1987			1.857					
1988			1.908					
1989			1.960					
1990			2.013		1.935	2.197	2.042	1.852
1991								
1992								
1993								
1994								
1995								2.096
1996								
1997								
1998								
1999								
2000					2.359	2.952		2.371

a/ 68-72 1973 IMF, Recent Economic Developments
1974 - IMF est 1976
1975 - IMF est 1977
1977 - IMF est (or census)

b/ 1965 = census est, 1977 census data
1982 projected from 1977 census

c/ Calculated trend 1965-77 and projected to 1990 = 2.72%

d/ Estimates by Sonader for CILSS Nouakchott colloque, July 1979

e/ Robert Hirsch, FAO Nouakchott colloques

f/ K.W. Gall, Agro progress Senegal-1978

g/ Rams, analysis of Selected Aspects of Mauritania's Agricultural Sector

h/ Rams; Bonte, Pierre "Etudes du changement' social movements de population et migrations en Mauritania, Juillet 1980. colonial data cited, p. 18.

households (total of 91,695) expressed the intention to become sedentary in the near future (immediate year 4.4%, following year 5.3%, after 14.6%0). However, the intention toward sedentarization was markedly stronger among those who already practice some cultivation (47.1% vs. 17.7%). It also appears that nomadism is more difficult to maintain in practice when the home base is in a zone of sedentary cultivators. The competition for land for pasture versus cultivation forces herders to migrate longer distances and more frequently. This can present hardships in families which do not have the manpower to make long migrations, or the means to hire herders. These poorer families were the first to lose livestock during the drought and they inclined toward sedentary farming.[24/] Whether the current tendency toward settled life will continue at the same rate, accelerate or decline, is not easy to predict. For the purposes of projections, it is maintained at the same rate, reducing the nomadic population to 20% of the total by 1990.

Urbanization is occurring at a rapid rate in Mauritania. Linked to the phenomenon of sedentarization (and for the purpose of our projections combined with it) it appears to be occurring in intermediate towns as well as large cities as is noted in Table 28.

24/ Ibid, pg. 85.

Table 28 - Population of Intermediate Centers

Center	1961-62	1975	1977
Kiffa	4,359	16,729	10,266
Aioun	4,877	13,606	8,505
Nema	3,898	9,236	7,938
Tijikja	3,661	8,175	7,861
Boutilimit	2,774	7,622	7,256
Aleg	1,360	5,224	5,316
Timbedra	1,815		5,302

Source: P. Bonte

Bonte suggests that these centers are the first step for most nomads who are moving toward sedentarization and are preferred by them 3 to 1 over larger cities. Their attraction is their relative position to old pasture lands, administrative services such as health and schools, and probably most importantly, centers for the distribution of food aid.[25/] The population of these centers remains somewhat fluid as some inhabitants are moving toward larger cities and others are evidently still practicing semi-nomadism.

The larger cities such as Nouadhibou and Nouakchott have experienced spectacular growth. As noted in Table 29, Nouakchott has witnessed a 23 fold increase in population between 1961 and 1977.

25/ Ibid, pp. 89-90.

Table 29 - Growth of Nouakchott Between 1961-1977

Date	Population	Annual Growth Rate Over Preceding Figure
End 1961	5,867	-
May 1964	12,307	+34.5%
Feb. 1975	104,054	+23.0%
Dec. 1976	134,986	+15.0%

Source: RIM Provisional Census 1977

Both a quantitative as well as a qualitative shift in cereals consumption can be expected due to the effects of sedentarization and urbanization. For example, consumption of wheat (especially as bread) and rice are increasing with urbanization.[26/] However, as the data on consumption patterns does not permit us to differentiate between types of cereals consumed, we will combine sedentary and urban as one consumer group.

B. Food Consumption Patterns

A household consumption study conducted by Dinh Xuan Quan[27/] from November 1979 to October 1980 in rural Mauritania is the most recent source of information on cereals consumption patterns. The study calculated separate consumption patterns for sedentary and nomadic populations. Table 30 summarizes the results for both groups. The study, done in four visits, one each quarter, probably does not include meat consumption for certain special days such as weddings, baptisms, or religious holidays.

26/ Jacqueline Mondet-Bernard, "La Situation Alimentaire et Nutritionelle en Mauritanie," FAO, Nov. 1980.
27/ Dinh Xuan Quan, op. cite.

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Table 30: Food Consumption, Rural Mauritania by Sedentary and Nomadic Households (in Kilograms/person/year.)

	Sedentary			Nomad		
Product	Total Consumption /per/year	Purchased	Home Prod.	Total Consumption	Purchased	Home Prod.
Cereals	135	118	17	84	80	4
Fruits & Veg's.	24	17	6	5	4	2/
Meat	33	29	4	5	-	3/
Fish	10	9	1	-	-	-
Milk & milk products	29	8	21	166	1	165
Tea	.96 1/	.96	-	.7	.7	-
Sugar	13.6	12.0	-	7	-	4/

1/ 55% of population adult.
2/ other kg not given, probably home.
3/ non-specified, probable home.
4/ non-specified, probably purchased.

Source: RAMS, Rapport Preliminaire Dec. 1980 (Dinh Xuan Quan)

Quan notes that the nomadic consumption is felt to be under-estimated. Wilder, RAMS livestock specialists feels, particularly, thatmeat consumption is under-estimated.[28/]

However, for the purposes of this report, the projections of cereals demands from the above mentioned report have been judged acceptable. Sedentary population consumption is projected at 135 kg/person/year and nomadic population consumption is projected at 84 kg/person/year.

C. Nutrition Levels

Any in-depth analysis of nutrition studies is beyond the scope of this report. However, it is useful to note certain studies which have been done on nutrition and to give estimates of nutrition levels noted in comparison with FAO recommended intake. This is particularly important as the consumption levels of cereals noted above are considerably below the levels of other sahelian countries.

The MISOES study[29/] of the Senegal River Valley, done in 1958, is among the earliest nutrition estimates covering the 4th, 5th, 6th, and 10th regions. The study determined that nutrition levels were fairly satisfactory, and this was confirmed by the medical survey which followed. Levels measured were: daily ration, average per person,

k. calories	2,380
protides/g	93.5
lipides/g	45.

This compares with the FAO recommended minimum calorie intake of 2,310 k. calories for Mauritania[30/]. Professor Ferro-Luzzi[31/], in 1962,

28/ Personal discussion with Wilder, Feb., 1981.

29/ J.L. Boutillier, et al, La Moyenne Vallee du Senegal (etude Socio - economique) France, Ministere de la cooperation, INSEE, Presses Universitaires de France 1962, cited in Mondot-Bernard

30/ Cited in AID, Africa Bureau, Office of Development Resources "Food for Development in Sub-Saharan Africa",

31/ Ferro-Luzzi g, consultant OMS Feb-Mar 1962 "Rapport Sur la situation alimentaire el nutritionnele en mauritanie" cited in Mondot-Bernard.

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basing his calculations on 100,000 tons of cereals and 500,000 hectilitres of milk or:

3,209 g cereals/person/day	1,214 k cal
.161 lts. milk/per/day	38 protides

and 280 k calories furnished by sugar, along with meat, fish, vegetables, oils and various items picked from traditional plants, estimated that the needs in K calories were being marginally met. However, he noted that the distribution of food among different groups meant that part of the population was undernourished. The cereal consumption noted above corresponds to about 115 kg. per person per year. If one compares this with CILSS estimates of cereals availability in table 31., for 1975/77 it would appear availability had not changed appreciably. Gendrault[32/], however, estimated total rice, sorghum and millet, availability at 97.3 kgs in 1968, (if wheat and barley are added, the total cereal availability was 101.6 kg per person/year). However, Jacqueline Mondot-Bernard[33/] feels that this was under-estimated, a statement not supported by her estimates of the 1968 food balance, although it was clear that caloric insufficiency for at least part of the population was the norm. The 1974 Sahel Nutrition study[34/] of May-July found child malnutrition similar to other sahelian countries; about 10% of 875 children surveyed were malnourished. The RAMS Survey of 1980[35/]

32/ M. Gendrault - "Etude sur les circuits commerciaux" SEDES 1968
33/ Jacqueline Mondot-Bernard, op.cite.
34/ Theodore K. Kloth, Medical Epidemiologist, Bureau of Smallpox Eradication, Center for Discase Control, Atlanta, GA 30733.
35/ RAMS, USAID Nouakchott.

Table 31: Mauritania: Production, Imports, Exports, Amounts Available and Self-Sufficiency Rate for Cereals Averages 1975/77

		Unit	Millet & Sorghum	Rice 1/	Maize	Wheat 2/	Miscellaneous	Cereals Total
1.	Production	Tons	45,000	3033	3000			51,033
2.	Imports 3/	Tons	73,400	21767	5000	21,298		121,465
3.	Exports 4/	Tons	--	--	--	--		
4.	Amount Available	Tons	118,400	24800	8000	21,298		172,498
5.	Self-Sufficiency rate	%	38.0	12.2	37.5	-0-		29.6
6.	Amounts available per person	Kg	82.5	17.3	5.6	14.8		120.2

1/ Paddy converted into rice on the basis of 650 kgs of rice for 1000 kgs paddy
2/ Grain equivalent
3/ Cereals only
4/ Illicit cross border trade unknown

Source: CILSS - Nouakchott colloque, July 1979.

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covered 450 children in the 5th arrondissement of Nouakchott. Two-hundred, ninety two or 65% had not suffered malnutrition, 74 (26.5%) suffered some malnutrition and 84 (18.5%) suffered serious malnutrition Jacqueline Mondot-Bernard calculated calorie intake from Quans' RAMS nutrition survey. In 118 observations (most were two observations of the same household) 59 were deficit when compared with caloric needs. However, RAMS felt this was an under-estimation of caloric levels, as it included only two of the four passes of the household consumption survey. These two passes were also during the second and third quarters, which are normally deficit food periods. In some regions good intake was not very different than that found in the 1958 MISOES study. Although it is dangerous to draw conclusions in the face of scarce information, it would appear that the recommended minimum nutrition levels would be reached with the supply of 120-130 kgs of cereals per person per year. Therefore, the consumption estimates of Quan have been accepted for total requirements, i.e., 135 kgs per year for sedentary population and 84 kgs per year for nomads. The fact that nomadic consumption may be slightly underestimated presents less of a problem in global estimates as nomads as a percent of the total population are projected to decline resulting in rising per capita requirements. As no data is available to differentiate between rural sedentary and urban consumers, urban consumers have been included in the total of sedentary population.

D. Total Demand

The above discussion raises the question of the appropriate level of global demand to use in Mauritania. As recent studies indicate that nutritive requirements have not declined from their levels of more abundant production in the 1950's and 1960's, it was decided to base the food balance calculations upon the cereals consumptions figures in the RAMS Consumption study, equating urban consumption with rural sedentary consumption. These consumption figures are used to produce the global demand noted in Table 32. Given that these figures are somewhat lower than those used by others in predicting cereals requirements, some comment is in order.

The figures are very conservative and in light of the earlier discussion of nutrition requirements, represent the absolute minimum needs. Therefore, they do not allow for distributional differences, which, if occur, would cause structural nutritional deficiencies. Further, the global figures presented allow for almost no dissappearance due to spoilage or post harvest losses or excessive demands for seed (due to multiple replantings for example). Therefore, total requirements given in Table 32 should be viewed as absolute minimal needs.

Finally, when using the consumption figures to establish food balances, it should be kept in mind that absolutely no estimates have been projected for building food reserves. Local production is controlled by a limited number of the population along the southern border. These farmers will attempt to build on-farm stocks in high

production years. Therefore, cereals available for consumption will not be expected to be as large as would appear in the tables in high production years. Thus, even if production reaches the high estimates, some groups of the population will experience shortages.

IV. CEREALS BALANCE

Table 32 summarizes both the Supply and Demand sides of the cereals balance from 1965-1980 with projections to 1990. Past high estimates suggest that stocks, most likely on-farm, were building throughout much of the 1960's. Given the serious shortages that were reported in some of these years this seems somewhat unlikely. On the other hand, the low estimates indicate only two possible years of building on-farm stocks in the past 15. This also seems unlikely unless cereals consumption was reduced below our estimates, which may have occurred in some years.

Our projections to 1990 suggest a continuing food deficit. The high estimate, which will require more intensive efforts and investment in agricultural production, and good rains, indicates a gradual decline in the deficit. On the other hand, our low estimates show major deficits of increasing quantities throughout the decade. It is likely that the true availabilities of cereals will lie somewhere between our two projections for most years in this decade. Thus, if food-aid continues at the 40,000 to 60,000 ton levels, it may be able to cover the deficit in the food balance over the next 10 years. However, in the event of an exceptionally low rainfall year, major insect attack or extremely low river flood, 60,000 tons would be insufficient to meet minimal needs.

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Table 32: Mauritania - Cereals Balance

YEAR	POP.	POP. SED.	%	Sedentary requirements (X135 kgs) 000 metric tons d)	POP NOMADE	%	Nomade requirements (X84 kgs) 000 metric tons d)	Total food requirements cereals 000 metric tons
1965 a)	1028900	360115	35	48.6	668785	65	50.2	98.8
1966	1056886	402368	38	54.3	654518	62	55.0	109.3
1967	1085633	445110	41	60.1	640523	59	53.8	113.9
1968	1115162	490671	44	66.2	624491	56	52.5	118.7
1969	1145495	532655	46.5	71.9	612840	53.5	51.5	123.4
1970	1176652	577736	49.1	78.0	598916	50.9	50.3	128.3
1971	1208657	622458	51.5	84.0	586199	48.5	49.2	133.2
1972	1241533	667945	53.8	90.2	573588	46.2	48.2	138.4
1973	1275303	714170	56.0	96.4	561133	44.0	47.1	143.5
1974	1309991	761105	58.1	102.7	548886	41.9	46.1	148.8
1975	1345623	808719	60.1	109.2	536904	39.9	45.1	154.3
1976	1382224	856979	62.0	115.7	525245	38.0	44.1	159.8
1977 b)	1420000	906000	63.8	122.3	514000	36.2	43.2	165.5
1978 c)	1458624	955399	65.5	129.0	503225	34.5	42.3	171.3
1979	1498299	1006857	67.2	135.9	491442	32.8	41.3	177.2
1980	1539052	1057329	68.7	142.7	481723	31.3	40.5	183.2
1981	1580915	1109802	70.2	149.8	471113	29.8	39.6	189.4
1982 e)	1623915	1162723	71.6	157.0	461192	28.4	38.7	195.7
1983	1668086	1217703	73.0	164.4	450383	27.0	38.2	202.6
1984	1713458	1273099	74.3	171.9	440359	25.7	37.0	208.9
1985	1760064	1328848	75.5	179.4	431216	24.5	36.2	215.6
1986	1807938	1386688	76.7	187.2	421250	23.3	35.4	222.6
1987	1857114	1444835	77.8	195.1	412279	22.2	34.6	229.7
1988	1907628	1503211	78.8	202.9	404417	21.2	34.0	236.9
1989	1959515	1563693	79.8	211.1	395822	20.2	33.2	244.3
1990	2012813	1626353	80.8	219.6	386460	19.2	30.9	250.5

a) Estimation of 1977 censes p. 13 1968-76 calculated at 2.72% compounded increases.

b) 1977 figures from 1977 censes

c) 1978-1990 projected at 2.72% grouth

d) 135 kg/per/yr for sedentary and 54 kg/per/yr for nomads according to consumption survey - RAMS 1979-1980 - nomads may be slightly under estimated see p.76 of cited study draft.

e) 1977 census estimates. tot. pop. 1,598,700 ; normal, res 380,900+ outside 66900 = 447500 (28%) Sedentary, rural 676200 urban 474700= 1150900 (72% of which 30% urban).

continued...

Table 32: Mauritania - Cereals Balance (continued)

Year	Availability high estimate	Availability low estimate	Possible stock carry-over High	Possible stock carry-over Low
1965	101.2	48.0	2.4	(50.8)
1966	93.8	79.4	(15.5)	(29.9)
1967	111.5	102.9	(2.4)	(11.0)
1968	94.0	64.0	(24.7)	(54.7)
1969	160.5	150.8	37.1	27.4
1970	146.6	114.3	18.3	(14.0)
1971	165.0	119.6	31.8	(13.6)
1972	143.6	95.8	5.2	(42.6)
1973	154.2	76.0	10.7	(67.5)
1974	183.9	149.1	35.1	.3
1975	178.0	79.7	23.7	(74.6)
1976	190.5	95.1	30.7	(64.7)
1977	191.2	100.6	25.7	(64.9)
1978	182.4	150.1	11.1	(21.2)
1979	158.1	126.1	(19.1)	(51.1)
1980	177. f)	133.0 g)	(6.2)	(50.2)
1981	175 h)	115 h)	(14.4)	(74.4)
1982	183	118	(12.7)	(77.7)
1983	191	121	(11.6)	(81.6)
1984	199	124	(9.9)	(84.9)
1985	207	127	(8.6)	(88.6)
1986	215	130	(7.6)	(92.6)
1987	223	133	(6.7)	(96.7)
1988	231	136	(5.9)	(100.9)
1989	239	139	(5.3)	(105.3)
1990	247	142	(3.5)	(108.5)

f) known quantities plus 20.000 US, 4.000 Libyan and 20.000 other donations

g) from 1980 estimates - Food Balances pg.

h) from table 25 projections

Per capita projections of cereals available from local production and commercial imports over the next decade were calculated on Table 32A from Tables 32 and 25. The picture is rather gloomy. Using the minimum cereals requirements for Mauritania given by CILSS in Table 31, food aid will need to be somewhere between 30 and 70 thousand tons in 1981. With the most optimistic situation absolute minimum requirements conceivable could be met in 1990. However it is more likely that the 100,000 ton deficit of the pesimistic situation will occur.

The level of cereals projected under the proposed project, 20,000 tons per year, would appear to represent about 1/3 of food aid needs. However, if a margin is built in for distributional problems, market imperfections or non-food uses, then the minimum base of 135-150 Kgs. per capita requirements as proposed by RAMS would show the situation as more precarious. In 1981 food aid requirements would need to be between 40,000 and 120,000 tons. In a bad year this requirement could rise to 120,000 tons, double production in a good year. It should therefore be kept in mind that the proposed level of PL 480 cereals is intended as a stabilizing mechanism for food prices. Occassional shipments of emergency aid coupled with continued aid shipments by other donors will be needed.

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Table 32A: Per Capita Cereals Availability in Mauritania from Estimated Production and Commercial Imports, 1981-1990.

High Prod. & Comm. Imp. (Metric Tons)	Year	Low Prod. & Comm. Imp. (Metric Tons)	Population	Per Capita High Kgs.	Per Capita Low Kgs.
175050	1981	115000	1,580,915	110.7	72.7
183050	1982	118000	1,623,915	112.7	72.7
191050	1983	121000	1,668,086	114.5	72.5
199050	1984	124000	1,713,458	116.2	72.4
207050	1985	127000	1,760,064	117.6	72.2
215050	1986	130000	1,807,938	118.9	71.9
223050	1987	133000	1,857,114	120.1	71.6
231050	1988	136000	1,907,628	121.1	71.3
239050	1989	139000	1,959,515	122.0	70.9
247050	1990	142000	2,012,813	122.7	70.5

Source: Calculated from Table 32 and 25

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V. TRADITIONAL FARMING UNIT

The cereals production projections and estimates made in Chapter I were predicated upon a continuation of dry land and recessional cropping with expansion of irrigated land. Studies indicate that trends in recent years have been toward declining production. Although this has been partially the result of lower precipitation it would appear that cultivated acreage is also declining. The latter phenomenon is reported to be the result of labor migration which would seem to imply that the remuneration for cereals production in the area is insufficient relative to other labor employment, i.e., the opportunity cost of labor is too high at current cereals prices. As this is important for food aid and cereals pricing policies some discussion of the traditional production system and returns to labor are in order.

A. Land Types

As noted in Chapter I, there are two major divisions of land in the Senegal River Basin: First is the upland, dry soils which are generally sandy and are collectively known as Dieri[36/]. These areas may have rock or laterite outcroppings or be interlaced with drainage systems, but in general they are only used for rainfed millet, sorghum and peanut production. The second land group is composed of the more humid, alluvial soils which are generally ascribed to the immediate River Valley.

The humid alluvial soils of the Valley have several subdivision which may be classed with fine subleties by the local people. However,

36/ The terms used are generally Soninke with the spellings from War on Wont's book The Guidimaka Region of Mauritania, (P. Bradley, E. Raynaut and J. Torrealba, 1977). Some of these terms are the same in Toucouleur. For terms in other languages (or different spellings) of the area see OMVS' socio economic study. Part B. op cit .

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there are generally three main alluvial deposits: the river bank itself, called the Falo; the top of the river bank which is a levee standing above even the highest flood, called the Fondé; aud the depressions that are behind the Fondé, called the Walo.[37/] The use of these soils relates to the hydrology and the annual flood of the Senegal.[38].

The Senegal drainage basin begins in the Fouta Djallon highlands of Guinee where the heaviest rainfall occurs. This rain starts much earlier than in the area of the Mauritania/Senegal border. The water drains to the north, then swings west and finally southwest to the ocean. The drainage out of the highlands causes a flood which will breech the levees along the river and flood the walo behind it. This occurs when the river is discharging about 2,000 m^3 per second, usually about mid-August. Farmers plant crops next to the water on these flooded lands, continuing to plant as the water recedes. The soil, having been saturated with water by the flood, and maintaining moisture due to a high water table, retains enough moisture to produce cereals.

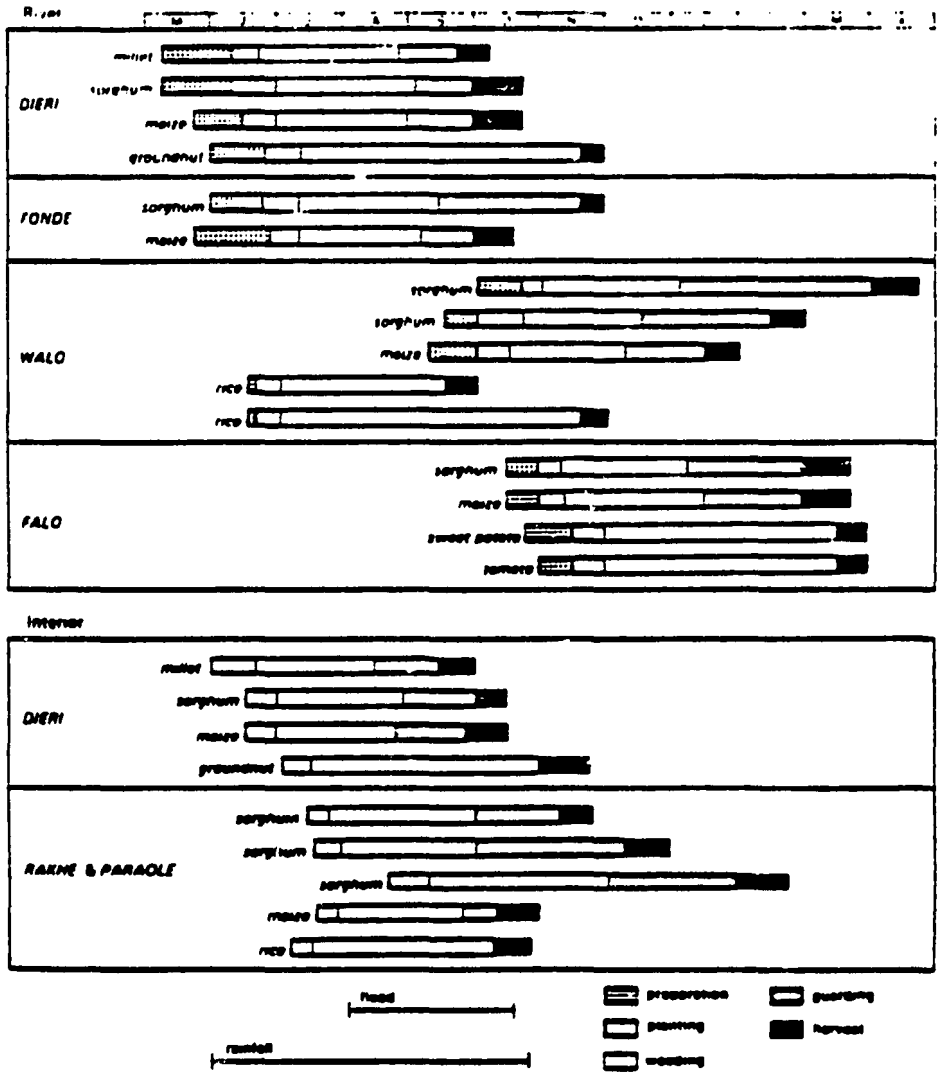
This flood is high variable. It can start as early as mid-late July and can last as late as mid-November.[39/] However, there are years when the flow in the river is inadequate for any flooding. Thus the area in recession crops is highly unpredictable. Farmers cannot use this area for rainfed cropping due to the threat of flooding, but if no flood comes they will have no recession crop.

37/ For a more complete description of these soils, their subgroups, their uses and analysis see The Guidimaka op cit

38/ This discussion is almost totally taken from The Guidimaka, and supported by personal observations in the Valley in 1980.

39/ Appendix C of The Guidimaka constructs a Flood Table for 1904-1964 at Bakel based on the 2,000 m^3/sec. discharge.

Figure 1: Calendar of Agricultural Activities in the Different Zones of the Riverine and Land Systems



Source: The Guidimaka Region of Mauritania.

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The Fondé is usually used for rainfed crops. The Falo and the Walo are used for recession cropping, with occassional rice production in the lowest areas. Sorghum is the preferred crop on most of these alluvial soils, although corn, cowpeas, melons and miscellaneous crops are also grown. New irrigation structures are being built on these lands. Generally the large perimeters have utilized the Walo while small perimeters are being built on the Fondé. Thus as controlled irrigation expands, acreage in recession cropping will decline.

In the interior, away from the river, the Walo and Falo disappear. Around natural low areas, semi-permanently flooded, are low lands called rakhe upon which long cycle sorghum and sometimes corn are grown, and the slopes leading to these lowlands called paraole on which sorghum and corn are grown. More importantly, farming in this area is on the dieri.

In the interior, farm land is usually found in depressions or along water courses where more moisture collects. Thus farming is in intermittent blocks between vast areas of grass and brush. Almost exclusively farming is done during the rainy season.

B. The agricultural calendar and labor requirements

Farming on the various types of soils, particularly in the Valley, offers opportunities to extend the cropping year and spread the work-load. On the other hand it also can present some serious constraints, particularly during periods when crop cycles on different areas overlap. The agricultural calendar presented in Figure 1 demonstrates the general

problem. Although recession cropping, particularly in the river area, permits agricultural activities to be carried out throughout the year, the months of August, September, October, and November show evidence of work bottlenecks.

Figure 1, of course can be somewhat misleading. First of all access to the types of land, with the general exception of dieri is unequal among caste groups.[40/] This appears to be so particularly in the case of Fondé. In addition a similar inequality between villages exists;[41/] some having much larger areas of Fondé, falo or walo than others. Thus labor bottlenecks would have to be viewed in terms of overall landholdings. These landholdings vary greatly. Table 33 presents a random sample of households drawn from different villages on the rivers.

Table 33: Landholdings of Random Households in Villages on the Senegal River

Recession	Rainfed	Recession as % of Rainfed
.39 ha.	2.95 ha.	13%
2.64 ha.	5.16 ha.	51%
.98 ha.	9.13 ha.	11%
.22 ha.	.91 ha.	24%
1.15 ha	1.75 ha.	66%

Source: OMVS Etude Socio-Economique

In only two households is recession acreage greater than rainfed. It is generally accepted that the dieri land yields less than recession lands or fondé. However fondé land appears to produce yields equal to or greater

40/ Although the OMVS study noted in a sample village, the area cultivated in fondé was approximately divided proportionally by caste group, but the lower castes rented their land. See Part B, p. B.I.22.

41/ See The Guidimaka op cit . p. 18.

than recession lands, so determining the relative importance of the fields in Table 33 is not possible.

Tables 34 and 35 present the labor requirements for fields cultivated in walo and fondé. Although the crop grown is not given it is assumed to be sorghum for the most part.

Table 34: Days of Labor per Hectare by Activity, (walo)

Activity	Heavy Land Clearing	Vegetation Removal	Seeding	Weeding	Guard	Harvest	Transport	Total
Number of Days Work /ha	2.1	4.8	9.5	7.4	41	5.1	1.8	71.7

Source: OMVS: Etude socio economique 1980

Table 35: Days of Labor per Hectare by Activity (Fondé)

Activity	Land Preparation	Seeding	1 Weeding	2 Weeding	Guard	Harvest	Transport	Total
Days of Labor/ha	11	6.8	26	24	22	3.2	2	95

Source: OMVS: Etude socio economique 1980

Other reports estimate labor requirements as 70 days for dieri and 80 days for walo.[42/] Wide variations in labor input exist depending upon previous use of the land, requirements for reseeding, plant density, bird or animal problems, etc.

Therefore, a major problem arises in using average labor times due to the wide variation in samples. For example, Table 36 shows the distribution of labor by group in the OMVS study.

42/ The Guidimaka, op cit p. 101. The MISOES study lists 85 days/ha for walo, op cit

Table 36 : Distribution of Farms by Number of Days Labor Per Hectare

Days of Labor Per Hectare	0 - 30	30 - 60	60 - 90	90 - 120	+120
% of farms	16	35	21	16	12

Source: OMVS: Etude socio economique

There appears to be a fairly high correlation between size of fields and labor input. This is primarily explained by the large amount of the total time devoted to guarding the crop. Small fields of ½ ha require as many man days of guarding as do fields of 2-3 has. Unfortunately, labor time by activity as a function of yields cannot be obtained from the available data as was the case for irrigated rice.[43/] Thus it is not possible to calculate marginal returns to labor. However, if the assumption is made that average returns are approximately equal to marginal returns a per day wage rate can be estimated.

C. Yields

As was noted in Chapter I, the Government of Mauritania has used estimates of 500-800 kg/ha for millet, 800-1200 kg/ha for recession sorghum and 900-1500 kg/ha for corn. OMVS reports[44/] a survey done in Mauritania by the Agricultural Service of Selibaby gave estimates for sorghum by variety as 750 kgs/ha for *fela*, 500 kgs/ha for *niobougou* and 1500 kg for *nabane*.[45/] However, they also report a survey conducted in a dry year (1977) on *fondé* sorghum fields where production averaged

43/ See Chapter I, "Irrigation"
44/ OMVS: Etude socio-economique, op cit., p. B.I. 37
45/ *Ibid*.

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128 kgs/ha. Thus the overall cereals yields of 366 kgs/ha of Table I, or the upper estimates used in Chapter I of 400 kgs/ha are probably reasonable for most years.

The important factors in attempting to determine a relative wage rate from traditional production are the expected labor involved in production, the expected yields of various crops, the expected value of those crops, and the availability of various types of land. Given availability of dieri for millet production for example, the wage rate is determined by:

$$\frac{\text{Expected yield X expected price}}{\text{Expected labor in production}} = \text{expected wage rate}$$

Considering the yields of millet and sorghum postulated in Chapter I (200-250 kgs of millet/ha, 400 kgs of sorghum/ha), the labor requirements noted above (70 days for dieri millet, 95 days for fondé sorghum) and a price of 15 u.m./kg our relative wage rates will be:

$$\text{Millet} = \frac{250 \text{ X } 15}{70} = 53.57 \text{ u.m./day}$$

$$\text{Sorghum} = \frac{400 \text{ X } 15}{95} = 63.16 \text{ u.m./day}$$

In periods of good rains as were experienced in the 40's, 50's and 60's[46/] one would assume that farmer's expectations of yields on rainfed fields would be high. Thus dieri and fondé would be preferred to recessional cropping on the walo or falo which is dependent upon the river flood, if that flood is less sure. Inspection of the flood charts noted previously[47/] indicate that timing, duration or extent of flood was

46/ See table 2, Chapter I
47/ Appendix C of The Guidimaka, op, cit , note D

probably inadequate in at least 25% of the years between 1904 and 1978.[48/] Meanwhile, rainfall had a high probability of being adequate in the 50's and 60's, and dropped in the 70's.[49/] Where rainfall is good OMVS notes that recession farming is much less important than rainfed. In a sample village, in the Bakel area in 78-79, neither the falo or the collengal was farmed, primarily due to a low flood. They noted that recession cropping was much less important than the "middle valley", which lies further north and therefore in a much lower rainfall zone.[50/] They do note, however, that the production of cereals on 55 ha's of dieri was only 20 tons, and would only be 33 tons in a good rainfall year. This was contrasted to 1960 when acreage of dieri was double. Before the Second World War the same village cultivated 350 ha's of dieri capable of producing over 200 tons of cereals.[51/] What appears to have happened is that farmers' expected yields, particularly on the dieri have dropped below expected yields on the recession lands, falo and walo, and even on the fondé.

In the Guidimaka of Mauritania which is a Sonike area, OMVS notes that between 1923 and 1972 the total land farmed had not increased. Considering the population growth in the area this represented a decrease in area of over 50%.[52/] Given that most areas have a limited amount of walo and

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48/ Ibid and OMVS studies, see Chapter I "The Impact of The River Flood". OMVS notes that since 1970 a series of exceptionally low floods combined with low rainfall meant almost no harvest on dieri land and only 15,000 ha of walo cultivated versus a "normal" year of 120,000 hectares. p. B.I. 55.

49/ See Chapter II, pages 8-10, 13-17.

50/ OMVS, Etude socio-economique, op cit . p. B.I. 23

51/ Ibid

52/ Ibid p. B.I. 29

falo land, the shift has been more toward fondé lands.[53/] These shifts, the extent of which depends upon village land resources, appear to be a rational approach to risk minimisation in response to the recent drier years. However, it appears that changes in traditional production are much more heavily influenced by labor migration.

D. Labor Migration

Labor migration from the Senegal River Valley dates from the beginning of the century. Most involved have been the Sonike and Touculeur. These have been as workers on European ships, merchants or workers in other African countries or toward urban centers in Senegal. Migrants may stay for a few months, several years or become permanent residents of other areas. In 1958-59 it was estimated that 60,000 people were residents of urban centers.[53/] Since then it is believed to have increased. Estimates of 220,000 to 280,000 urbanites in Senegal and Mauritania come from the Valley.[54/]

The migration of male workers is responsible almost everywhere in the Valley for the decrease in area cultivated. OMVS notes that the abandonment of fields is not compensated for by the clearing of new lands. It is generally the dieri which is abandoned in favor of the

53/ Ibid p. B.I. 36, see also The Guidimaka, op. cit ., p. 72-73; p. 86-87. One reason why parts of the fondé lands are not cultivated in normal years is that the lower parts, as they slope down toward the walo, occassionally flood. Although this is not adequate for recession cropping it can destroy rainfed crops.

54/ Ibid p. B. III. 10.

fondé and walo, a process accentuated by the development of irrigation.[55/] In a survey of 762 persons, for example, 48% of men between ages 15-59 were gone, which left only three adult workers per eight males.[56/] The villages from which most migrants go to France, there was more than one migrant per farm unit. Villages where the tendency was to migrate to African urban centers or other African countries, 50-80% of farm units had one migrant.

The economic impact of this migration upon the Valley can only be seen in general terms. In one region of Senegal, a study of postal money orders sent through the postal system from August 1, 1977 to July 31, 1978 shows 2.310 billion FCFA sent from France and 430 billion FCFA sent from other African countries.[57/] Comparing this with a SAED study of 1977-78 showing 45-55% of repatriated funds came through the Postal Service, the Global amount flowing in was 6.1 billion FCFA with 5 billion FCFA from France. At the same time, they estimated the gross domestic product of that area at 10 billion FCFA.[58/] Another study estimated that in the early 1970's, for one year, monetary transfers to Mauritania from France reached a total of 1 billion, 450 million FCFA or 290 million ouguiya's (u.m.).[59/] The war on want study estimates the annual average remittance at 40,000 U.M. per migrant.

55/ OMVS - Etude Socio-economique p. B.I. 28
56/ Ibid p. B.I. 27
57/ OMVS, approximately 12.5 million U.S. dollars
58/ OMVS, approximately 45.6 million U.S. dollars GDP and 27.8 repatriated
59/ The Guidimaka, (from IDEP study) p. 55

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(approximately $890 u.s.).[60/] In terms of the macro economics it is difficult to determine if the net effect of migration (considering lost production) is positive. However, given the estimates of remittances one can determine an opportunity cost of labor in traditional agriculture. For example, if the above estimates are correct on remitted savings, and one assumes that 250 days of employment were available in the Valley in agriculture, then the opportunity cost is 160 ouguiyas (U.M.) per day. The important question is not the actual savings sent back by migrants, but rather the expected remittances as viewed by a prospective migrant. In any case, it seems reasonable to set the labor value equal to the minimum wage (SMIG) of 120 U.M./day.

E. Cereals Production Cost

Two figures can be used to estimate cereals production costs. First is the marginal return to labor employment in irrigated rice production as calculated in Chapter 1.[61/] The second is the value of migrant savings estimated above. Those values are 210 U.M./day and 160 U.M./day respectively. If we consider that traditional cereals production requires 70 days per hectare, then our gross labor costs would range from 14,700 u.m. to 11,200 U.M. Considering a production range of 400 to 800 kgs per hectare our per kilo values would be 36.75 to 18.375 U.M./kg for the upper labor value and 28-14 U.M./kg for the lower labor value.

60/ Ibid
61/ Chapter II, page 39

Actual farm gate prices are not available. However, we have some indicators of prices at retail from spot market checks which indicate ranges of 12.5 U.M. to 32 U.M./kg, with 15-20 being normal in the producing zone. Over the last two years OMC has offered farmers 10-11 U.M./kg for grain but has not been able to buy any. This suggests that private traders are paying considerably above this level. However, unless yields are over 500 kgs/ha on the average and farm gate prices near 15 U.M./kg, the minimum wage is not being earned by producers. In fact the low yields that appear to be obtained on dieri soils suggest that the remmeration for labor discourages cropping these soils. This appears to be the case in the southern part of Mauritania. In fact, if the 250 kgs/ha yields are the norm, prices of over 30 U.M./kg would be required to meet minimum wage, and this would still be below the opportunity cost of labor. It appears, therefore, that farm floor prices need to be established relative to the higher producing walo and fondé soils where yields of 800 kgs/ha can be expected.

VI. OMC PRICE DETERMINATION

A. Producer Prices

The present production of cereals in Mauritania supplies probably no more than 30-35% of the nation's requirements in any year. Even this estimate is predicated on a "normal" year of average to good rains and good river floods (see production estimates). Given that OMC sales prices of imported grain will rise progressively over the next five years, it is unlikely that OMC would purchase any grain from farmers at current offered prices (10-11 U.M./kg to farmers). This is substantiated by the fact that OMC has not been able to buy grain in the last two years. It is believed that this has been due to the increase in OMC selling prices from 3 U.M./kg to 8 U.M./kg for imported grain in the interior. The hypothesis is that merchants procure imported grain for the OMC selling price or slightly above it either through purchases or barter, reselling at the market value to the consumer. Local grain enjoys a preferential price due to consumer taste preferences. Therefore, local merchants buy the local production for a margin of 4-5 U.M./kg over OMC costs (or recipients resale prices). Thus farm-gate prices have risen along with OMC selling costs.

If the above hypothesis is correct, then farm-gate prices in Mauritania will rise with annual increases in OMC prices. Because quantities of imported cereals coming through the OMC will be at least 50% and in some yeass 100% of local production, and these imports will represent 10-20% of total cereals consumption, OMC sales will have a

heavy influence on the cereals markets. However, at the margin it will remain market supplies by local producers that will be price determinant.

s the large potential margins between OMC selling prices and con-umer prices should narrow as OMC raises cereals prices and narrows the merchants' margins. This will make local grain more attractive to merchants and local grain prices should rise.

Due to the chronic structural deficit in Mauritania, the development of local security stocks or grain purchases for farm price stability become less important. A producer floor price therefore, is intended only as a mechanism to insure that local producers can remain competitive with imported grain prices, particularly under the present subsidies to consumers, and to purchase surpluses in the exceptional year, to store as reserves against localized disasters such as a local drought.

For all practical purposes we can assume that only the extreme southern part of the country is a producing region. Within that region, only Region 10, Selibaby, is a surplus producer (See production analysis). Directly north of this area, roughly the Nouakchott-Nema road axis, is a deficit region with a heavy population concentration. Kiffa lies mid-way on that road axis, and just north of the Selibaby region. Therefore Kiffa will be used as a point to determine the economic price of cereals. The value of cereals is taken as the FAS value at U.S. gulf ports plus ocean transport to Nouakchott, plus

handling costs by OMC plus private transport costs to Kiffa.[62/] The cost items can be estimated at present as:

	$/ton	U.M./ton
FAS value Sorghum, U.S.[a/]	171	7900
Ocean Freight & Insur.[b/]	170	7900
Port charges[c/]		1600
Warehousing and handling[d/]		1803
OMC overhead[e/]		700
Transport Nouakchott-Kiffa[f/]		3000
TOTAL Value, Kiffa		22903

a/ From USDA estimates for Sorghum as of Dec. 18, 1980
b/ Estimated from 1980 costs for PL 480 shipments, USAID Nouakchott
c/ From listed billings to USAID from Port of Nouakchott
d/ From OMC estimates, June 1980
e/ From estimated costs for 1981 established Feb., 1981
f/ From CRS, response to their bid requests, private transport, Jan., 1981

The economic value of grain at farm gate, is calculated as Value Kiffa less transport costs to Kiffa from Selibaby less merchants margins for handling and profits. A proxy for merchant's margins is taken as the OMC handling and transport costs for buying local cereals in Selibaby. Thus our estimates of farm gate prices is calculated as:

	U.M./m ton
Value Kiffa	22,903
Transport Selibaby - Kiffa[a/]	3,000
Merchant's margin[b/] (OMC handling costs)	5.600
Estimated farm gate value	14,303

a/ estimated, Executive Order, R122/MFC/DC establishing rates, 1979.
b/ OMC estimates, June 1980

62/ These costs may be slightly higher than true economic costs due to the inclusion of taxes and duties in some items such as transport.

B. Settling the Farmer Floor Price

OMC will act as a price stabilizer and market of last resort for local production. It is not the intention to suplant local free market systems. This is believed to be neither desirable nor efficient. Therefore, the farm gate floor price should encourage the continuation of the private grain trade but at the same time offer some guarantee to encourage local producers. Because it is felt that private merchants will operate on lower cost margins in the grain trade than those estimated for OMC purchases, a margin of 10% below the calculated value of the farm gate price should be adequate to encourage private grain merchants. This could give grain merchants 15% return on capital which is well above the assumed opportunity cost of capital in Mauritania. Thus, the floor price should be established at 90% of the calculated price The advantage with the proposed formula is that savings in marketing costs will be automatically transferred to the producer. For example, if new road construction in the area lowers transport costs, recalculation of the marketing costs will raise the farm gate floor price. Thus savings are passed on to the producer. At

the same time merchants will be rewarded for efficiency in their operations, as their marketing costs are generalized from government costs. Thus the farm gate price will be established as:

Farm gate floor price	U.M./m. ton
Farm gate value	14,303
less 10%	1,430
Farm gate price	12,873

C. Selling Price by OMC for Locally Purchased Grain

At present OMC selling prices for imported grain and calculated purchase price for local grain, OMC would lose money in the event it bought local grain for resale at imported grain selling prices. This is not recommended nor is it necessary. OMC will use any grain bought locally as a combination security stock and price stablizing stock. Through its market monitoring system OMC will determine an annual average market price for grain in each of its operating areas. When shortages occur, driving grain prices upward, OMC will liquidate security stocks. This will be done when a "trigger" price of 20% above average prices have been sustained for a period of two weeks. In this situation price will be the main determinant of market supply levels. OMC will, of course, also use its imported grain stocks to stabilize market prices. Therefore local grain stocks will be used only when imported grain stocks are inadequate to temper price rises. The price that OMC establishes for sales of local grains should be 10% below the average annual market price. This should prevent large

losses on handling margins and in most cases should cover costs. Thus, if local consumer market prices are set at 25 U.M./kg, OMC would liquidate local grain stocks at 22.5 U.M./kg. Considering that this will occur only when local market prices have climbed to 30 U.M., this price will have a dampening effect on consumer market prices. When selling prices for imported grain rise to the point of covering all OMC costs plus the FAS cost in year 5, the difference between local grain prices and imported grain conceivably can be eliminated.

OMC will need to fix a limit to quantities of grain bought to prevent excessive flows to them in the event neighboring countries prices' are considerably lower. Excluding rice, the maximum production in Mauritania will probably not exceed 60,000 tons. Of that, probably no more than 15,000 tons will be marketed of which private traders can be expected to take 70%.[63/] Thus OMC can safely plan on a maximum target of 4,500 tons per year, with considerably lower quantities in low production years. Given the purchase costs per ton estimated by OMC,[64/] a U.M. amount of 25,200,000 ($U.S. 560,000) from the development account will need to be earmarked for grain purchasing operations plus U.M. 58.5 million ($U.S. 1.3 million) for the grain.

63/ See table 37
64/ See table 38

Table 37: Cereals Production and Quantities Purchased by OMC in a Normal Production Year

Region	Millet & Sorghum M. Tons	Milled Rice M. Tons	Production of Millet & Sorghum Marketed %	Production of Millet & Sorghum Marketed Tons	Millet & Sorghum Purchased by OMC % of Cereals on Market	Millet & Sorghum Purchased by OMC Tons
1	5000	-	40	2000[a/]	40	800
2	4000	-	25	1000	40	400
3	4600	-	26	1200	25	300
4	14000	3150	25	3500	27	800
5	13000	2100	23	3000	20	600
6	4500	3400	22	1000	20	200
10	14500	450	24	3500	43	1500
	59600[b/]	9100	25.5	15200	30	4600

a/ Includes grain smuggled from Mali
b/ Omits 1200 tons from Regions 7 and 9

Source: FAO

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Table 38: Cost of Local Grain Purchases

	U.M./Ton	U.M./Kg
Farm gate price	13,000 a/	13.0
Marketing costs		
- sacks	1,000	1.0
- loading trucks	400	.4
- transport (10 u.m./r. km, distance of 150 km, round-trip = 300 kms.	3,000 b/	3.0
- losses	130	.13
- direct buying costs		
- material buying	300	.3
- agents	400 c/	.4
- overhead (4%)	520	.52
TOTAL	18,750	18.75

a/ Rounded up from calculated price of 12873.
b/ Based on OMC in-house transport, calculated March, 1980, 100.095 per kilometer, 10-ton truck equals 10 u.m./ton kilometer.
c/ Based on OMC licensed buyers receiving % buying fee

Source: OMC, base June 1980

D. OMC Wholesale Pricing

1. Estimating OMC distribution and handling costs

True cost of handling and distribution of grain by OMC for any given year can be expressed as a price per Kilogram of grain, P, in $year_t$. This value P_t can be estimated at the beginning of the year as the cost for the previous year P_{t-1} times the estimated inflation rate for the year. Normally, that rate would be assumed to be equal to the previous years actual rate or a rate determined by the trend over several previous years.

Thus, the form to estimate the cost per Kilo is:

$$P_{t_e} = P_{t-1} (1 + i_e)$$

where P_{t_e} = Estimated cost/Kg at beginning of year.

P_{t-1} = Actual cost/Kg over the previous year.

$1 + i_e$ = The inflation factor for year t where i_e is the estimated rate of inflation.

If the actual rate of inflation (i) is equal to the expected rate of inflation (i_e) then the expected value of P_t (P_{t_e}) is equal to the actual value. In this case the value of P_{t_e} will become the factor in the equation (P_{t-1}) for the subsequent year (t + 1). For a constant inflation rate we can write in the form:

$$P_t = P_o \ (1 + i)^t$$

which is merely the compounding factor for P_o. The use of the compounding factor, however, risks to over or underestimate the true cost and does not allow adjustments to be made for changing rates of inflation.

Thus we choose the form:

$$P_{t_e} = P_{t-1} (1 + i_e)$$

So that P_{t-1} can be adjusted each year to reflect actual costs of OMC and i_e can be set to reflect recent or expected changes in the cost components of OMC (i.e., changes in the SMIG, changes in fuel for trucks, changes in rent, etc.).

Thus, for the proposed project, the cost factors can be estimated for the life of the project by assuming an inflation factor by:

$$P_t = P_o (1 + 1)^t$$

with adjustments made for actual annual changes by: $P_{t_e} = P_{t-1}$ $(1 + i_e)$. This method should prevent a quantum price increase at the end of the project that could occur if inflation (i) was underestimated at the beginning of the project.

For example, the consumer price index for the period 1973-1977 was estimated by The Banque Centrale at 9.32% per year. We have estimated the actual cost of handling and distribution by OMC at 5.0 U.M./Kg in 1980. The breakdown of estimated OMC costs are shown in Table 39. These represent about 6.3 U.M./Kg. These costs were adjusted to remove depreciation charges on warehousing in the first two years. That cost, as noted in Table 40, represents 650 U.M./MT. In addition, port

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charges were reduced from their true cost of 1,122 to 500 U.M./MT relating to government non-billable internal costs. Thus we arrive at a cost of 5044 U.M. per metric ton or approximately 5 U.M./Kg. If we assume the inflation rate will accurately reflect OMC cost increases (rounded to 10% for contingency and ease of calculation) our Formula for estimating OMC costs in any year is:

	$P_t = 5\ (1 + .10)^t$		Est. OMC cost/Kg. U.M.
1981	$P_1 = 5.5^*\ (1 + .10)^1$	=	5.5
1982	$P_2 = 5.5\ \ (1 + .10)^2$	=	6.05
1983	$P_3 = 5.5\ \ (1 + .10)^3$	=	6.66
1984	$P_4 = 5.5\ \ (1 + .10)^4$	=	7.32
1985	$P_5 = 5.5\ \ (1 + .10)^5$	=	8.05

* (does not include the warehouse rental cost or the depreciation adjustment for warehousing)

Table 39: Distribution and Handling Costs of OMC. U.M./metric Ton 1980

Category	U.M./Mt.
1. General overhead a/	689
2. Port - Harbor - Warf charges and labor for unloading vessel b/	1122
3. Warehousing costs c/	1803
4. Inland transport d/	2552
5. Handling d/	150
TOTAL	6316

a/ Source: OMC 1979/80, based on 25000 metric tons/year.
b/ Source: OMC 1979/80
c/ Source: Table 40
d/ Calculated from CRS bids from private transporters, Jan. 1981. Figure is a weighted average for actual 1980 distribution tonnage to various towns.

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Table 40: Storage Costs Per Metric Ton of Cereals Based on a Typical 5000 Ton Storage Unit

Cost Categories	Unit Cost Per Ton Per Year
Annual storage cost	
Fixed cost - Depreciation 5%	650
Variable cost	
- warehouse maintenance	260
- equipment maintenance 20%	64
- salary - branch managers	74
- salary - warehouse men	34
- salary - guard/laborer	21
- treatment, disinfection	400
- stock losses - shrinkage 3% of cereal value (10 U.M./Kg.)	300
TOTAL	1803

Source: OMC, base June 1980

If our inflation rate varies from the 10% postulated above the annual price estimation will make gradual adjustments.

$$P_{t_e} - P_{t-1} (1 + i_e)$$

1980 P actual = P_o = 5.0/Kg (1980 cost)

1981 $P_{1e} = P_o (1 + .10) = 5.0 (1.1) = 5.5$

assuming P_1 estimated = P_1 actual i.e. 5.5, then;

1982 $P_{2e} = P_1 (1 + .10) = 5.5 (1.1) - 6.05$

if inflation in 1982 is estimated at 15% then

$$P_{2e} = P_1 (1 + .15) = 5.5 (1.15) = 6.325$$

if our true rate of inflation, however, proved to be 11.7% then our P_2 actual would be $P_2 = (1 + .117) = 5.5 (1.117) = 6.14$. Thus, before beginning year 3 our adjustment could be made upward or downward for setting prices for year 3. If "ie" equals 12% then:

1983 $P_{3e} = P_2 (1 + i_e) = 6.14 (1 + .12) = 6.88$

1984 $P_{4e} = P_3 (1 + .12) = 6.88 (1.12) = 7.70$

1985 $P_{4e} = P_4 (1 + .12) - 7.70 (1.12) = 8.62$

The cost factors for each year (P_1, P_2, P_3, P_4, P_5) will be determined by the actual expenses of OMC on a per kilo basis. These costs will be known after the end of each fiscal year (July 1 - June 30). The cost increase factors "i" will be known and estimates for "i" for the next year can be made. Thus, prior to the ordering of grain in November, the new cost estimates for grain sales will be determined.

2. Estimate of the FAS cost of grain

The FAS (Free Along Side) value of the grain will be determined each shipment by the USDA. This value will be converted into U.M. at the current official exchange rate at the time when the FAS value is determined.

For purposes of estimation, the USDA projected prices of red sorghum and wheat provide the basis for calculating % increases for title II sorghum and wheat based at $1.67/Ton and $195/Ton respectively

Table 41: Estimated FAS Values Sorghum and Wheat 1980-1985

	Sorghum		Wheat	
	% Increase	$/MT.	% Increase	$/MT.
1980	0	$167	0	$195
1981	2.5%	$171	5%	$205
1982	3.60%	$177	8%	$221
1983	4.7%	$186	8%	$239
1984	5.6%	$196	7%	$256
1985	7.5%	$211	6%	$271

Therefore, the two factors which will determine the FAS deposit requirement in U.M. are estimated and can change i.e., the U.S. $ FAS price which will be determined by the world grain market and the exchange rate which will be determined by the international money market.

3. Total wholesale costs

Using estimated rates for FAS grain prices and OMC handling costs, Table 42 gives projections of costs to be covered.

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Table 42: Estimated Wholesale Price per Kg. of PL 480 Grain, Sorghum and Wheat, U.M./Kg.[a]

Year	FAS Sorghum[b]	FAS Wheat[c]	FAS Aver.[d]	OMC	Total
1981	7.9	9.0	8.45	5.5	13.95
1982	8.2	9.5	8.85	6.05	14.9
1983	8.6	10.2	9.4	7.24[e]	16.64
1984	9.1	11.1	10.1	8.4	18.5
1985	9.8	11.8	10.8	9.13	19.93

a/ based on 46.24 U.M. = $1 U.S.
b/ from USDA projections, sorghum
c/ from USDA projections, wheat
d/ estimated 10,000 tons each wheat and sorghum
e/ warehouse depreciation for five years of project added in years 1983 - 1985.

1980 wholesale selling prices of U.S. grain were 8 U.M./Kg. in the interior and 10 U.M. in Nouakchott. The GIRM felt that to cover the estimated costs in Table 42 would require too great a price increase in one year. Therefore a formula was established whereby the GIRM would subsidize handling and distribution costs of OMC on a declining basis. The subsidy would be entirely eliminated in the fifth year. Thus OMC would charge a wholesale price that would cover all of the FAS value of the grain plus the unsubsidized portion of OMC handling costs. Table 43 summarizes the subsidy requirements for grain handled by OMC under the PL 480 Title II project.

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Table 43: Subsidy Requirements for OMC Costs

	OMC Handling Cost	% Charged to Wholesalers Annual	Cummulative	Covered by Price Increases U.M./Kg	Subsidy U.M./Kg.
1981	5.5	30	30	1.65	3.85
1982	6.05	25	55	3.32	2.72
1983	6.66	20	75	5.0	1.66
1984	7.32	15	90	6.59	.73
1985	8.05	10	100	8.05	-0-

Actual wholesale prices are estimated in Table 44 below.

Table 44: Estimated Total Subsidy Requirements Mauritania PL 480 Project.

	Est. FAS a/	OMC Costs b/	Total Cost	Wholesale Price c/	Sub/ Kg.	Total M.T. Subsidy Millions U.M.
1981	8.45	5.5	13.95	10.6	3.35	67
1982	8.85	6.05	14.9	12.6	2.3	46
1983	9.4	7.74	16.64	15.6	1.04	20.8
1984	10.1	8.40	18.5	17.6	.9	18
1985	10.8	9.13	19.93	19.6	.33	6.6

a/ From Table 42
b/ From Table 39, adjusted, see p.
c/ From est. 6,000 tons sold in Nouakchott and 14,000 tons sold in interior with 2 U.M. differentiation in price.

Therefore, the subsidy can be reduced from 67 million Ouguiyas to zero in five years. Total subsidy requirements will be 158.4 million.

VII. CONSTRAINTS

The overriding constraint to increased production of cereals in Mauritania is the limited amount of land that can be put into cultivation. The alluvial soils, primarily in the Senegal River Valley, can only reliably produce under rainfed cropping in the Guidimaka region. Land for recession cropping is limited even in years of good floods. Irrigation can improve the situation, but capital investment is high and presently water can be limiting. The upland sandy soils are plentiful, but are not very productive particularly under conditions of the present low rainfall.

Added to the land constraint, is a labor constraint which is accentuated by labor migration. Labor intensive farming methods in the area require fairly dense concentrations of population. Even under good conditions, one adult worker could produce only enough grain for 4-5 other people. Given that, at present, about 30% of the population are urban dwellers, and 30% are nomads, the remaining adult labor force would be hard pressed to produce adequate cereals under the best of conditions. However, with as many as ½ of the adult males in the river area away working, those that remain have a hard time meeting flood needs within The Valley; surpluses are in fact illusions.

Improved technology which either reduced labor requirements or increased yields, or both, could help produce needed cereals. However, yield increasing technology is pretty much restricted to chemical

fertilizers and may have limited economic benefit. While mechanisation could help eliminate labor constraints it is of doubtful economic value, and systems simply do not exist to support mechanisation.

Irrigated offers improved yeilds, and may permit at least partial mechanisation. However capital investment costs are so high, there is doubt if any returns to investment can be realized. Certainly to do so will require better management and productivity than is currently the norm.

Part of the problem in attempting to increase production is the isolation of the producing area. Guidimaka, the most productive region can be totally inaccessible during the rainy season. Repairing irrigation pumps, delivering fuel or fertilizer or movements of agricultural extension agents are impossible during the main growing season.

Thus one should not expect this project to have a major impact on cereals production in Maurita-ia. Some overall gains can be made but it is doubtful if they will do more than slightly increase the per capita supply of cereals. In irrigated rice production, farmgate price increases could have some impact upon production. Currently it appears that GIRM pricing policy on rice imports discourages local production. Imported rice at about $330/metric ton translates into about 15 U.M./Kg at the port. Handling and transport costs of 8-10 U.M./Kg should bring the wholesale price of rice to 23-25 U.M./Kg.[65/] Sonimex, the rice

65/ Ministry of Plan economists calculated CIF rice costs delivered to Sonimex Nouakchott warehouses at 17 U.M./Kg. Sonimex overhead at 2.77/Kg. To this must be added inland transport which is approximately 2.5 U.M./Kg for OMC. Memo of Plan economist assume Diop to the Minister, assumed 1980 N.d.

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importing agency, was selling rice at 15-18 U.M. in February 1981. Thus a subsidy on imported rice made it impossible for Sonader to increase its buying price on paddy. Sonader was forced to sell milled rice at the Sonimex price. However, given that its milling rate was only 56% and milling costs were about 3 U.M./Kg,[66/] Sonader is already losing money on paddy purchased at 8 U.M. from farmers. However, it must be stressed that with good per hectare yields it appears that rice production pays reasonable returns to farm labor employment. Thus improving yields is equally as important as price policy in increasing local rice supplies.

In other cereals, it is doubtful if price policy can have any significant impact upon production. Farmgate prices would need to rise 2-3 times their current levels to compete with the income potential of labor migration. At current farmgate levels, estimated at 13 U.M./Kg., an increase of that magnitude would put local prices far over the estimated world cereals prices of 23 U.M./Kg. Even if such a price increase were possible, it is not certain that this would have a major impact upon production or market supplies. Evidence in other Sahalien countries indicates that on-farm stock levels are more significant in determining market quantities than are prices.[67/]

66/ Transport, milling, bugging based on paddy: total paddy costs were 14.1 U.M./Kg or 21.7 U.M./Kg milled rice. Ministere De L'Economie et Des Finances, Direction Des Etudes Et DeLa. Programmation, "Elements Pour Ure Prise De Decision Relative Aux Prix De Reference Des Cereales Produites En Republique Islamique De Mauritania Pour La Campagne 1979-80. Mimeo, March 6, 1980.

67/ (Niger Agricultural Sector Assessment, USAID, 1979)

The PL 480 Title II, 206 project will have some very positive effects on Mauritania. It should be made clear that these will not have immediate effects on grain supplies, but they should establish the basis upon which long term farm production increases will be established.

Because this project requires the deposit of the FAS value of the grain for development purposes, the GIRM's selling price must rise to cover handling costs. The true cost of the grain in the interior of the country would need to be about 16 U.M./Kg in 1981, rising to about 20-22 U.M./Kg in 1985 to cover the FAS value plus handling costs. Although the GIRM plans to subsidize handling costs, a gradual removal of those subsidies will bring wholesale grain prices up to about 20 U.M. in 1985. Increasing this wholesale price should have three major impacts on Mauritania.

First, wholesale price rises will cut into the profits of grain merchants and shift this suprlus to government. The grain will represent about 10-15% of total cereals disappearance in Mauritania. At present this grain is sold for 8 U.M./Kg in the interior and 10 U.M./Kg in the capitol. Rice is imported and sold wholesale at 15 in Nouakchott and 18 in the interior. Local sorghum and millet, getting a preferential price, appears to bring 13-15 U.M. at farmgate and sells for as high as 30-40 retail. Consumer prices appear to range from 20-40 depending upon market and cereal. However, 25 U.M./Kg. can be used as a generalized average lacking good market data. At that rate merchants are

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enjoying a 17 U.M. margin between government wholesale and market retail prices. Even if handling and marketing costs are 7 U.M./Kg, the merchants are realizing a 10 U.M./Kg profit.

It appears that locally produced grains plus Sonimex-imported rice determine consumer market prices. Food aid sold at prices far below retail prices, therefore, provide profits that merchants channel to other investments. The major investment appears to be expensive urban housing, and is only marginally productive to the national economy. As rising prices for food aid cut into merchant's profits, government will capture some of this surplus through the development fund which can then be channelled into rural development.

Rising prices for food aid will also cause upward pressure on farmgate prices for millet, sorghum and corn. Again, it should be primarily merchants margins that will be squeezed. The east with which people can enter the market throughout the producing zone and the fact that little grain appears to be transported far from the zone, will make it difficult for merchant's to pass off higher farmgate prices to consumers. These upward price pressures will have two effects in the Valley. First, farm incomes will rise. This will allow farmers to expand their use of inputs such as fertilizer. More importantly, it will increase the returns to labor. A result could be increased use of wage labor, decrease in labor migration or expansion of acreage cropped. It is doubtful if a major impact will be noticed until the fourth or fifth year when food aid sorghum reaches 16-18 U.M./Kg.

Secondly, a direct impact will be possible on paddy production. Water pumping costs are higher and labor raquirements grea-er for paddy production than for sorghum or corn. Thus as coarse grain prices rise, farmers will be tempted to shift out of paddy production in favor of coarse grains, either by shifting labor employment to sorghum land, or converting irrigated perimeters into sorghum and corn. A stagnation or decline in paddy production will force Sonader to increase paddy prices to farmers to maintain their milling operations. This will cause greater losses to Sonader which may force the GIRM to reconsider its pricing policies relative to Sonimex imports of milled rice. The long-term impact could have some upward pressure on consumer prices. This however, is impossible to avoid given the general upward trend in world food pricing. At the same time increasing incomes to farmers will help improve overall production, or at least prevent further decline. Increased revenues will also be essential in translating GIRM program for irrigated farming into realized cereals supplies.

Annex G

TRANSPORT OF PL - 480 GRAIN FOR MAURITANIA: A REVIEW OF CURRENT PROBLEMS AND ANALYSIS OF PROPOSALS FOR REDUCING TRANSPORT COSTS.

FEBRUARY 1982

I. SUMMARY AND RECOMMENDATIONS

The cost of transportation of food relief grain from the transfer port of Dakar to its final destination in Mauritania is extraordinarily high, and adds more than sixty per cent to the CIF price of the grain in Dakar. The purpose of this study is to take a systematic look at the transport problems, and to identify alternatives in both the areas of operational improvements and investment that would have the potential to reduce the cost of transport.

Up to 1981 USAID used the Port of Dakar in Senegal to transfer the grain from large vessels of about 10,000 GRT to trucks of about 30 tons for the long journey to Nouakchott.. The land distance from Dakar to Nouakchott is about 570 kms over a fair paved road and with a ferry crossing over the Senegal River at the border. Though the single ferry is a weak link on the landroute, USAID has experienced no significant technical problem with that route. There are costly institutional problems at the border; however, and it appears that the long-haul trucking industry in both Senegal and Mauritania is somewhat monopolistic and charges exorbitant prices.

Though in theory [1] it is possible to transport the grain all the way from Dakar across the border to Nouakchott on Senegalese trucks, there have been many instances where the Mauritanian gendarmerie at the border crossing at Rosso

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[1] In 1977 the Governments of Senegal and Mauritania agreed that, for the carriage of food relief grain and perishable commodities, seventy trucks from each country be authorized to cross the borders without interference. USAID should consider urging the enforcement of this agreement.

forced Senegalese trucks to transfer the grain to Mauritanian trucks. There have also been instances where border officials delayed the trucks for several days before allowing them to proceed. Either type of delay adds considerably to the transport costs, and USAID therefore started exploring alternatives for transporting the grain.

In 1981 USAID for the first time, and after careful investigation, shipped grain from Dakar to Nouakchott by coastal vessel. Since it was known that the Wharf of Nouakchott (a simple unprotected pier of 330 meters length terminating in a working platform that can work two small vessels) was highly congested, assurances were obtained by the GIRM that the ships carrying USAID grain would receive top berthing priority. Since the line haul rates by coastal vessel are substantially below those of trucks, and since temporary storage of the grain in Dakar can be avoided, the calculations by USAID indicated potential for substantial savings by the coastal route provided the coastal vessels received berthing priority.

It may be concluded that the experiment of transporting grain from Dakar to Nouakchott by coastal vessel was a success, and should be continued provided further physical deterioration of the Wharf at Nouakchott is halted. The coastal vessel mode slightly reduces the total cost of delivering grain to the inland destination in Mauritania. More importantly, it significantly reduces (by about $30 per metric ton) the transport costs paid by the US government. The share of the costs carried by the GIRM, however, is somewhat increased, though this increase could be nullified if the GIRM would place the management and administration of the Wharf on a sounder basis. The increased burden imposed on the GIRM may have the beneficial effect of providing that government with an incentive to initiate remedial action to correct some of the most costly deficiencies at the Wharf.

The coastal vessels carrying USAID grain received some priority in berthing, and their turn-around time was far below that of the other grain vessels. However, the poor management of the port and poor condition of the equipment, and the consequent lengthy service times inflated the costs of coastal shipping well above normal.[1] Thus, although the coastal vessel mode proved viable, significant improvements in the operation of the Nouakchott Wharf will be required before the large potential savings in total transport cost from the use of coastal vessels can be realized.

This study analyzes the potential for the development of small bulk grain unloading facilities to reduce the harbor congestion, making possible direct shipment in bulk from the U. S. and thereby lowering the cost of discharging grain. It was found that such a facility could be both economically and technically feasible. The technical feasibility should, however, be verified by an expert in bulk handling equipment. USAID should consider engaging such a person to follow up on the findings of this study. If verified as technically feasible, the GIRM should consider drawing from the proceeds of grain sales to invest in such a facility. Support from the private sector in investing in a small bulkhandling facility could be expected since, as explained in the main body of the text, at least two entrepreneurs are promoting such a facility.

In this respect significant improvements in port efficiency could be realized without major capital investments. USAID should encourage the GIRM to reorganize the management of the port, and to place the operation, administration, maintenance, and accounting of the port on a sounder basis. USAID and other users of the port could assist the GIRM by financing a technical assistance program that would provide experts in the fields of port administration, operations, and accounting, and in the planning of the staff required to properly operate the port.

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[1] Extra handling in Dakar due to congestion in Nouakchott at times added as much as seven dollars per ton.

Because the Senegal Valley area, which contains a large proportion of the recipients of the grain, has an extremely poor road system, the inland distribution costs for the grain are also high. The GIRM should consider using local currency proceeds from grain sales to fund road maintenance and rehabilitation in that region. USAID could assist by providing dollar funds for technical assistance in labor based road improvement techniques and in rural road planning techniques.

II. PAST EXPERIENCE

During 1981 a total of 75,550 tons of food relief sorghum and wheat were imported by the world's donor nations into Mauritania. Of this amout only 5000 tons was shipped by landroute from Dakar See Tables 1 and 2: Food Relief Imports for 1980-1981). The remaining part was either shipped directly into the Port of Nouakchott from the point of origin of the grain (the U.S.A., Canada, Argentina, or Europe), or was shipped first to a transfer port such as Dakar, Senegal where the grain was transshipped into small coastal vessels. As discussed below, the Port of Nouakchott is one of the world's most primitive and congested ports with a very limited capacity to directly unload ships alongside its wharf. Ships over 5,000 tons carrying capacity must be unloaded via lighters, a time-consuming and unreliable process. It is for this reason that coastal vessels are preferred by the grain importers.

A. USAID

Shipments by USAID under the PL 480 Title II program accounted for about 20,000 tons of the grain [1] imports for 1981. All of the USAID grain during that year was imported by coastal vessels loaded in the Port of Dakar. This represents a

(1) Divided about equally between Wheat and Sorghum.

change from past practice where the grain was imported from Dakar by the 572 km road journey in 30 ton carrying capacity trucks. However, because of the unreliability of the land route and the cost and delays sometimes incurred at the Senegal-Mauritania border crossing, and because of the competitive advantage of coastal shipping over trucking on lengths of haul exceeding 300-400 km, USAID and other agencies involved in providing food relief became increasingly disposed toward trying coastal shipping in an attempt to lower transport costs.

The cost of transport from the U.S.A. to the final inland destination more than doubles the U.S. cost of the grain valued FAS[1] the ship at a Gulf Coast port. In approximate terms, wheat costing 180 dollars per metric ton in the U.S.A. delivered alongside an ocean liner in one of the Gulf Coast ports will cost about 280 dollars per ton upon arrival in Dakar after completing its ocean voyage. The rise in cost of about 100 dollars per ton represents the cost of the trans-oceanic component of the transport. Transport from Dakar to the most appropriate point of entry in Mauritania adds about 110 dollars per ton, and wheat stored in the warehouse in Nouakchott will have a value of about 390 dollars per ton. Final delivery to the final consumer over the remaining 400 km or so over the primitive inland transportation system in Mauritania will add about 80 dollars per ton, bringing the final value of the wheat to about 470 dollars per ton . . . almost 2½ times the value of the wheat in the USA. Much of the increase in cost is due to the physically inadequate, poorly maintained, and inefficiently administered transport infrastructure in Mauritania. It is believed that a program focussing on improving the operational efficiency of the system through better administration and

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[1] Free Along Side

maintenance combined with small but judiciously selected investments could reduce the cost of the delivered grain by at least 100 dollars per ton.

Costs for the Overland Truck Mode, 1981

This section presents the costs paid by the US for transport of grain from the Port of Dakar to the warehouse in Nouakchott, using the truck mode for the Dakar-Nouakchott portion. Not included in this cost summary is the value of the grain FAS Gulf Coast port, the cost of the transatlantic journey, and the costs for the inland distribution in Mauritania. But such costs are identical for both the truck and coastal vessel mode, and are therefore not needed for analyzing differences in costs of the modes. The information for this summary came from Dakar cable 00666.

In 1981 a total of about 22,643 metric tons of grain (wheat and sorghum) was delivered to Mauritania. The grain arrived in Dakar on four shiploads carried by four vessels: the Virginia M, the Bardomar, the Del Monte, and the Kyokko Maru. Some of the grain arrived in bulk, and some of it arrived already bagged. For three of the shiploads, the grain was shipped to both Rosso and Nouakchott. Only for one vessel, the Del Monte, did the grain arrive in bulk, and was all shipped to Nouakchott. Since the experience in 1981 for coastal vessel transport only involves bulk grain shipped to Nouakchott, we present in this section the Del Monte shipment cost experience as most relevant for the comparison between the two modes of truck and coastal vessel.

The 1980 cost experience for the Del Monte grain is given in the following categories:

Category	Cost per Metric Ton (CFA)	
Shore Handling, Dakar	5,883	
Local Transfer, Dakar	1,746	
Local Storage, Dakar	89	
Truck Transport to Nouakchott	13,764	
Fumigation	1,156	
Customs Escort	603	
Losses Enroute	427	(reimbursed to U.S. by the carrier)
Total:	23,668	

Costs for the Coastal Shipping Mode, 1981

This section gives the costs paid by the US for the transport of grain from the Port of Dakar to the Nouakchott Wharf, using the coastal vessel mode for the Dakar to Nouakchott portion of the trip. As for the truck mode, not included are the value of the grain FAS Gulf Coast port, the cost of the transatlantic journey, and the inland distribution costs. Estimates for these are given in the section comparing total transport costs for the two modes in 1982.

In 1981 a total of about 9938 tons of grain was delivered to Mauritania. The grain arrived in Dakar carried by two "mother vessels," the Del Oro (loaded with bags) and the Del Rio (loaded with bulk), and was transshipped in Dakar port to smaller coastal vessels. The transport by the coastal vessels can be

divided into two periods. The seven coastal vessel trips during the first period went relatively smoothly with only moderate delays at Nouakchott Wharf. During the second period, however, congestion at the Nouakchott Wharf caused a backup of undelivered grain in the Port of Dakar. This backup necessitated the initiation of contingency storage of the grain in Dakar, and added considerably to the cost of the transport operation. The 1981 cost experience is summarized as follows:

	Cost per Metric Ton (CFA)	
Category	First Period (Bagged Cargo)	Second Period (BulkCargo)
Stevedoring ashore, mother vessel	0	1,730
Stacking of bags, tarps, and small gear	603	603
Stevedoring ashore and aboard, coastal vessel	2825	2825
Temporary storage	100	100
Transport to Nouakchott	1,1625	11,625
Overtime Nouakchott	500	500
Berthing and Mooring	425	425
Contingency transport, Dakar, storage, fumigation	0	6554
Total:	16,078	24,362

It is important to note that the additional charge for CFA 1,730, incurred for stevedoring ashore for the mother vessel, was caused by an extra stevedoring operation in Dakar. This operation is peculiar to grain arriving in bulk. The cargo shipped during the first period was already bagged in the US, and therefore was not

subject to this small stevedoring charge. Furthermore, the more substantial cost of "contingency transport, etc." of CFA 6,554 which appears during the second period is due to the congestion at the Nouakchott Wharf. This additional cost would be entirely avoidable once the operation of the Wharf is placed on a sounder basis.

Comparison of the Two Modes

A comparison of the two modes shows that costs to the US are markedly reduced when the coastal shipping mode is used, provided that the servicing of the ships at the Nouakchott wharf proceeds reasonably smoothly as experienced during the start of the experiment with the coastal ships. The savings to the US is CFA 23,668 - CFA 16,078 = CFA 7590 per ton, or about $32 per ton. However, if the servicing of the ships at the Wharf does not proceed smoothly, and the back up by the congestion causes additional costs of storage and local transport of the Dakar port, the advantage of coastal vessel mode disappears, and both modes become about equally costly.

One issue that was not addressed in this section but which can be found discussed in detail in Section IV is the difference in total cost of the grain as delivered to its inland destination in Mauritania. This total cost includes all costs, from the FAS value of the grain alongside the ship in one of the Gulf Coast ports, the costs of the transoceanic voyage, and all other costs including losses and demurrage.

B. Catholic Relief Services

Along with the WFP, the Belgians, and the Germans; CRS prefers to import its food relief commodities by road from Dakar. The CRS has tried the Nouakchott Wharf, but with very unsatisfactory results. In 1977, for example, 400 bags out of 1000 bags of milk powder were lost in the port.

The high costs of the Nouakchott port operations and high losses and pilferage in that port accounts for CRS's preference for road transport. Their food, on average, is more expensive than the grain provided by other donors, and CRS imports are small compared to those of other donors. The value of the CRS food relief commodities (oil, milk, powder, flour, etc.) is about 260 dollars per ton. This compares with the 120-200 dollar per ton value of the grain imported by other donors. CRS commodities are therefore more susceptible to pilferage in a poorly policed location such as the terre-plain[1] of Nouakchott port. Furthermore, the tonnage of the CRS imports is small (5000 tons per year) compared to the quantities imported by other donors. This reduces the influence the CRS might have over harbor operations, and it would be more difficult for the CRS to obtain docking priority than it would be for the larger donors.

The CRS, through their agent SOCOPAO, transports their food relief in trucks of about 30 tons carrying capacity. The present rate for their bagged cargo is about CFA 30,000 per ton and this includes storage in Dakar, loading, and unloading the trucks. This cost is high compared with the cost quoted by SOAEM to USAID for 1982 of about CFA 24,000 for this operation. But part of the additional cost is due to the higher insurance and handling cost of their high value commodities.

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[1] Storage and marshaling area in a port

In the past, the CRS has experienced considerable delays and added costs at the border. In 1981, for example, the Mauritanian gendarmes, probably at the instigation of the Federal Mauritanienne des Routiers (a Mauritanian truckers association) that wishes to reserve the Mauritanian portion of the transport to their own membership, forced 10 of the Senegalese trucks to offload and transfer their cargo to Mauritanian trucks at the border. The cost of this transfer operation was about 90 dollars per truck, or three dollars per ton, and there were some losses and spoilage. Since then, and after vigorous complaints to the Ministry of Health - the Ministry most interested in the success of the CRS program -transport by truck from Dakar has proceeded without interference from the Mauritanian gendarmes.

C. Review of Demurrage Charges Accumulated in Nouakchott Harbor, 1981

SONIMEX: This organization, a government owned import and export firm, imported 80,000 tons rice and 80,000 tons sugar in 1981. Ships of around 5,000 to 10,000 GRT were used. The agreed upon discharge rate was 250 tons per day per ship, and the agreed upon ship days in port was 160,000/250 or 640 ship days. Demurrage would be paid by the GIRM at a rate of $4000 per day beyond 640 ship-days. The actual unloading in 1981 proceeded at a rate of only 120 tons per day per ship, and the number of ship days in port was 160,000/120 = 1333 ship-days. The cost to the GIRM for demurrage on the 160,000 tons of sugar and rice imported was therefore:

demurrage = (1333-640) x 4000 = $2,772,000

or $17.32 per ton

AID: The small coastal vessel "Afro-Star" discharged an average of 766 tons of grain on each of seven voyages made from August 27 to December 24, 1981. Even though this ship was accorded priority at the Nouakchott pier thanks to vigorous efforts by FFP/Mauritania to make the GIRM live up to its promise of priority, considerable delays were experienced. (See Table 3: Calculation of Demurrage Costs for the Afro-Star). On the average, discharge took place at a rate of 4.12 tons per hour in port, or 99 tons per day in port. It took an average of 7.75 days to discharge the 766 tons from the Afro-Star. The shortest time in port was 39 hours (1.63 days), and thus would have been considered "normal" for ships such as the Afro-Star in efficiently operating West African ports. The longest time in port for the Afro-Star was 368 hours (15.33 days), and only three of these days were lost due to bad weather. The main cause for the long delay can be attributed to the very low efficiency of the port.

Though USAID/FFP was not billed for demurrage, it was informed that a total of CFA 5,779,774 ($20,000) had been accumulated by the Afro-Star. On a per-ton of grain delivered basis, this demurrage works out to $3.68 per ton. This is considerably lower than that experienced by SONIMEX, and is due, in part, to the higher berthing priority received by the Afro-Star.

FAMO: This privately-owned flour mill imported 8000 tons of flour through the Nouakchott Wharf in 1981 and is believed to have incurred demurraged costs of MU6 million (MU750/ton), or $15.60 per ton.

WFP: The World Food Program, a United Nations organization, imported 16,395 tons of wheat through Nouakchott Wharf in 1981 at a demurrage cost of $305,058 million ($18.61 per ton). (See Table 4.)

III. EXISTING PORT AND ROAD FACILITIES

A. Wharf of Nouakchott

The Nouakchott Wharf is located about 10 km from the capital city along a stretch of coast that is all sandy beach with low dunes inland, and that offers no protection from the elements. The sandy bottom slopes gradually to depths of about 9 meters 300 meters from the shore, and to depths of 10 to 18 meter 4 to 5 km from shore. There is an almost permanent N-S current running at about 0.5 knots; it reverses S-N on a few days during the year. The rapid onset of bad weather is a hazard, and vessels should at all times be ready to unmoor or weigh anchor and proceed seaward as the coast offers no natural shelter.

According to the Assistant Director of the Wharf, the strong swell during the first quarter of the year is a serious constraint on the docking and unloading of ships at the Wharf, and perhaps 30 per cent of the days during the first quarter are lost due to bad weather and sea conditions. He recommended that USAID avoid sending grain during the first quarter. The weather during the second quarter is fairly good with about 20 per cent of the days being lost mostly due to rain. During the third and fourth quarter only five percent of the workdays are lost. However, the actual days lost during a month to bad weather or sea conditions may vary considerably from the average, as indicated in Table 5 (Days of bad sea conditions during 1981). Furthermore, as discussed below, equipment failures at the port may be an even greater cause of lost working days. And, it is estimated that on the average, the number of actual working days at the Wharf will not exceed 200.

The port is highly congested, and at any one time from 15 to 20 ships representing a carrying capacity of about 100,000 tons may be observed at anchor. This tonnage is large considering that the annual capacity of the Wharf is about 300,000 tons. According to "Ports of the World" rationing of water is advised upon arrival since the normal turn-around time for a general cargo ship (in 1979) is 30-40 days.

The Wharf itself is a steel pile pier built perpendicular to the coastline. It has an access jetty about 250 meters long and with two lanes for vehicular traffic each of seven meters width. Waiting ships remain at anchorage two to four km off the coast, and since the anchorage is unprotected they depart in bad weather.

The Wharf was designed for extensive use of unloading by lighterage, and one berth can unload two lighters at a time while the recently constructed wharf extension could accommodate small ships not exceeding 5000 tons. However, the wharf extension needs extensive repairs since all four protective fenders (Duc d'Albas) have collapsed. Although the Wharf administration is preparing a contract to replace one of these fenders at a cost of about 125,000 dollars, it has no funds to replace the other three. It will take up to four months to replace the new fender, and until at least one fender has been replaced only ships carrying less than 3,500 tons will be permitted to dock at the extension.

According to the Assistant Director of the Wharf, the budget for operations and maintenance is met entirely from Wharf fees and charges, but is not sufficient to cover replacement of old equipment and major repairs. Even minor repairs and activities such as painting do not appear to be carried out. Out of a budget of UM 217 in 1981, 25 million were budgeted for equipment replacement. Of UM 220 million in 1982, 45 million has been allocated for equipment replacement.

According to the Assistant Wharf Director, the Wharf handled almost 300,000 tons in 1981. Table 5B. (Metric tons of dry cargo unloaded in 1981) shows the monthly totals unloaded for that year. The Assistant Director estimated the daily discharge capacity as 250 MT for lightering, 500 MT on the extension, and 600 MT on the original quay. These rates are considerably reduced when more than one boat is being worked since, for all practical purposes, the same limited amount of wharf equipment has to be parcelled out among two or three operations. Furthermore, the many electric power outages, small repairs to fenders, etc., and numerous stoppages of cranes and small equipment significantly reduce these rates.

Table 6 (Nouakchott Wharf Traffic, 1970-1981) presents the history of port traffic through the Wharf from 1970-1981 broken down, where possible, by imports and exports, and also shows the number of ships that called at the port. Though there are many missing data, and it is difficult to establish a trend, it appears that traffic has been growing at an annual compound rate of 13 per cent. Table 7 (Composition of Nouakchott Wharf Imports, Dry Cargo) shows the tonnages of the major commodities imported at the Wharf for the years 1973, 74, 79, and 1980. For the year 1980, and excluding the large category of "miscellaneous," grain at 33,000 tons was the third largest import following rice (48,000 tons) and cement (37,000 tons). Though the statistics for 1981 on the composition of imports have not yet been issued, we know that grain imports through the Wharf by donors (See Table 1 Food Aid Arrivals in 1981 and Table 2 Food Aid Arrivals in 1980) equalled approximately 63,000 tons. The increase over the 1980 imports was caused in part by the shift in transport by USAID from road to coastal shipping. This shift increased grain imports at the port by 18,000 tons.

The equipment at the Wharf is in poor condition, and much of the equipment originally supplied is missing. For example, of the five motor launches available in

1979 only one is operative, another is apparently permanently deadlined, and the other three could not be located by the study team. Of the 18 barges available in 1979 only nine appear to be operational, and only four are actually in use since this is all the single motor launch can handle. The Assistant Wharf Director informed the study team that the Wharf needed 14-15 new barges, 5 new tug boats for the barges, 7 front-lift loaders, and 2 travelling cranes. The European Development Fund (FED) is considering supplying a large amount of new equipment, as shown in Table 8 (Scope of Wharf Improvement Program Under Consideration by the FED). The study team was told by the FED that funding this program was being favorably considered, and that the total program cost would be around three million dollars. This program involves equipment and repairs to the Wharf only, and no training or technical assistance in properly operating the equipment is being considered. At the earliest, financing could be approved in Brussels by end 1982, and equipment could start arriving early in 1983.

The severe lack of equipment and poor maintenance account for only a part of the low productivity of the port. Perhaps more important are the poor operational procedures resulting from the lack of management of the port. These poor procedures, examples of which are given below as related to us by the OMC manager of port operations, started when the port was first opened in 1960 and have now become firmly embedded. Some typical examples of such procedures include:

1. The stevedores expect and are given 8 hours pay even if for reasons of bad weather or equipment breakdown the work of unloading the ships must stop after only one hour. This practice is especially costly to port users during overtime shifts.

2. Many of the equipment operators are poorly trained, subject equipment to abuse without being held accountable for damage, and do not properly apply preventive maintenance. This, of course, causes rapid equipment wearout. For example, a forklift purchased in 1981 is already in need of major overhaul, as is a mobile crane purchased in 1980. Of the five motor launches for towing barges available as late as October 1979, only one is now operational. Ships must berth under their own power since the two tugs available in 1975 have disappeared.

3. Equipment operators have developed a habit of shutting equipment down, claiming engine trouble such as overheating, whereas in fact, the equipment is in operating condition. Because of the present great shortage of equipment, the operator of a forklift truck has the power to stop the work of several work gangs.

4. Overtime must be contracted by a ship in whole units of 12 hours. Thus, if a ship has 15 tons remaining to be unloaded at 7:30 pm, it is faced with the difficult choice of contracting for 12 hours of overtime, or returning to the roads where it has to start the process of negotiating for wharf space all over again.

5. A common practice is to charge ships double for stevedoring services. This occurs when, say, two ships are at the wharf, and each is being unloaded by one work gang. The harbor department then argues that, since two gangs are at work on the wharf, each of the ships should be charged for the work services of two gangs.

Need for Reorganization at the Port

USAID should consider supporting the GIRM to reorganize the port, and to place the operation, administration, accounting of the port on a sounder basis. This would be a low-cost approach to greatly improving the efficiency of the port. USAID and other users of the port could assist by financing a technical assistance program that would provide experts in the fields of port administration, operation, accounting and in the planning of the staff needed to properly operate the port.

B. The Dakar-Nouakchott Overland Route

The landroute from Dakar to Nouakchott consists of a bituminous pavement two lane road that measures about 400 km from Dakar to the border crossing at the Senegal River, and an additional 200 km from there to Nouakchott. The road is in fair condition and, especially on the Mauritanian side would benefit from some pavement strengthening. The IBRD intends to fund this work in their fourth highway program for Mauritania. On the Senegal side, the shoulders of the road are somewhat dangerous and the study team observed two overturned large semi-trailers of about 35 ton capacity. The sole ferry at the Senegal River seems to be a weak link in the overland route. A serious accident with that ferry could close the overland route for months. In general, however, there appear to be no technical faults with the overland route.

C. Inland Truck Transport Costs

For a number of reasons including the large distances between the towns and small settlements, poor road-construction soils, and difficult terrain and climatic

conditions, lack of transport planning and coordination, and poor maintenance, the road system in Mauritania is of very limited extent and, except for a few heavily travelled paved roads is in poor condition. As a result, truck transport in the interior is expensive, arduous, and often hazardous.

The highway network is about 7000 km long of which less than 1500 km are paved roads linking Nouakchott with earth and gravel roads of which only are passable the year round. As we shall see below, the poor road system adds greatly to the cost of transporting grain as well as other products needed by the population in the interior. There is a major need for the upgrading of maintenance and for extension of the rural road network, especially in the Senegal Valley, and for developing a strategy for determining the priorities.

Table 9 gives the transport prices charged by Mauritanian truckers in 1981 for the transport of grain from Nouakchott to distribution points in the interior. The transport is by heavy trucks capable of carrying about 10 tons of bagged grain. Prices are given for trucks engaged both by OMC and CRS. Also shown for purposes of comparison are the prices that were charged in 1975 for the transport of SONIMEX products.

The Table shows that the 1981 transport rate over paved roads was between 4 and 5 UM per ton/km (8 to 10 U.S. cents per ton/km). This rate does not appear out of proportion to transport rates charged for similar service in other parts of Africa. Over the unpaved portion of the routes, and especially over those portions where road maintenance is poor and where travel times increase to the point where trucks average only about 150 km of travel in a day, the cost of transportation

rises rapidly. It is estimated that over the unpaved roads the rates increase to about 12 UM per ton/km (25 U.S. cents). The table shows that the OMC rates are lower than those charged the CRS. The explanation appears to be that OMC ships larger quantities of grain than CRS, and furthermore that OMC has their own small truck fleet that can be used over those routes where truckers attempt to charge non-competitive prices. Thus, OMC is in a much better bargaining position than CRS and can put downward pressure on rates.

Though the data are not sufficient to enable the drawing of any firm conclusions, comparison of the SONIMEX transport rates for 1975 and those for OMC in 1970 appear to indicate that, except for those routes that were improved, transport rates have remained relatively stable. This may indicate that savings in vehicle operating costs are passed on to the users. For those routes that were improved, the drop in transport rates was pronounced. For example, the rate on the Nouakchott-Kiffa route in 1975 (and before the improvement) was UM 6.90 per ton/km. Over the improved road, the rate in 1981 was UM 3.98 ton/km — a reduction of 42 percent. Over the Nouakchott-Nema route which was partly improved since 1975 the rate dropped from 7.3 to 4.7 UM per ton/km, a drop of 35 percent. Conversely, the rate increased significantly over the Nouakchott-Atar route, perhaps due to lack of maintenance on that road since 1975.

IV. ALTERNATIVES FOR TRANSPORTING GRAIN

A. The Road Vs. Coastal Vessel Alternative

Table 10 (Summary Comparison of Grain Transport Costs 1982, etc.) compares total costs, as estimated for 1982, of transporting grain from the U. S. Gulf Coast to an inland distribution point in Mauritania. These costs are not true

economic costs, and no attempt was made to estimate the true cost of the resources consumed in the transportation by, for example, deducting taxes and transfer payments, or by shadow pricing foreign exchange and labor. And, the cost of ship waiting time was estimated by the cost of demurrage. However, these costs are believed good estimates of the financial costs incurred by the US and the GIRM, and emphasis was placed on deriving an estimate of the total system cost, including losses of grain and the costs of delays at the border or Nouakchott Wharf.

The information for this Table was obtained from actual shipping costs incurred by USAID during road transport in 1980 and coastal vessel transport in 1981, and updated from information on the increases in cost of diesel fuel (see Table 11: Price of Diesel Fuel in Senegal, 1978-1982), and from data provided by shipping companies, trucking companies, and other donors that are currently using these modes. Data for cost of wheat at the Gulf Coast, and the cost of ocean freight for 1982 were provided by the USDA.

The Table presents the summary results of the analysis. Detailed cost components can be found in Appendix 1. As discussed in Section II, the level of service at Nouakchott Wharf during the first seven coastal vessel arrivals was considerably higher than that for the remaining trips. The higher level of congestion at the Wharf during the latter period backed up into the Dakar Harbor operations, and necessitated an expensive contingency storage and handling operation. In the estimation of the 1982 costs for coastal vessel we assume that the management of the Wharf will be somewhat improved and, as provided for in the planned FED loan, some of the urgently needed maintenance and renewal of equipment will be started. Thus, we do not expect that contingency storage and handling operations in Dakar Habor will be necessary.

The comparison shows that there is little difference between the two modes. The final cost of grain (including all costs) delivered to the average inland destination (calculated as the center of gravity for all grain shipped inland from Nouakchott) is $459 per ton by the coastal vessel mode and $461 per ton by the overland truck mode.

Thus, the coastal vessel mode is $2 per ton cheaper, though this difference is not significant given the accuracy of the estimates used in the comparison.

The difference in costs borne by the US and the GIRM is very significant, however. For the truck mode, the cost borne by the US is $202. But by coastal vessel, the cost is only $169, or $33 per ton less. The cost borne by the GIRM is $260 per ton for the truck mode and $289 per ton for the coastal vessel mode. The reason these costs change is that the "point of entry" is different for each of the modes, and the US pays for the transportation costs up to the point of entry. Thus, for the truck mode, the point of entry is the warehouse in Nouakchott, and the US therefore must pay the cost of the overland truck trip from Dakar to Nouakchott (in addition to the cost of the trans-atlantic voyage and the port handling costs in Dakar). The cost of this truck trip is about $66 per ton, or almost $16 per ton more expensive than the cost from Dakar to Nouakchott by coastal vessel where the "point of entry" is "the end of ship's hook" of the wharf.

As explained in Section II, transport by truck also requires additional port handling operations in Dakar. This is because the available trucks cannot remove the grain (shipped in by the 10,000 ton mother ship) fast enough from the port area, and the grain therefore must be temporarily stored in a warehouse. Removing the grain from the temporary storage location in the port area to the warehouse, and including the cost of the fumigation which is also required, adds a cost of about $18

per ton above that which would be required for the coastal vessel mode. Thus, costs to the US are reduced by the sum of the $15 per ton and $18 per ton, or by $33 per ton.

Costs paid by the GIRM increase when the coastal shipping mode is used. This is because the US pays only the costs up to "the end of the ship's hook" at the Nouakchott Wharf, and the GIRM must pay for moving the grain from the end of the ships hook to the OMC warehouse (by the overland truck mode, the US paid for the costs of transport up to the OMC warehouse). The GIRM must also pay for the demurrage costs. The cost of the additional handling in the Wharf area and the local truck transport amounts to about $30 per ton.

The increased transport cost incurred by the GIRM under the coastal shipping mode is caused, in large part, by the inefficiency of the Wharf operations. And, should USAID continue to use the coastal shipping mode, the possibility of reducing these costs may provide an incentive to the GIRM to place the operation of the Wharf on a sounder basis. Improvement of the Wharf would also benefit USAID (though we do not pay directly for the Wharf operations) since it would very probably reduce the presently inflated costs charged by the coastal vessels to compensate for inefficiencies at the Wharf. For example, we were told by the Captain of the Afro-Star, one of the coastal vessels that actively participated in the 1981 grain shipments, that his ship had suffered $10,000 damage to its hull because of the poorly maintained fenders at the Wharf. Since such accidents lead to higher hull insurance costs, these increased costs will undoubtedly be reflected in future billings.

B. Trans-shipment at the Border (Rosso)

This alternative involves transporting by overland route the grain from Dakär to Rosso, at the border, and there transshipping the grain from Senegalese trucks into Mauritanian trucks. This alternative might be forced upon USAID in the event coastal shipping became prohibitively expensive due to worsening Wharf congestion or deteriorating Wharf operations. This alternative might also be selected by USAID if it wishes to minimize the transport costs borne by the US, though the total transport cost will increase significantly.

The additional costs incurred under this alternative arise from the additional operations of unloading the Senegalese trucks at the border and loading the Mauritanian trucks. It is very likely that there will also be additional storage costs at the border, losses and spoilage of grain, and slight increases in the now shorter line-haul charges (instead of one 570 km haul we now have two shorter hauls, one of 370 km and one of 200 km). But it was not possible to estimate these additional line haulcosts with sufficient accuracy to include in this analysis.

The net result of this alternative is to increase total transport costs by an insignificant CFA 693 (about $2.40) composed of the additional operations of loading and unloading in Rosso minus the cost of the border delays (CFA 1041 - 347). However, this total increase is underestimated because it ignores factors mentioned above, and the possibility of increased losses of grain.

A more important result is a marked shift in the impact of the transport costs. The reduction of US cost is about $24 per ton, whereas the GIRM suffers an increase in cost of almost $27 per ton. It is therefore to the GIRM's advantage to minimize the possibility of this alternative being selected.

C. Dakar to St. Louis by Rail, to Rosso by Barge

The study team visited St. Louis in Senegal to explore the possibility of shipping grain from Dakar to St. Louis by rail, transshipping the grain to barges in St. Louis and barging the grain to Rosso over the Senegal River, and then transshipping the grain again to trucks for the final leg from Rosso to Nouakchott. It was believed that the transport rates by barge and rail might be sufficiently competitive against road to offset the cost of the additional transfers that would be required.

The investigation revealed that the rate of rail (CFA 5099 per ton) and barge (CFA 8300 per ton) together almost equalled the rate for road haulage to Rosso (CFA 13,271 per ton). Furthermore, the transfer distance from the rail station in St. Louis to the barge wharf is at least one km and requires crossing a bridge over the Senegal River. Though we were not able to obtain a quote, we estimate this transfer cost at about CFA 1200 per ton. Finally, though there exist three motor barges that ply the Senegal River, of 100, 80, and 70 tons capacity, and two 50-ton lighters are available, the condition of these vessels is poor. Because of the cost disadvantage of this alternative, and the lack of facilities (the rail warehouse is in poor condition), this alternative was not further explored.

During the visit to St. Louis, however, the study team was impressed by the newly constructed fishing port at the mouth of the Senegal River. It contains a wharf of about 140 meters length with a depth of water of 3-4 meters, and could therefore accommodate small coastal vessels. In the future, when one could expect that the road improvement programs planned by the IBRD, USAID, and the OMVS program have greatly improved the road system in the Senegal River Valley

area, it may prove advantageous to ship in grain by coastal vessel to the fishing port, and then barge it to distribution points along the Senegal River. It was verified by the team that locks for barges would be installed at the planned dam across the Senegal River, and that the river would be navigable well beyond Rosso.

D. Nouadhibou Port for Bulk Grain Vessels

Nouadhibou Port is well protected and has wharves suitable for unloading the large grain vessels that load at the U. S. Gulf Coast. Presently, however, the land connection with Nouakchott is poor. The grain would have to be transported in railcars for about 300 km to Choum via the mining company railway. In Choum it would be transferred to trucks for the 450 km haul to Nouakchott. The cost of using the present land route is well above that of the Dakar - Nouakchott alternative.

The GIRM is considering, with Arab financial assistance, to invest in a new paved road from Nouadhibou direct to Nouakchott. These considerations are preliminary and, since the investment could not be justified on economic grounds, it may be difficult to obtain financing. However, there is a possibility that the road will be justified on largely political and social grounds. If so, the import of grain through Nouadhibou would offer substantial cost advantages over other alternatives.

USAID should therefore carefully monitor the planning for this road. Should the road become likely, USAID might reconsider this alternative as a viable option.

E. Mini-Bulk Grain Unloading Facility in Nouakchott

This section presents a brief economic evaluation that was done on those mini-bulk handling alternatives that appear to be technically feasible. Its primary purpose was to identify those alternatives that appear most appropriate, and to explore the impact of the timing when the "Chinese" port becomes operational on the economic feasibility of the alternatives. (Appendix 2 gives the calculations.)

Though based on the best available information, the evaluation is tentative, and should be followed by a more comprehensive evaluation by a team including a port operations expert, an expert in planning port installations, and a person with experience in port simulation models. This team would be able to develop better estimates than was possible in this study of the possible reductions in port congestion made possible by the mini-bulk unloading facility. Short-term consultancy by a ship handling expert would also be highly desirable.

The analysis done in this section explores three alternatives. The first alternative is a pneumatic system installed on the existing wharf with the capability to unload small and medium size coastal vessels. It has the advantage of an early operational data and low cost, and would have an early impact on reducing port congestion. The savings, however, would accrue for only a few years since, after the new Chinese port becomes operational, it may be assumed that harbor congestion is reduced to such an extent that any further savings in congestion attributable to the mini-bulk handling facility would become negligible.

The second alternative consists of an independent and new pier with either a pneumatic or a conveyor belt system[1] for unloading the bulk ship. It would have the capability to unload vessels up to 10,000 tons carrying capacity. In addition to reducing port congestion, as with Alternative A, this facility would also greatly reduce transport cost since the larger vessels that normally transfer their cargo in transfer ports such as Dakar or Antwerp, could now directly unload in bulk in Nouakchott. Thus, even after the new Chinese port becomes operational and the congestion-reducing benefits of Alternative B diminish, the benefits from reducing transport costs will persist. However, since a new pier — though a small one — needs to be constructed to carry the pneumatic system or the conveyor belts, the cost of this facility is higher than that for Alternative B. It would also require a somewhat longer construction time.

The final alternative, Alternative C would be integrated with the new Chinese port. It would have the capability to unload vessels up to 10,000 tons carrying capacity, either via a pneumatic system or via conveyor belts. Since it probably cannot become operational before the new port itself (though the possibility exists that, since the pier of the new port is practically finished, the mini-bulk facility could become operational earlier than the port), it would not offer savings in harbor congestion as with Alternative B, but only in the reduction in transport costs. Furthermore, the cost of this facility is lower than that for Alternative B since an existing pier is used to support the pneumatic or conveyor belt equipment.

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(1) Multipurpose conveyor belts that can handle both bulk and bagged cargo, and if technically feasible, may offer large cost savings because of their greater utilization.

The economic benefits of all three alternatives are good (see Appendix 2: The Economic Evaluation of Mini-Bulk Alternatives) with, on a Net Present Value (NPV) basis, Alternative B ranking the highest, followed by C, and with Alternative A at the bottom. Alternative B is top ranked because it makes an early impact on harbor congestion, well before the opening year of the new Chinese port. In addition, the savings in transport cost continue even after the new port has started operation.

These conclusions are sensitive to the assumption that harbor congestion will disappear after the new Chinese port opens. It may well be that, should harbor congestion persist (but perhaps on a smaller scale) after the new port opens, Alternative A might move up in ranking. This is one of the reasons that this preliminary study should be followed by a more comprehensive one including experts in port planning and operations, and an expert in the use of simulation models so that the very difficult problem caused by the high variability of traffic and the variety of ship operations can be properly analyzed.

A. Alternative A: Mini-Bulk Facility as Part of the Existing Wharf

This would consist of a pneumatic system comparable and parallel to the existing cement bulk facility located on the existing wharf. Coastal vessels loaded with bulk grain would lie alongside the wharf extension, or would be moored between two mooring buoys at most 30 meters from the end of the wharf extension; and the grain would be evacuated in bulk at a rate of about 100 tons per hour. The grain would be stored temporarily in a small silo located in the port area, and would be bagged there or at the OMC warehouse. This is a great improvement over the present rate of unloading bagged grain of 100 tons per day.

Even under the best conditions, and assuming that the port management greatly improves, the unloading rate of bagged grain is unlikely to exceed 2 - 300 tons per day. A further advantage of this facility is that somewhat larger coastal vessels carrying as much as 3000 tons of bulk grain could be accommodated. The line-haul charge for the larger ships is substantially below those of the small (800-ton) Afro-Star type. This concept originated with Mr. B. O. Boucheiba, the President of GICR, a Mauritanian firm located in Nouakchott. The technical plans for the facility appear to be well advanced, and Mr. Boucheiba showed blue prints prepared by Rosal Iberia, Inc. of Spain, a company specializing in bulk handling equipment. The cost is not expected to exceed five million dollars.

According to Mr. Boucheiba, private financing of the facility is assured and the Mauritania Development Bank (BMDC) and another bank will participate in the financing. He is now awaiting formal approval for the project by the Ministry of Finance. The study team heard from another source sponsoring a competing project, however, that financing was not assured and that the technical and financial feasibility of the project had not been demonstrated.

If successful, the facility will be operated as a monopoly for the import of bulk grain with the rates regulated by the GIRM. According to Mr. Boucheiba, this is the way the present cement bulk facility is operated.

This type of facility, estimated to cost about five million dollars, would offer the following savings in costs. First of all, the ships would be unloaded faster and this would reduce harbor congestion and demurrage. Secondly, the coastal vessels could be loaded in bulk in transfer ports such as Dakar and Antwerp, thereby reducing the transfer costs in those ports. In the economic evaluation,

however, only the savings from reduced harbor congestion were included. Time available for this study did not permit estimation of the reduced transfer costs in transfer ports.

The advantages of this type of facility are that it could be quickly installed and could be operational at the beginning of 1983. Furthermore, it uses the existing wharf and therefore saves on costs. However, though it can start reducing harbor congestion at an early date, much of its advantage would disappear once the new "Chinese" port becomes operational early in 1986. With both the old wharf and the new port in operation at that time, it is believed harbor congestion will be significantly reduced. Should this assumption prove wrong, and should harbor congestion continue even after the new port opens, the benefits accrued under Alternative A would, of course, also continue.

As shown in Appendix 2 (Economic Evaluation of the Mini-Bulk Handling Facility Alternatives), the economic evaluation indicated a favorable economic rate of return (the IRR = 29%) and the net present value (NPV) of the investment discounting the benefits at 15 per cent is slightly above two million dollars.

B. Alternative B: Mini-Bulk Facility Installed on an Independent Pier

A new pier and one independent from the existing wharf would be constructed somewhere between the location of the new Chinese port and the existing Wharf. Though light in construction since the pier would be designed only to carry the pneumatic or conveyor system necessary for the unloading of the grain, and

would not have to carry heavy vehicular traffic or other loads, the pier would be expensive since it would extend out to sea far enough (perhaps 500 meters) to enable unloading of medium size ships. The pier would connect with one or two small silos for temporary storage of the grain, and the grain could be bagged at that site.

This concept was proposed by Mr. Soulier, a consultant with the BMDC, and under contract with the World Bank. Though his background is in banking, he has engaged the SPIE Corporation (France) located in Nouadhibou to advise on the technical and cost aspects of the idea. The SPIE Corporation specializes in pipeline and bulk unloading facilities, and estimated the cost of the project to be between two and four million dollars. The study team judged this estimate as very optimistic, and suggests that a cost of nine million dollars be used for planning purposes. The study team was told that there are several sponsors for this system and that a considerable portion of the financing has been assured. Mr. Soulier hopes for participation in the financing by USAID.

The concept would have the advantages that, first of all, port congestion would be reduced during the period before operation of the new Chinese port. Secondly, since it would be able to accommodate large ships up to 10,000 tons carrying capacity, it would enable transport direct to Nouakchott from the point of origin of the grain, such as one of the US Gulf Coast ports. From such ports, the transoceanic cost of transport is the same, whether the grain goes to a transfer port such as Dakar, or goes directly to Nouakchott. Thus, Alternative B would not cause an increase in the transoceanic transport cost. The alternative would, however, eliminate the cost of transferring the grain in say, Dakar, to a coastal

ship or to trucks for the overland route, and the line haul costs to Nouakchott. This cost is very significant and, at a minimum, is composed of the cost of unloading the mother ship (CFA 1655 per ton) including temporary stacking of the bags in the harbor area, the stevedoring ashore and aboard to load the coastal vessel (CFA 3190), and the transport by coastal vessel from Dakar to Nouakchott (CFA 10,500). In total, the cost saving would by CFA 14729 per ton, or about $50 per ton. Savings if trucks were used for the Dakar to Nouakchott leg would be comparable. The study team did not investigate what the savings would be for those ships that use Antwerp or another port for the transfer operation, but assume that these savings would also amount to $50 per ton.

If it were possible to use conveyor belts for the unloading of both bulk grain, and also bagged cargo (flour, sugar) Alternative B would offer very significant further cost savings. There is, however, some uncertainty whether such a multi-purpose conveyor system could be economically constructed, and the study team therefore assumed that only bulk grain would be unloaded by the system. The possibility of designing a multi-purpose system should be further studied by the port planning and operations experts.

The economic evaluation indicates that this alternative has the most favorable economic return. The IRR is estimated at 36 per cent, and the NPV (or the amount whereby the savings, discounted at 15%, exceed costs) of the project is above eight million dollars. The high economic return stems from the relatively early operational date of the facility (operational in 1984) so that benefits accrue from the reduction of port congestion during the two years before the new Chinese port opens. Furthermore, even after the new Chinese port becomes operational in 1986, benefits will continue from the reduction in transport costs.

A further and perhaps significant advantage of this system is that it is physically removed from both the old wharf and the new Chinese port, and it may be feasible to operate the mini-bulk handling facility as an atonomous operation independent from that of the harbor administration. This feature would be useful in the event that it is not possible to improve with sufficient speed the management and administrative capability of the present harbor administration.

III. ALTERNATIVE C: MINI-BULK FACILITY INTEGRATED WITH THE NEW PORT

The pneumatic or conveyor belt system would use the pier and wharf of the new Chinese port to reach out to the bulk grain carrying vessels. The pier extends about 600 meters, and to a sufficient ocean depth to accommodate 10,000 ton vessels. The system would have the advantage of low cost since it uses the planned pier, and would be comparable to the B Alternative in that it would offer savings in transport cost to the large vessels that can unload directly at Nouakchott, by-passing the usual transfer ports. A disadvantage is that the system would not go into operation until 1986, and that it would therefore have no impact on relieving the serious harbor congestion expected during 1983, 1984, and 1985.

According to a briefing given American personnel in January 1981, the Chinese are not considering the provision of any bulk terminal facilities in their plans. There is no evidence, however, that they would object to incorporating such a facility if financed by someone else. (Unfortunately, the study team was not able to contact the Chinese to discuss planning for a small bulk-terminal though persistent efforts were made to do so). With due speed, therefore, contact with

the Chinese port engineers and administration should be made to explore the costs and performance of a mini-bulk handling facility, and to prepare a time table for the incorporation of such a facility into the port. Another subject that should be explored is that of starting the unloading of bulk grain ships before construction of the wharf has been completed. Since the bulk handling facility would operate independently from the wharf — ideally the grain carrying vessel would be moored between two buoys at the end of the pier — it may be possible to start bulk unloading well before completion of the wharf.

The economic analysis indicates that Alternative C has an IRR of 42 per cent, and a NPV of alightly more than four million dollars.

D. Summary

The Table below presents a summary (see Appendix 2 for details) of the results of the economic evaluation, and ranks the alternatives according to their NPV, the correct economic indicator for such a ranking. Based on the assumptions made in this limited study, the preferred Alternative is B, followed by C and then A.

	IRR	NPV	RANK
Alternative A: Use existing wharf	29	$2 million	3
Alternative B: Construct new pier	36	$8.5 million	1
Alternative C: Wait and use Chinese built port	42	$4 million	2

If it were possible to start the mini-bulk facility prior to completion of the wharf component of the Chinese port, Alternative C would probably end up as top ranked.

V. CONCULSIONS

It may be concluded that the experiment of transporting the grain by coastal vessel from Dakar to Nouakchott was a success, and should be continued provided further physical deterioration of the Wharf of Nouakchott is halted. The coastal vessel mode slightly reduces the total cost of delivering grain to the inland destination in Mauritania. More importantly, it significantly reduces the transport costs paid by the US government. It also increases the share of the costs carried by the GIRM, though this increase can be largely nullified if the GIRM would place the management and administration of the Wharf on a sounder basis. The increase burden imposed on the GIRM may provide it with an incentive to initiate remedial action to correct some of the worse deficiencies at the Wharf.

The transport costs by truck from Dakar to Nouakchott are high. Nevertheless, transport by the truck mode may be a forced alternative if the operations at the Nouakchott Wharf do not improve. An important factor contributing to the high cost of truck transport is the lack of cooperation between the Senegalese and Mauritanian governments regarding the passage of trucks across their border. There exists an agreement ratified in 1977 between these two governments allowing 70 specific trucks from each country to cross the border unhindered if carrying grain for food relief. This agreement, however, is frequently violated by government personnel at the border, and Senegalese trucks are often forced to transfer their loads at the border to Mauritanian trucks. And vice-versa, Mauritanian trucks that wish to proceed to Dakar to pick up grain are harassed by Senegalese officials. USAID should encourage the GIRM and GOS to settle their differences, and to allow unrestricted passage of trucks carrying grain for food relief.

USAID should also consider encouraging the GIRM to reorganize the management of the Wharf, and to place the operation, administration, maintenance, and accounting of the Wharf on a sounder basis. This would be a low-cost approach to improving Wharf efficiency. USAID and other users of the Wharf could assist the GIRM by financing a technical assistance program that would provide experts in the fields of port administration, operations, and accounting, and in the planning of the staff required to properly operate the Wharf.

Because the Senegal Valley area, which contains a large proportion of the recipients of the grain, has an extremely poor road system, the inland distribution costs for the grain are also high. The GIRM should consider using proceeds of the grain sales to fund road maintenance and rehabilitation in that region. USAID could assist by providing dollar funding and technical assistance in labor based road improvement techniques and in rural road planning techniques.

TABLE 1: FOOD RELIEF IMPORTS FOR 1981

DONATEURS	DENREES	BATEAU	DATE	QUANTITES	LIEU DE RECEPTI
FRANCE	BLE	SARDAIGNE	JAN 81	1,000	NOUADHIBOU
"	"	"	"	1,000	NOUAKCHOTT
"	"	SCHOUWENBANK	23/9/81	2,400	"
"	"	COELO	2/10/81	1,600	"
PAYS BAS	BLE	URSULA I	6/02/81	1,045	NOUAKCHOTT
"	"	STENHOLM	9/03/81	950	"
"	"	URSULA II	6/04/81	995	"
PAM	BLE	CAMION	Fev/mars 81	2,540	ROSSO
"	"	HANNE THIGON I	19/6/81	1,100	NOUAKCHOTT
"	"	HANNE TRIGON II	27/6/81	1,000	"
"	"	VIOLA	25/6/81	1,437	"
"	"	CAMION	Juin/Jul 81	1,500	"
"	"	ERIK SIF	8/8/81	2,800	"
"	"	HERMAN SIF	9/8/81	2,200	"
TURQUIE/FINLANDE		BLE	11/6/81	3,500	NOUAKCHOTT
USAID	SORGHO	MARIA MONICA	14/5/81	900	NOUAKCHOTT
"	"	" " 2	1/6/81	2,419	"
"	"	" " 3	21/6/81	2,453	"
"	"	AFRO STAR 1	26/6/81	760	"
"	"	" " 2	4/7/81	768	"
"	"	MARIA MONICA 4	18/7/71	1,613	"

Table 1 (cont.)

DONATEURS	DENREES	BATEAU	DATE	QUANTITES	LIEU DE RECEPTION
"	BLE	THOR 1	20/7/81	1,100	"
"	"	MARIA MONICA 5	18/7/81	876.6	"
"	"	AFRO STAR 3	1/8/81	780.2	"
"	"	" "4	27/8/81	759.5	"
"	"	" "5	12/9/81	770	"
"	"	" "6	24/9/81	765	"
"	"	" "7	2/10/81	770.1	"
"	"	" "8	18/10/81	770	"
"	"	" "9	28/10/81	"	
USAID	BLE.	AFRO STAR 10	11/11/81	770	NOUAKCHOTT
"	"	" "	29/11/81	770	"
"	"	"	8/12/81	300	"
CRS - USA	SORGHO FORT.	ROUTE	ler trim 81	1,136	NOUAKCHOTT
"	HUILE	"	" "	343	"
"	CSM	"	" "	300	"
"	SORGHO FORT.	"	20 trim 81	1,726	"
"	LAIT EN POUDRE	"	" "	230	"
"	HUILE	"	" "	136	"
"	CSM	"	" "	90	"
"	LAIT	"	3e trim 81	457	"
"	HUILE	"	" "	92	"
"	SORGHO FORT.	"	4e trim 81	500	"
"	LAIT	"	" "	114	"
"	HUILE	"	" "	115	"

Table 1 (cont.)

DONATEURS	DENREES	BATEAU	DATE	QUANTITES	LIEU DE RECEPTIO
RFA	BLE	ROUTE	Juin 81	2,000	NOUAKCHOTT
"	"	URSULA	28/6/81	1,100	"
"	"	M. DE ČAVADONGA	6/6/81	1,900	"
LYBIE	BLE	THEODORUS	10/5/81	4,000	"
CEE	BLE	MED JOY	21/11/81	3,000	NOUADHIBOU
"	"	" "	5/12/81	2,000	NOUAKCHOT
"	"	TARA	17/12/81	5,000	"
"	LAIT	SUNNY MED	10/11/81	1,000	"
"	BEURRE	" "	10/11/81	500	"
ARABIE SAOUDITE	BEURRE	SUNNY MED	10/11/81	1,300	NOUAKCHOTT
	"	WESTG	29/11/81	700	"
"	BLE	DEMARG	29/11/81	10,000	"
ESPAGNE	FARINE	AMALINDA	25/12/81	1,500	NOUAKCHOTT
		TOTAL	WHEAT SORGHUM	63,278 Tonnes 12,275	

Source: PAM

TABLE 2 - FOOD RELIEF IMPORTS FOR 1980

Donateurs	Denrees	Bateau	Date d'arrive	T. M.	Lieu de recepton
CEE	Ble	SARINE	20/08	2,300	Nouakchott
	Ble	7 SAES	/09	1,700	Nouakchott
	Ble	KUND SIF	28/10	1,000	Nouadhibou
	Ble	MARIA A	30/10	4,000	Nouakchott
	Ble	CHRISTINA	23/11	2,000	Nouakchott
	Beurre	SUNNY MED	9/02	500	Nouakchott
	Lait en poudre	" "	9/02	815	Nouakchott
	"	ANNI BEHRENS	/11	1,000	Nouakchott
	Beurre	WESTGATE	/10	500	Nouakchott
PAM	Ble	TRIANA	4/7	3,100	Nouakchott
	"	par route ex. Dakar	/07-08	2,103	Nouakchott
	"	TRIANA II	23/08	4,700	Nouakchott
	Huile	par route	/08/09	672	Nouakchott
	Lait	par route	/08-09	1,000	Nouakchott
IRAQ	Riz	BABYLON	9/02	516	Nouakchott
	Huile	"	9/02	100	Nouakchott
USA	Sorgho	par route	/04	5,000	Nouakchott
USA	Sorghum	land route	/04-05	5,000	Rosso
	Wheat	" "	/08	3,500	Nouakchott
	Ble	" "	/08	1,500	Rosso
	Ble	" "	/10-11	8,180	Nouakchott

Table 2 (cont.)

Donateurs	Denrees	Bateau	Date d'arrive	T. M.	Lieu de recepton
FRANCE	Ble	Cpt. Fulcor	29/02	2,493.2	Nouakchott
	"	Le Coelo	11/03	1,608.8	Nouakchott
	Ble	LESLIE	1/06	1,000	Nouadhibou
	"	"	10/06	3,000	Nouakchott
RFA	Ble	GRISADER	20/07	1,200	Nouakchott
	"	ARGANAUD	9/08	1,800	Nouakchott
ESPAGNE	Ble	AVE	/11	4,000	Nouakchott
CANADA	Ble	PAGRINA	10/12	604	Nouakchott
	"	VIOLA	11/12	1,645	Nouakchott

Total cereals:	61,946 tonnes
Total huile:	1,772 tonnes
Total lait en poudre	2,815 tonnes
By road:	26,955 tons
By sea:	39,578 tons
Rosso:	9500

Source: PAM

TABLE 3: CALCULATION OF DUMURRAGE COSTS FOR THE AFRO -STAR (1981 VOYAGES)

Arrival date	Departure date	hours to	Demurrage, CFA discharge	Hours charged to Demurrage
Aug 27, 81 at 0140 hrs	Sept 7 at 1440 hrs	277	1,733,542	157
Sept 25 at 0200 hrs	Sept 28 at 1500 hrs	85	(193,229)	(35)
Oct 3 at 1000 hrs	Oct 13 at 1100 hrs	241	1,336,042	121
October 18 at 1500 hrs	October 24 at 1700 hrs	146	287,066	26
Nov 11 at 0700 hrs	Nov 18 at 1200 hrs	149	320,208	29
Nov 23 at 0700 hrs	Nov 24 at 1200 hrs	39	(447,188)	(81)
Dec 9 at 0715 hrs	Dec 24 at 1515	368	2,738,333	248
		1305	5,774,774	465
Average per voyage:		186 hrs (7.75 days)	824,968 CFA ($2816)	66.4 hrs

1. Average tonnage discharged per voyage equalled about 766 tons

2. Average rate of discharge would be 766/186 = 4.12 tons/hour or 766/(186/24=99 tons per day

3. Average cost of demurrage would be 824,968/766 = CFA 1077/ton ($3.68/ton)

4. Demurrage is charged at a rate of CFA 265,000 per 24 hrs or $904 per 24 hrs for any excess about 5 days (120 hrs). This works out to 904/766 = $1.20 per ton per day.

TABLE 4 - DEMURRAGE CHARGES INCURRED IN 1981 by PAM

TRISENA I	=	MT 4,706	=	$54,635
TRISENA II	=	MT 3,189	=	$83,784
ADA	=	MT 3,500	=	$93,968
HERMAN SIF	=	MT 2,200	=	$67,887
ERIK SIF	=	MT 2,800	=	$4,783
	Total demurrage cost			$305,058

Source: Programme Alimentaire Mondial, Nouakchott

TABLE 5A: Days of Bad Sea Conditions at the Wharf, 1981

Month	Number of Days	Days Wharf was clos
January	5	6-7-8-9-11
February	1	12
March	18	48-9-10-11-12-13-17-18-19-20-22-23-26-27-28-29-30
April	5	3-4-7-9-11
May	3	22-23-25
June	2	6-17
July	7	2-7-12-14-18-19-23
August	9	1-2-5-7-9-13-14-22-25
September	5	3-5-6-7-10
October	2	9-30
November	3	20-28-ET 30
December	7	1-2-12-13-21-30-31

Source: ETABLISSEMENT MARITIME DE NOUAKCHOTT

TABLE 5B: Metric Tons of Dry Cargo Unloaded in 1981

Month	Good Weather Working Days	Tonnages Debarques Correspondents	Tonnage Unloa per Working Da
January	26	14,519	558
February	27	21,729	804
March	13	8,957	609
April	28	18,171	725
May	28	29,588	1057
June	28	32,714	1068
July	24	22,425	934
August	22	22,681	1031
September	25	28,696	1148
October	29	30,018	1035
November	27	35,120	1301
December	24	29,100	1212

Source: Etablissement Maritime de Nouakchott

TABLE 6: Nouakchott Wharf Traffic, 1970-1981

(in '000 tons)

Nouakchott Wharf	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Imports (dry)	53.5	68.0	99.0	157.5	130.1	..	..	..	..	228.9	206.3	293.7
Exports	.2	7.5	23.3	31.4	42.4	..	..	..	..	1.7	3.4	..
Total	53.7	75.5	122.3	188.9	169.6	180.0	..	..	..	230.6	209.7	..
Ship arrivals	..	..	..	131	..	..	..	..	..	213	216	..

Note: .. Not available

Source: Republique Islamique de Mauritanie, Annuaire Statistique, 1981.

IBRD, Mauritania Transport Sector Memorandum (unpublished), June 1976.

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Table: 7

Composition of Nouakchott Wharf Imports (Dry Cargo)

(metric tons)

Product	1973	1974	1979	1980
Imports				
Rice	66,683.3	28,973.2	42,664	47,924
Flour	..	379.9	18,020	10,984
Sugar	26,989.7	18,120.7	46,979	23,575
Cement	..	..	29,553	36,887
Iron	..	..	3,807	..
Charcoal	5,700	13,927.8	..	..
Tobacco	56	624.9	..	..
Tea	1,642.4	805.7	1,815	2,986
Fabrics	323.4	418.1	0	0
Miscellaneous	..	24,565.2	76,575	49,859
Grain	..	29,972.1	20,140	33,026
Corn	..	11,144.8	..	..
Butter	..	1,085.0	..	..
Fish	..	61.2	..	..
Explosives	..	46.0	..	..
Milk	0	0	1,412	1,006
TOTAL	157,482	130,125	228,945	206,257

Note: .. not available

Source: Republique Islamique de Maritanie, Annuaire Statistique, 1981 IBRD, Mauritania Transport Sector Memorandum (unpublished), June 1976.

Table: 8

Scope of Wharf Improvement Program Under Consideration by FED

(in Ugiyas Mauritania)

DESIGNATIONS	MONTANTS CORRESPONDANTS	TOTAUX PARTIELS	TOTAUX GENERAUX
A) ENTRETIEN:	50,000,000/	50,000,000	
B) MATERIEL D'EQUIPEMENT ET COUTS APPROXIMATIES			
- Deux Vedettes remorqueurs	20,000,000		
- Huit barges	28,000,000		
- Douze remorques platear de 10a25T	8,000,000		
- Deux tracteurs	7,000,000		
- Deux elevateurs P80A. 4tonnes	6,000,000		
- Deux elevateurs P125A. 6tonnes	7,000,000		
- Un lot pieces de rechange pour Grue liebherr	6,000,000		
- Un lot pieces de rechange pour Grue PM	3,000,000		
- Un lot pieces de rechange pour Grue COLES	2,000,000		
- Un lot pieces de rechange pour Grue Hyster	6,000,000		
- Un lot pneumatiques et chambres a air de differentes dimensions	2,000,000		
-Un lot pieces de rechange pour moteur Baudouin	3,000,000		
-Un lot de materiel d'atelier de premiere necessite.	2,000,000		
	_____/	100,000,000	150,000,000

Source: Establissement Maritime de Nouakchott

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TABLE 9

Transport Rates Offered by Mauritania Truckers in 1981 for Transporting[1] Bagged Grain from Nouakchott to Various Inland Locations

From Nouakchott to:	Distance by Road (km)	Tariff in UM/Ton/km charged to CRF	Tariff in UM/Ton/km charged to OMC	Charged for SONIMEX prod 1975
Boutilimit	154	6.49[2]	6.17	—
Mederdra	160	13.75	—	—
Rosso (paved rd)	204	4.90	2.94[2]	4.0
Akjoujt (paved rd)	256	5.86	—	—
Aleg	258	5.62	4.76	—
Boghe	328	6.10	5.49	5.7
Magta-Larjar	363	—	5.51	—
Kaedi	438	6.62	5.84	5.7
Atar	454	6.39	7.33	3.4
M'Bout	563	8.88	—	—
Magama	565	8.85	—	—
Kiffa (paved rd)	603	4.98	3.98	6.9
Tidjikja	628	9.55	—	7.7
Selibaby	683	7.32	6.59	6.4
Zouerate	791	6.95	—	—
Aioun (paved rd)	793	3.78	3.78	—
Nema (paved 90%)	1093	6.40	4.75	7.3
	Average Price:	7.03	5.18	5.89

1. Bagged grain is generally transported in 45 Kg bags aboard trucks with a 30 ton payload capacity (truck-semitrailer combinations), except for routes that consist of mostly unpaved roads and where smaller 10-ton payload capacity trucks are used.

2. These rates apparently were below cost and the truckers declined to continue offering this particular service. The grain was transported by OMC owned trucks instead.

3. Costs include loading and unloading the truck.

TABLE 10

Summary: Estimated Grain Transport Costs for 1982 From U. S. Gulf Coast to Inland Destination, Mauritania Using the Alternatives of Coastal Shipping or Trucks for Transport Between Dakar and Nouakchott
(Wheat shipped in bulk from the U. S.)

			CFA/Ton	
A.	Costs Paid by U. S. Government		Coastal Vessel	Truck
	I.	Ocean Freight Including Bagging in Dakar	28,128	28,128
	II.	Handling at Dakar Port and local area	6,586	11,853
		Costs associated with ocean vessel	3,209	3,209
		Costs associated with coastal vessel	3,377	0
		Costs associated with truck transport	0	8,644
	III.	Transport Dakar-Nouakchott	15,043	19,317
		Line haul, unloading, customs escort	14,000	18,709
		Spoilage, losses, border delays	1,043	608
		Subtotal	49,757	59,298
B.	Costs Paid by the GIRM			
	I.	Cost of Wheat Delivered to US Liner Vessel, Gulf Coast	52,740	52,740
	II.	Handling at Nouakchott Port and local area	8,914	0
	III.	Inland Distribution	23,024	23,024
		Subtotal	84,678	75,764
		Grand Total CFA	134,435	135,062
		US$	459	461

Note: This assumes service at Nouakchott Port comparable to that received during the fir series of coastal ship voyages in 1981.

Table 11: Price of Diesel Fuel in Senegal, 1978-1982

Date	Price (CFAF per litre)
1978	75
Jan. 1979	87
Jan. 1980	94
Feb. 1980	100
March 1980	103
Aug. 1980	107
Jan. 1981	126
Aug. 1981	135
July 1981	150
Jan. 1982	150

Source: SOAEM, Dakar

APPENDIX 1

Estimated Grain Costs (1982) from U. S. Gulf Coast to Inland Destination, Mauritania Using A Coastal Ship Between Dakar and Nouakchott

		CFA per ton
A.	Costs Paid by U. S. Government	
I.	Ocean Freight Including Bagging in Dakar	28,128
II.	Port Operations, Dakar	
	a. Stevedoring ashore, mother vessel	1,989
	b. Stacking the bags, tarpaulins/dunnage, small gear usuage, tax terreplain	880
	c. Stevedoring ashore for coastal vessel	1,989
	d. Stevedoring aboard for coastal vessel	1,288
	e. Harbor dues	100
	f. Spoilage and losses	340
III.	Transport Dakar-Nouakchott by Coastal Vessel and Nouakchott Port Operations	
	a. Transport and stevedoring aboard	14,000
	b. Spoilage and losses	1,043
B.	Costs Paid by GIRM	
I.	Costs of Wheat Delivered to U. S. Liner Vessel, Gulf Coast	52,740
II.	Nouakchott Port Operations and Local Transport	
	a. Stevedoring ashore, stacking bags, and temporary storage	5,396
	b. Load trucks, transport to OMC warehouse, unload trucks, and stack bags in OMC warehouse	2,440
	c. Demurrage	1,078
III.	Inland Distribution	
	a. Load trucks, line-haul transport about 453 km, and unload trucks	12,568
	b. OMC overhead	10,456

	CFA/ton	$/ton
Cost paid by U.S.A.	49,757	169
Cost paid by GIRM	84,678	289
Total	134,435	459

Appendix 1 (cont.)

Estimated Grain Transport Costs (1982) from U. S. Gulf Coast in Inland Destination, Mauritania Using Trucks Between Dakar and Nouakchott

			CFA per Ton
A.	Costs Paid by U. S. Government		
I.	Ocean Freight Including Bagging in Dakar		28,128
II.	Port Operations, Dakar		
	a.	Stevedoring ashore, mother vessel	1,989
	b.	Stacking of bags, tarpaulins/dunnage, small	880
	c.	Gear usage, taxe terre-plain magazinage portuaire, 10 days	3,637
	d.	Local transport for contingency local storage	3,637
	e.	Contingency fumigation	1,170
	f.	Contingency local storage, 10 days	200
	g.	Spoilage and losses	340
III.	Land Transport to Nouakchott		
	a.	Load bags and transport by truck to the warehouse in Nouakchott. Unload bags and stack bags in the warehouse	18,009
	b.	Cost of border delays in Rosso	347
	c.	Cost of losses en route	261
	d.	Customs escort	700
B.	Costs Paid by GIRM		
I.	Cost of Grain (wheat) Delivered to U. S. Liner Vessel, Gulf Coast		52,740
II.	Inland Distribution		
	a.	load trucks, line-haul transport about 453km and unload trucks	12,568
	b.	OMC overhead (tentative)	10,456

	CFA/Ton	$/ton
Cost paid by USA	59,298	202
Cost paid by GIRM	75,764	259
Total	135,062	461

APPENDIX 2

Economic Evaluation of Mini-Bulk Handling Facility Alternatives

(Costs and savings in million $)

	Alternative A: Mini-bulk facility on existing wharf			Alternative B: Mini-bulk facility on new and independent pier			Alternative C: Mini-bulk facility on new "Chinese" port		
	Investment cost	Savings		Investment cost	Savings		Investment cost	Savings	
Year		demurrage	transport cost		demurrage	transport cost		demurrage	transport cost
1982	5			4.5			0		
1983		2.72	0	4.5			0		
1984		2.72	0		2.72	2.75	0		
1985		2.72	0		2.72	2.75	6		
1986		0	0		0	2.75		0	2.75
1987		0	0		0	2.75		0	2.75
1988		0	0		0	2.75		0	2.75
1989		0	0		0	2.75		0	2.75
1990		0	0		0	2.75		0	2.75
1991		0	0		0	2.75		0	2.75
1992		0	0		0	2.75		0	2.75
IRR		29 per cent			36 per cent			42 per cent	
NPV (at 15%)			$2.14 million			$8.54 million			$4.11 million

Assumptions about the new port: Opening year in 1986. Bulk-handling facility installed during 1985 at a cost of $6 million. After the new port is opened it is assumed that the combined capacity of the old wharf and new port will be sufficient to reduce congestion and demurrage to a negligible amount. Only savings in transport cost from direct shipment of large (10,000 GRT) bulk carrying vessels will result.

Appendix 2 (cont.)

Savings in demurrage for grain ships is calculated at an average of $17 per ton of grain for 80,000 tons per year, or $1.36 million per year. It is assumed, conservatively, that an equal amount of savings in demurrage will accrue to non-grain ships. The operating and maintenance cost of the bulk facility is assumed negligible compared with the savings in demurrage.

Saving in transport cost is assumed at $50 per ton by eliminating stevedoring in the transport port (Dakar, Antwerp, etc.) and the line haul cost by coastal vessel. It is assumed that a total of 55,000 tons now carried by coastal vessels will be carried by larger bulk carriers. This is in addition to the 25,000 tons already carried (bagged) in larger carriers.

Appendix 3

Economic Cost of Ship Waiting Time
US $/24 hours

Ship Category	Gross Register Tonnage	Ship Waiting Cost ($/24 hours)	Approximate Waiting Cost ($/ton/24 hrs)
Small Coastal Vessels	Less than 1500	1700	2.30
Coastal Vessels	1500 - 2000	2200	1.30
Small Liners and Cement Trampers	2000 - 6000	4000	1.00
Medium Size Liners	6000 - 9000	5200	.70
Large Liners	More than 9000	6500	.60

Source: IBRD Appraisal of Nouakhiban Port Project, Mauritania, Oct. 13, 197-
Study Team Estimates and Updating to 1982

APPENDIX 4

Losses in shipment by coastal vessel, 1981

A. Based on 9 voyages by the Santa Monica, Thor, and Afro-Star

Average tonnage loaded in Dakar aboard coastal vessel:	1381.23 tons
Average tonnage discharged in Nouakchott Wharf	1377.17 tons
Average loss on sea voyage and discharge	4.06 tons (.29%)
Average tonnage received at Nouakchott Storage depot (Terre plain)	1350.55 tons
Average tons lost between Wharf and storage depot	26.62 tons (1.93%)

Total loss per voyage 30.68 tons (2.22%)
Cost of losses per ton of wheat:
Sea voyage and discharge: .0029 x (180+96)= $ 80/ton
between Wharf and warehouse: .0222 x (180+96) =$6.13/ton

Total $6.83/ton

B. Based on 9 voyages made by Afro-Star

Dispatched	6912.81 tons
Received Terre Plain	6823.68 tons
	89.13 tons (1.29%)

Cost of losses per ton of wheat including the coastal ship voyage, and between Wharf and warehouse: .0129 x (180+96) = $3.56/ton

APPENDIX 5

STEVEDORING AND OTHER CHARGES AT NOUAKCHOTT WHARF INCURRED BY OMC FOR USAID PL 480 GRAIN SHIPMENTS, 1981

Date	Vessel	Stevedoring Ashore	Overtime Personnel	Overtime Equipment	Trucks	Maritime Equipment	Wharf Charge	Lighthouse Tax	Cranes	Total
14/05/81	Maria Monica	158,043	83,380	87,589	81,000	-	270,000	22,500		702,512
03/06/81	Maria Monica	421,115	190,882	260,020	135,000	67,200	725,841	60,500		1,860,558
22/06/81	Maria Monica	423,820	167,539	290,079	135,000	74,900	736,020	61,350		1,888,708
22/06/81	AFRO-STAR	128,045	200,178	92,820	54,000	68,600	228,000	19,000	48,500	839,143
04/07/81	AFRO-STAR	131,034	90,855	101,456	81,000	74,900	228,000	19,000	65,000	791,245
20/07/81	THOR	193,143	190,882	254,482	81,000	68,000	330,238	27,525		1,145,870
02/08/81	AFRO-STAR	136,486	109,717	159,426	54,000	67,200	234,057	19,525		780,411
27/08/81	AFRO-STAR	132,914	90,855	98,384	54,000	67,200	230,000	19,000		692,353
12/09/81	AFRO-STAR	134,534	82,460	171,468	54,000	-	230,000	19,000		691,462
		1,859,134	1,206,748	1,515,724	728,000	488,600	3,212,156	267,400		9,392,262
		10,624 Tonnes								
	CFA/Ton	1,069	693	871	418	281	1,845	154		5,396

Source: OMC

APPENDIX 5

STEVEDORING AND OTHER CHARGES AT NOUAKCHOTT WHARF INCURRED BY OMC FOR USAID PL 480 GRAIN SHIPMENTS, 1981

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22/06/81	Maria Monica	423,820	167,539	290,079	135,000	74,900	736,020	61,350		1,888,708
22/06/81	AFRO-STAR	128,045	200,178	92,820	54,000	68,600	228,000	19,000	48,500	839,143
04/07/81	AFRO-STAR	131,034	90,855	101,456	81,000	74,900	228,000	19,000	65,000	791,245
20/07/81	THOR	193,143	190,882	254,482	81,000	68,000	330,238	27,525		1,145,870
02/08/81	AFRO-STAR	136,486	109,717	159,426	54,000	67,200	234,057	19,525		780,411
27/08/81	AFRO-STAR	132,914	90,855	98,384	54,000	67,200	230,000	19,000		692,353
12/09/81	AFRO-STAR	134,534	82,460	171,468	54,000	-	230,000	19,000		691,462
		1,859,134	1,206,748	1,515,724	728,000	488,600	3,212,156	267,400		9,392,262
		10,624 Tonnes								
	CFA/Ton	1,069	693	871	418	281	1,845	154		5,396

Source: OMC

Annex H: FOOD AND AGRICULTURAL SECTOR STRATEGY FOR USAID/MAURITANIA

INTRODUCTION

The first group of USAID projects involving the agricultural sector are either in the implementation stage or ending. These projects represent a potpourri of developmental and food aid initiatives which responded to a crisis caused by the drought situation. At this juncture, many of the major constraints to self-reliant development have been identified, resource inventories have been undertaken, and a knowledge of the local institutional capabilities has been acquired. From these facts, the most important parameters which will shape our assistance program have emerged. These parameters include other donor activities, mission development assistance and management budgets, the Mauritanian resource base and absorptive capacity, and the geographical distribution of population centers.

It is well known that USAID plans to comprehensively assess the agricultural sector, to outline a strategy for the next five to ten years, and to conduct prefeasibility analyses of the project(s) that will implement the strategy. In the interim, considering the relative paucity of alternative investment opportunities, the Mission has identified a program focus that responds to the parameters discussed above.

AFRICA BUREAU POLICY

The Mission strategy coincides with the major components of Africa Bureau policy. Our strategy responds to the need to reverse the trend of declining per capita food production in Mauritania. Our strategy addresses the need to increase productivity per hectare and to increase the area under production. Our strategy addresses factors such as how host country policy issues are influenced and how institutions that support policy reform are developed and strengthened. Lastly, our strategy calls for greater participation by farmers and farmer groups in the development process.

USAID/MAURITANIA STRATEGY

This strategy is a departure from the strategy implicit in earlier Mission activities. It starts from the recognition that the "emergency" rationale of the past can no longer be valid justification for projects focused on targets of opportunity or on specific geographical zone and must now be jointly focused on policy issues, on food availability and production, and on the urgent need to address institutional and human resource development.

The current strategy is designed to increase food availability. The components of the food and agriculture strategy address long and short range impediments to increased production and are designed to complement each other. The strategy components are listed below:

Policy Reform

To increase food availability, USAID will support activities to strengthen policy designed to minimize food subsidies and provide production incentives.

Institutional Development

USAID strategy is to support the development of institutions that have a beneficial impact on food production or that increase the efficiency of the marketing system.

Human Resource Development

Recognizing that the development of Mauritania cannot proceed without a cadre of trained personnel and informed citizens, the strategy dictates that heavy emphasis be placed on human resource development. The details of this component of the strategy will result from the sector assessment.

One envisions a major emphasis on US and third country training at the technician, B.S., and professional levels as well as an emphasis on the development of indigenous institutions where appropriate.

Increased Food Production

Where the prerequisites exist, USAID will support food production projects. Our efforts will not have a geographical focus, but will reflect balanced development, economic rationale, and technical feasibility. Available data suggests that dry land (rainfed, recessional) agriculture will be the most effective means of increasing production in the short run. However, irrigated agriculture may be the only long run solution for satisfying the caloric requirements of Mauritania's population. The strategy calls for an integration of the "OMVS" program (agricultural research, irrigated production, and area development) into the bilateral strategy. The sector assessment will determine if resources additional to the planned OMVS Projects should be committed in the river basin.

Livestock is the single most important sector in Mauritania's agricultural activities. It makes a major controbution to GDP (17%) and is pervasive in the lives of Mauritanians. USAID does not envision activities in this sub-sector for several reasons. The current traditional system "works" and to our knowledge there is no cost effective method of modifying the system which would result in substantial improvements in herder health and welfare or in improvements of the range given the existing political, social, and economic climate. Where we could contribute effectively is in animal health. However, other donors and the government are able to deal with this concern. Better health often translates into larger herds and more pressure on the range, thus better animal health may actually generate negative effects. AID support for commercial livestock ventures or joint ventures would be considered if proposed by cooperatives or by private entrepreneurs.

Maintenance and Improvement of the Natural Resource Base

The implementation of USAID strategy must support the maintenance and improvement of the natural resource base. This is not to say that specific USAID projects need to address this issue. However, USAID projects must be extremely environmentally sensitive.

Self-Reliance

Mauritania is a poor country. It is poor in skilled human resources. Its endowment of natural resources is meager. USAID strategy requires that as little as possible additional burden be placed on existing institutions and that new institutions not be created.

Maximum individual and community participation and control of the development process is to be supported. Development of community and individual skills is given high priority.

Administration

The projects that implement the strategy will also have an orientation predetermined by the strategy. They will be uncomplicated and few in number. During the design phase of project development the implementation plan and procedures will receive the same feasibility scrutiny that other chapters of the paper receive. The strategy calls for the staffing of a Mission Food and Agricultural Division. The Division will be comprised of a small core of DH Project Officers with professional agricultural and management backgrounds. The core group will be supported by contract employees and professional FSN employees. Maximum responsibility for project implementation will be placed on the Government, local individuals, communities, contractors, or universities.

USAID/Mauritania will develop a long-term relationship with a "Land Grant" (Title XII) University. The university will backstop the Government's food and agriculture program and assist in the design and implementation of the USAID program.

RELATION OF THE TITLE II SECTION 206 PROGRAM TO THE STRATEGY

USAID's Food for Development program is designed to respond to the USAID program of influencing host country policies that hinder development. The USAID/Mauritania Food for Development program and the analysis that justifies this program, comprise one component of the overall Mission strategy. This is a component that must be addressed within any assistance strategy in Africa today - increased food production. This is particularly true for Mauritania where there is a chronic food (cereals) deficit.

Annex I: INITIAL ENVIRONMENTAL EXAMINATION

USAID Regulation 16 was adopted in 1976 to protect the environments and peoples of developing countries. It applies to any USAID project in which funds are to be used for the procurement of application of pesticides. USAID financing of the section 206 project, "Reinforcement of the Crop Protection Service" will therefore be contingent on compliance with Regulation 16.

Regulation 16 discourages the use of USAID funds for projects that purchase or use pesticides that are not registered for the same or similar use by the United States Environmental Protection Agency (USEPA). Regulation 16 restricts proposals for the use of: a) any pesticide other than one registered in the U.S. for the same or similar use as that proposed in the project without restriction, or for restricted use on the basis of user safety or b) any pesticide for which a notice of Rebuttable Presumption against Registration, notice of intent to cancel, or notice of intent to suspend has been issued by USEPA.

Paragraph 216.3 (b)(1)(i) of Regulation 216 establishes the procedures used evaluating the benefits on the planned pesticide use.

1. The USEPA registration status of the requested pesticides. The Mauritanian Crop Protection Service is currently using four pesticides: Fenethrothion, Malathion, Propoxur and Thiram. The first three are used mainly for grasshopper control, and the fourth, Thiram, is a fungicide seed treatment used for sorghum and millet. Malathion and Thiram pose no problems as they are registered for the same or similar use in the U.S.

   Propoxur, although not registered for grasshopper control on cereal crops in the U.S., is registered for general use under the trade name Baygon, for control of cockroaches and other household pests. Propoxur is also registered for agricultural use for the control of turf pests.

In West Africa, Propoxur has been used for grasshopper control over the past several years to replace BHC, a chlorinated hydrocarbon insecticide which has been cancelled by the USEPA. Minimum residue levels (MRL) have been established by the FAO for Propoxur on cereal crops. The use of Propoxur by the Mauritanian Crop Protection Service should pose no problem as it is considered safe enough for household use by the USEPA and the MRLs have been established by the FAO for use on cereal crops.

Fenethrothion does pose a problem as it is not registered for any use in the U.S. This is not due to any human or environmental safety factors but simply because no one has tried to get Fenetrothion registered for use in the U.S. The FAO has set MRLs for Fenethrothion on cereal crops and it is registered for use in most European countries.* Nevertheless, if Fenethrothion is not registered for use by the USEPA before this project begins operating, USAID will advise the Mauritanian government that project funds will not be made available until the use of this pesticide is discontinued.

2. The basis for selection of the requested insecticides

The pesticides cited in section 1 of this paper are the insecticides currently being used by the Mauritanian Crop Protection Service. The Crop Protection Service selects the pesticides to be used on the basis of their efficacity, safety for the environment, and safety for the manipulator. Although the Regional Food Crop Protection Service does not purchase any pesticides, the PASA Crop Protection Specialist assigned to work with this project in Mauritania advises the Mauritian government on which pesticides to procure and in what quantities. This person reviews the USEPA status of the pesticides before making any recommendations. The Mauritanian government is now in the process of establishing a Pesticide Registration Committee which will eventually control the importation and use of pesticides in Mauritania.

It is likely that during the life of the Section 206 project, pesticides other than those listed above will be used by the Crop Protection Service. The USEPA status of these pesticides will be reviewed as part of the selection process for these pesticides.

3. The Extent to which the proposed use is part of an integrated pest management program.

The Mauritanian Crop Protection Service, in conjunction with both the RFCP and IPM projects, is developing integrated pest management approaches for agricultural pest control in Mauritania. As these efforts progress, practical non-chemical control methods will be introduced as they are identified over the life of the project. The Crop Protection Service is presently working on an integrated control approach to grasshopper control using wheat bran baits. This method significantly decreases the amount of pesticide used and the impact on non-target organisms. The Service is also in the process of extending to the farmers a non-chemical method for control of cowpea weevils in storage. USAID's Crop Protection Assistance projects in Mauritania have been very influencial in redirecting the Crop Protection Service from a pesticide application oriented service to an integrated pest management approach to pest control. It is anticipated that the Section 206 funds to be used to compliment and expand the Service's pest control efforts will be directed towards increasing the emphasis towards an integrated approach to pest management.

4. The proposed method or methods of application, including availability of appropriate application and safety equipment.

The Regional Crop Protection Project procures most of the application equipment and all of the safety equipment used by the Mauritanian Crop Protection Service. All applications are made by ground equipment either mounted on vehicles or carried by the applicator. The application equipment is periodically checked for safety and effectiveness.

All equipment undergoes a thorough overall once a year at the end of the cropping season. The safety equipment used by the pesticide applicators includes rubber boots, rubber gloves, respirators, plastic goggles, and overalls. The safety equiment used complies with NIOSH regulations (National Institute for Occupational Safety and Health).

5. Any acute and long-term toxicological hazards, either human or environmental, associated with the proposed use, and measures available to minimize such hazards.

All pesticides are potentially dangerous to humans and to the environment and should be treated with great care regardless of their relative toxicity. Any pesticide can impose an environmental insult or human danger when introduced in an unmitigated fashion such as in excess, to an improper site, an accidental spill, or deliberate dumping of excess tank mix.

The acute and chronic toxicities are presented in the table below for the four pesticides being used by the Mauritanian Crop Protection Service.

PESTICIDE	ACUTE ORAL LD50	ACUTE DERMAL LD50	CHRONIC EFFECTS NO EFFECT LEVEL	TOXICITY RATING
Malathion	1375 mg/kg	4444 mg/kg	100 PPM	slightly toxic
Fenethrothion	800 mg/kg	1300 mg/kg	5 PPM	slightly toxic
Propoxur	104 mg/kg	1000 mg/kg	250 PPM	moderately toxic
Thiram	780 mg/kg			slightly toxic

In general these pesticides are compatible with the ecosystems encountered in the agricultural zone of Mauritania. None of the pesticides being used are highly toxic for warm-blooded animals.

All of the pesticides being used are rapidly degradable in the environment and do not accumulate in living organisms. For this reason, no long-term adverse effects are foreseen. Two of the pesticides being used, Malathion and Fenetrothion, although not highly toxic for mammals, are moderately toxic for fish. Because of this, extreme care will be used with these two pesticides when in use near waterways.

Mitigation of the identified adverse effects will be achieved through continued training of the staff members of the staff members of the Crop Protection Service will be used to compliment and expand the continued training efforts of the Regional Food Crop Protection Project.

The development of economic thresholds, being undertaken by the RFCP and the IPM projects for application against specific pests will reduce the hazard of "prophylactic treatments" and reduce the amounts of chemicals that would otherwise enter into the environment. All of the potential hazards can be minimized by adopting appropriate safety procedures and dosages and by applying the pesticides selectively and judiciously based on the thresholds.

6. The effectiveness of the requested pesticides for the proposed use.

The pesticides which are being used have been proven effective over the course of years for control of West African pests. Malathion, Fenetrothion, and Propoxur are recommended by OCLALAV (Organisation Commune de Lutte Antiacridienne et de Lutte Antiaviaire) for control of acridien pests. The USDA Crop Protection Specialist with the RFCP project has observed first hand the efficacity of these pesticides over the past five years. Any new pesticides to be used by the Mauritanian Crop Protection Service are subjected to one year of field testing for efficacy before being adopted for full scale use.

The seed treatment, Thiram, is used in many parts of the world for control of various fungal diseases of cereal crops. It has proven extremely effective in the control of the grain smuts and seed rots of sorghum and millet.

7. Compatibility of the proposed pesticides with target and non-target ecosystems.

See Section 5

8. The conditions under which the pesticide is to be used, including climate, flora, fauna, geography, hydrology and soils.

The Mauritanian Crop Protection Service primarily works in the southern agro-pastoral zone of Mauritania in the cultivated land areas where wildlife is sparce. Hence the effects on the proposed uses on native wildlife will be minimal. Furthermore, the agricultural areas of Mauritania are characterized by a semi-arid tropical climate. The high temperatures in this area lead to a more rapid photo-chemical breakdown of pesticide residues than takes place in temperate areas of the world. The pesticides being used are not persistent and will break down to non-toxic substances within 3-21 days after application.

9. The availability and effectiveness of other pesticides or non-chemical control methods.

See Section 3

10. The requesting country's ability to regulate or control the distribution, storage, use and disposal of the requested pesticides.

The Mauritanian Crop Protection Service, which has been assisted by the USAID Regional Food Crop Protection Service since 1977, controls the distribution, storage and use of the pesticides in question.

The Service currently has one storage warehouse in Nouakchott along with four other storage warehouses located in regional capitals in the agricultural zone. These warehouses are kept locked except when pesticides are stocked or taken out for use. An inventory is kept of all pesticides entering and leaving the warehouse. The distribution and use of these pesticides is by the Crop Protection Service's own mobile teams which operate throughout the southern part of Mauritania. These teams have been trained by the PASA Crop Protection Specialist assigned to work with the National Crop Protection Service.

11. The provisions made for training of users and applicators.

This does not pose a problem as the USAID Regional Food Crop Protection Project has in the past and will continue in the future to thoroughly train the staff members of the Crop Protection Service. By the PACD of the RFCP project (1985) a trained cadre of Mauritanians will be in place to continue training efforts.

12. The provisions for monitoring the use and effectiveness of the pesticides.

The USDA/PASA Crop Protection Specialist with the RFCP project will assure the monitoring of the use and effectiveness of pesticides until the end of the RFCP project in 1985. When this person leaves, four Mauritanians which will have been sent to the U.S. for long-term crop protection training will have returned and will be working with the Crop Protection Service to ensure the continued monitoring of Crop Protection Activities.

Annex J: PROGRAM DESIGN SUMMARY LOGICAL FRAMEWORK

Project Title and Number: Mauritania Title II, Section 206
Food for Development Program

Life of Project: FY82 to FY85/87
Total US Funding: $
Date Prepared: May 1982

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Program Goal: Increase Mauritania's Food Self-Reliance	Measures of Goal Achievement Reduction of emergency food aid from 35% of total requirements in 1983 to 15% by 1987.	Annual FAO - sponsored multi-donor mission	- Planned food production projects are implemented on schedule. - GIRM increases commercial food import capacity as result of successful economic stabilization and recovery program. - No major natural disasters. - No new outbreaks of the Western Sahara War involving GIRM.
Project Purpose: (1) Increase domestic marketed food production	Conditions that will indicate purpose has been achieved: End of project status: OMC increases purchases of locally produced foodgrains from an average annual level of 2000 MT in 1982 to 4500 MT in 1987.	OMC records	- OMC producer prices are announced by May 1 of each year in order to affect farmer planting decisions. - OMC buying campaigns are timely and efficiently supported with financial resources and buying agents. - Farmers and traders are responsive to price incentives.
(2) Strengthen OMC Food marketing and distribution system	OMC handling capacity increases from 20,000 MT in 1982 to 64,500 in 1985 and stocks turn over once annually. OMC operating as a financially self-sustaining institution by 1987.	OMC records	- FRG technical and training assistance continues - ADB project to construct 32 1000 MT capacity centers implemented on schedule.
Outputs: (1) Food Price Policy Reform Program	Magnitude of Outputs: -OMC wholesale prices at 100% import parity plus internal transport and handling by 1987.	GIRM records, evaluations, and site visits	- Price increases can be adminisered incrementally without seriously adverse consumption effects and/or political risks.
(2) Food Marketing and Price Stabilization Program	-Market prices stabilized within range of fluctuation not to exceed 20% by 1987. -Food price monitoring system established and fully operational by 1983 -40 OMC rural marketing specialists and warehousemen trained and functioning by 1985.		- Severe drought does not disrupt market stability. - GIRM increases CAA and SONIMEX food prices more in line with import parity criteria.

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
	-One OMC MT warehouse and 5 OMC 500 MT warehouses constructed by 1988. -Studies on impact of food aid traditional marketing of cereals and national price and production trends completed by 1984.		
(3) Food Crop Extension Project	-275 farmers trained in and employing animal traction technology by 1985. -275 teams of oxen trained by 1985 -275 animal traction demonstration plots utilized by 1985. -200 animal traction equipment loans extended by 1985. -620 ha planted to improved seeds by 1985. -700 traction animals vaccinated by 1985. -670 MT of additional grain produced by 1985. -70 MT of additional vegetables produced by 1985. -75 village small infrastructure projects completed by 1985.		- Farmers adopt technology - Qualified resident staff personnel can be found who are willing to reside in Selibaby and who can interact successfully with indigenous personnel.
(4) Reinforcement of Crop Protection Service	-4 regional crop protection centers constructed and operational by 1987. -Diagnostic center constructed and operational by 1985. -Fences around 4 existing pesticide storage warehouses constructed by 1984. -Surface area treated increases by 8400 ha per year by 1987.		
(5) Rural Road Rehabilitation	-115 kilometer section of M'Bout-Kaedi road upgraded to year-round, all-weather serviceable road.		
(6) Bulk Handling Facility	-Bulk handling facility constructed by 1986.		
INPUTS: See Sub-Projects Budget			