



USE OF TREATED SEWAGE FOR IRRIGATIONTABLE OF CONTENTS

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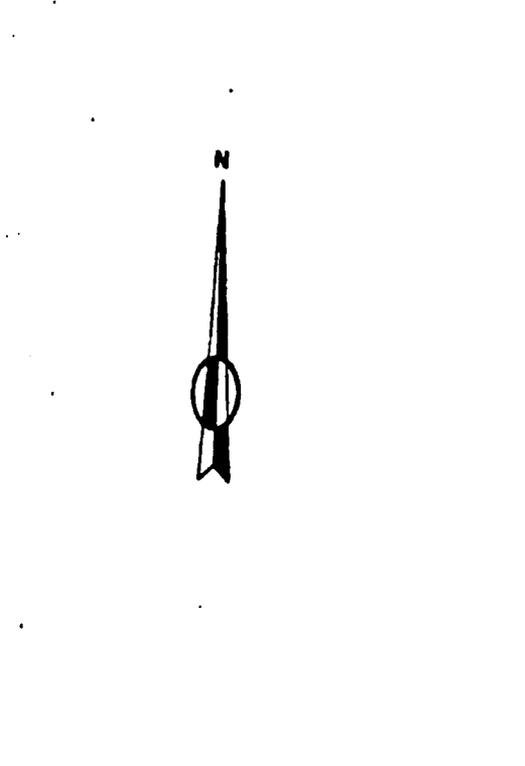
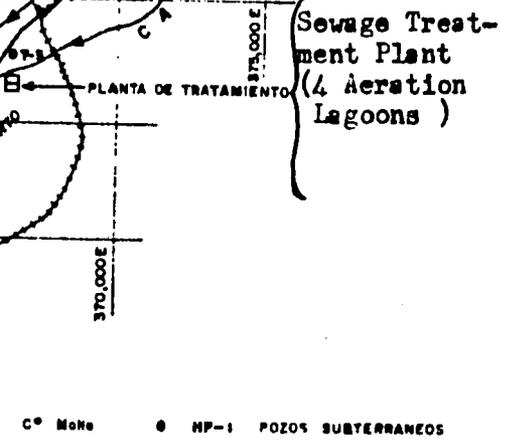
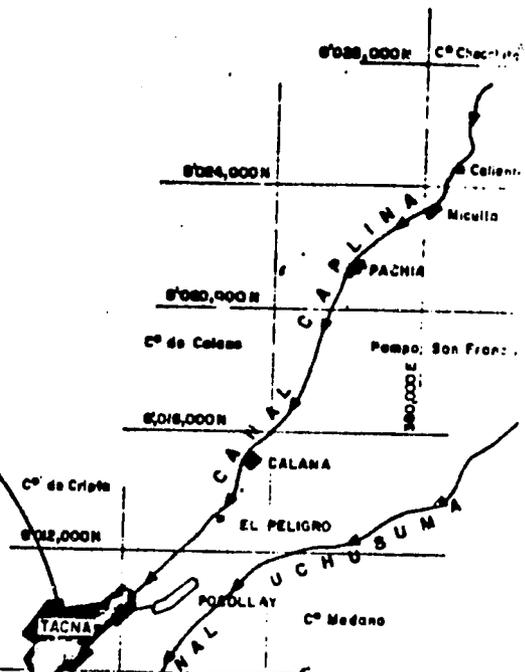
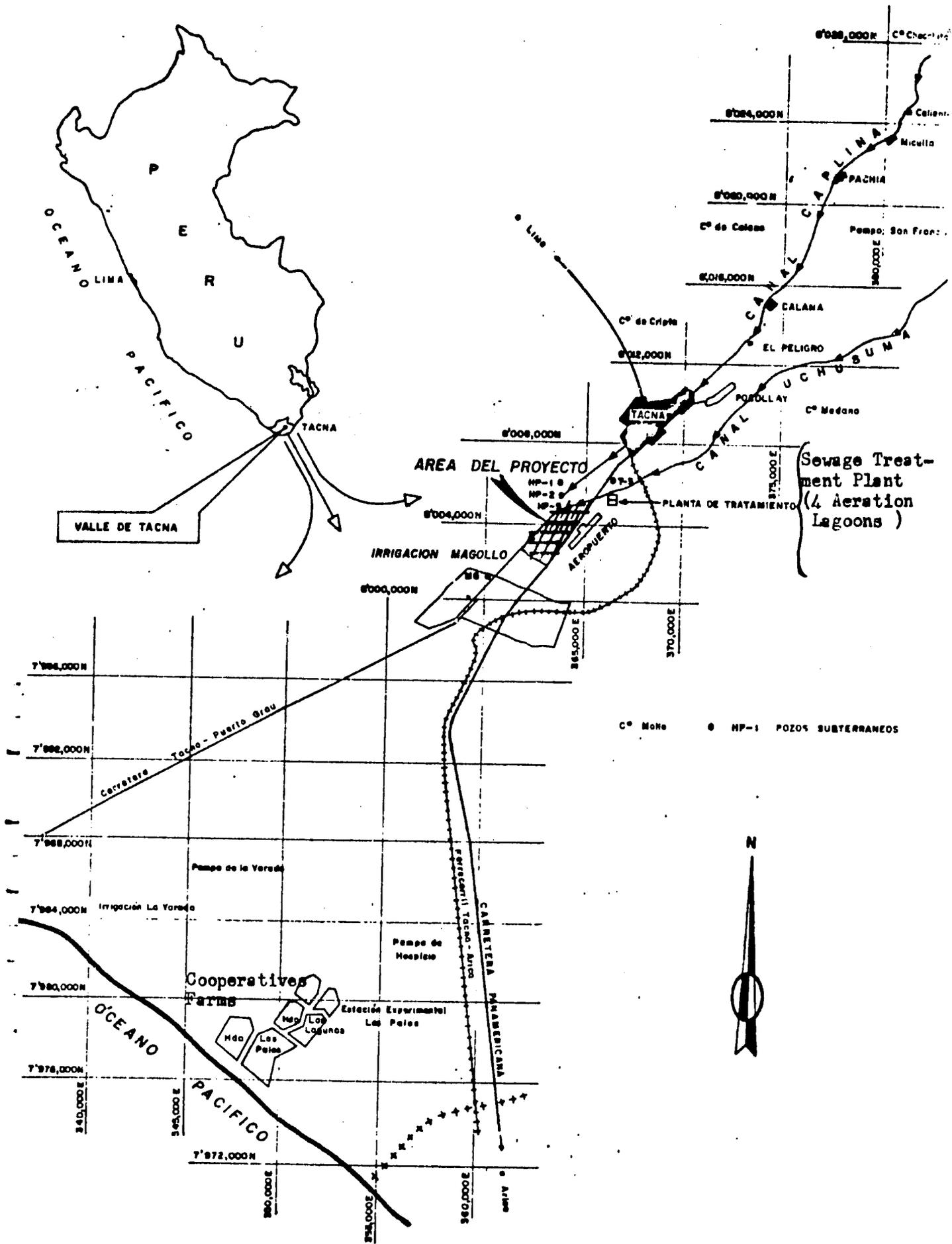
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**B. LIST OF ABBREVIATIONS FOR****PERUVIAN AGENCIES**

GOP . . . . .	Government of Peru
MOA . . . . .	Ministry of Agriculture
DGA . . . . .	Directorate General of Waters
DIPRECO . . . . .	Directorate of Preservation and Conservation
A. Z. VII . . . . .	Agrarian Zone No. 7
A. B. . . . .	Agrarian Bank
MOF . . . . .	Ministry of Food
MOH . . . . .	Ministry of Health
AREA No. 4 . . . . .	Tacna Office of the Ministry of Health.

C. LOCATION MAP

5.



USE OF TREATED SEWAGE FOR IRRIGATION  
PROJECT PAPER

PART I. SUMMARY AND RECOMMENDATIONS

- A. Face Sheet
- B. List of abbreviations for Peruvian Agencies
- C. Location map
- D. Recommendations

USAID/Peru recommends that AID/W authorize a Grant of \$200,000 (\$125,000 in the Transition Quarter and \$75,000 in FY 1978) to assist the Government of Peru, through the Directorate General of Waters of the Ministry of Agriculture, to demonstrate the economic and technical feasibility of producing significant quantities of food and forage on Peru's vast coastal desert by irrigating with treated sewage effluent. The demonstration will be executed at a site near the city of Tacna in southern Peru.

E. Description of the Project

Based on an existing sewerage treatment facility, this project provides for the construction of an irrigation system to utilize available treated sewerage effluent for crop production on the coastal desert lands near Tacna. The system to be constructed will service an initial 120 hectares by 1978 and will be designed for extension to an additional 80 hectares which will be developed by the GOP at a later date. The project is designed to demonstrate the economic feasibility of producing significant quantities of food-stuffs on now barren desert lands reclaimable in this manner and to demonstrate that foods grown with treated sewerage meet sanitary regulations for foods for human consumption.

The construction of the project irrigation system will be completed by early 1978, thus permitting the planting of 120 hectares of crops at that time. This area is sufficient for the harvesting of approximately 6,708,000 pounds of agricultural products per year based on a land utilization ratio of 1.65 which will be obtained through double cropping. Initial production, in accordance with existing GOP sanitary regulations, will include corn, potatoes, lima beans, squash and alfalfa.

An important aspect of the project, however, will be a five hectare research plot to be administered and monitored collaboratively by the agriculture and health authorities. The research plot will provide for continuous analysis of soils, water quality, etc., but will also be devoted to the testing of the sanitary properties of labor intensive, high value crops such as tomatoes, melons and lettuce which are at present precluded from production with the use of sewerage effluent under the GOP sanitary code. The purpose of this research is to demonstrate that treated sewerage effluent is safe for the production of such food crops.

The Directorate General of Waters (DGA), a principal division of the Ministry of Agriculture (MOA), will be the responsible GOP Agency for this project acting in close coordination with the Agrarian Zone VII (MOA Tacna Office) and other local institutions such as the Tacna Office of the Agrarian Bank, the Ministry of Health's Tacna Office, and the local office of the Ministry of Food (MOF). Beneficiaries of the project will be landless former farmers who will be organized into a cooperative by the Agrarian Zone VII (A.Z. VII) concurrently with the execution of infrastructure works.

The most important structure of the system already exists and is operating; this is the sewage treatment plant. The project will finance primary and smaller secondary canals, low cost feeder roads, water control gates and research and supervision. GOP counterpart contributions to this project will be basically in-kind and credit, providing services, some of the skilled and support personnel at all stages of the project and some of the materials. AID grant funds will be utilized for renting certain pieces of equipment, for contracting specialized professional personnel, and for labor and some materials.

## F. Summary Findings

### 1. Priority

USAID/Peru and the Ministry of Agriculture's Directorate General of Waters (DGA) staff have worked closely to develop this project and have readily secured the interest of other GOP agencies, e.g., the Ministry of Health and the Agrarian Bank, in collaborating. The project fits well within the GOP's economic development priorities which stress increased food production through such means as the expansion of Peru's limited arable lands through irrigation projects. It is the Mission's

judgement that the AID assistance proposed under this project can lead to significant economic benefits to Peru in terms of maximizing scarce coastal water resources to increase the domestic food supply.

## 2. Administrative and Technical Feasibility

The planning, design and cost calculations for construction, which the DGA has done for this project, have essentially followed irrigation planning practices which have been used and refined in Peru over the past years and which are accepted as standard for small irrigation projects. DGA's engineers approached the project planning with professional competence in each of several engineering disciplines. Their field investigations have been in sufficient depth to assure that adequate data is available for developing and laying out all elements of irrigation and drainage. USAID/ENG has reviewed the DGA standard designs and has found them to be technically satisfactory. In the final engineering study the standard designs will be tailored to actual field conditions and, at that time, will again be reviewed by USAID/ENG to assure their adequacy.

GOP funding for the project is contained in their 1976 budget and in the 1977/78 biennial budget request of the DGA. The additional resources required of the DGA as a result of this project does not impose an excessive burden on its current or future funds. The USAID is confident that sufficient technical management capacity exists in the DGA to execute the project effectively and efficiently as they have demonstrated in various projects in several parts of Peru.

## 3. Financial and Economic Feasibility

The feasibility study prepared by the DGA on the proposed project contains a detailed economic and financial analysis which demonstrates clearly the feasibility of the program. A study of the costs and incomes generated by the project over the course of a 25-year period, which is calculated to be the useful life of the project, showed the projected internal rate of return to be 23.94 and the benefit-cost ratio to be 1.13 for the first phase of the project (120 Ha.). For the second phase of the project (200 Ha.) the projected internal rate of return is 24.10% and the benefit cost ratio is 1.16.

#### 4. Replicability and Output Potential

Peru's coastal desert is ideal for treated sewage irrigation projects. The ultra-violet ray factor is extremely high on the desert, even during seasons when large areas have cloud cover. These rays speed the oxidation digestion of sewage in the treatment process by speeding algae growth in the lagoons. It is estimated that about 14,000 hectares of land near Peru's 8 major cities could quite readily be irrigated with treated sewage. As double cropping is feasible along the coastal desert, a cropping equivalent of approximately 23,100 ha. of arable land could be achieved through project replicability (14,000 has. X land use intensity factor of 1.65).

The following illustrates the potential outputs which may reasonably be projected for the above mentioned replicable area based on analyses undertaken for the project demonstration site.

##### a. Production of Agricultural Commodities

For the Tacna pilot project, the projected gross value of agricultural production averages S/.40,400 (US\$898) per hectare. Applying this average to 23,100 has. results in a total value of potential production of US\$20,744,000. This total is equivalent to 5% of Peru's total 1975 food imports (\$395 million). While there is not a complete overlap between current food imports and the types of crops which could be grown with treated sewage irrigation, such production would result in direct savings in the case of corn, potatoes and meat (alfalfa).

Actual commodities produced would vary from area to area, depending upon temperatures, soil conditions, and whether or not the GOP changes its current policy on the types of crops which can be cultivated using treated sewage. In general, however, one hectare of intensively cultivated arable coastal land in Peru is capable of supporting ten people per year in terms of agricultural crops. An expanded system of treated sewage irrigation should then eventually be able to support 230,000 people in terms of its production.

##### b. Employment

###### i) Family

Assuming an average of one family per 4.5 has. of actual land, approximately 3,110 farm families (18,660

people) could become direct beneficiaries of project replicability. Using a general rule of thumb of 2.2 workers per farm family, 6,842 jobs would be created among the beneficiaries themselves.

ii) Contracted Labor

Assuming labor needs average 100 man days per cropable hectare, total manpower requirements would be 2,310,000 person days. Family labor available is calculated at 2.2 family members available for 220 days per year. Total family labor (3,110 x 2.2 x 220) is 1,505,240 man days. Contracted hired labor would be required to complete the remaining needs: 804,760 days or 3,658 jobs representing a value of S/.132,636,640 (US\$2,947,480) at current wage levels.

iii) Cost Per Job Created

The Tacna pilot project will require an average investment of \$1,421 per hectare. This cost does not include approximately \$79 per hectare which would be required for pumping in other areas, thus bringing the total average investment per replicable hectare to \$1,500. Since a total of 10,500 new jobs would be created (family labor plus contracted labor) the average cost per job created would be \$2,000 (14,000 has. times \$1,500 divided by 10,500). This figure compares very favorably with this Mission's experience in "little man" type projects under earthquake reconstruction assistance. The average cost per job under Loan 053 was \$3,159 in the Coast and \$2,906 in the Sierra.

It should be noted that replication would also require new GOP investment in sewage treatment facilities such as that which already exists in Tacna. Such facilities would have an average cost of \$2,000 per hectare. This cost was not included in the above calculations since it represents an investment primarily in the sanitation/environment/health sector and should not be charged to agriculture. Nevertheless, inclusion of this major cost would still result in a return on investment of 8.53%, not taking into account the benefits of an improved health environment.

c. Prospects for Replicability

The GOP is showing increasing interest in building sewage treatment facilities based primarily on health considerations. In addition to Tacna, for example, sewage treatment lagoon facilities already exist at Ica, Sullana and Piura. Heightened

interest in sewerage treatment facilities for their potential for reclamation of valuable water for agricultural purposes may reasonably be predicted as a result of the execution of the proposed demonstration project.

Moreover, sewage treatment facilities are essential for reversing the serious contamination of several streams and adjacent coastal areas nearby Peru's larger coastal cities a subject of increasing GOP and private concern. As an example, the immediate ocean and swimming beaches fronting Lima have a pollution contamination factor 6 times higher than the permissible maximum. As one result of awaking concerns relative to such contamination, a pre-feasibility study has recently been made for recovering and treating some 6 cubic meters per second, i.e., 60% of the city's present discharge of raw sewage.

Thus, based on health, agricultural, and environmental interests and the financial and technical advantages of sewage lagoon treatment facilities along Peru's coastal desert, project replicability is both desirable and likely.

## PART II. Background and Detailed Description

### A. Background

#### 1. Agricultural Sector Background

One of the major problems impeding Peru's economic growth is the continuing low growth rate of the agricultural sector which in recent years has given rise to shortages of foodstuffs, vastly increased imports of basic foods, and inflationary pressures. <sup>1/</sup> An estimated 47% of Peru's population is dependent upon the agricultural sector, which is characterized by poor farming practices, a low level of technology and correspondingly low income levels.

An estimated 45% of Peru's population is concentrated on the Pacific coast desert. This sloping plain extends nearly the full length of Peru, over 1600 miles, but, squeezed between the ocean and the abruptly rising Andes, it averages less than 12 miles in potentially useable width. Fifty-three short fast flowing streams cut this desert. Only thirteen of these have continuous flow, although they all provide for some irrigation within the immediate confines of their valleys. As a result they are the oasis around which population centers and immediate agricultural support areas have developed. Between the river valleys there is only desert, which has little economic potential in its present condition.

The limited productive land base of Peru is a major constraint to achieving agricultural goals. It is estimated that there are approximately 400 persons per square kilometer of arable land in the country, a very poor ratio when one considers the number of inhabitants which depend on agriculture for a livelihood, and the high (3.1%) rate of population growth.

While the agricultural sector employs an estimated 47% of the total work force, its relative contribution to GDP has been steadily dropping over the last decade. In 1965 agriculture contributed

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<sup>1/</sup> Peru's food imports amounted to \$166 million in 1972; in 1973 these jumped to \$238 million and soared to \$395 million in 1975. This contributed to Peru's international reserves decline of \$543 million during 1975.

18.3% of GDP; this dropped to 14.9% in 1972 and is estimated at 13% in 1974/75. Agricultural growth rates since 1970 have ranged from "poor" to "unacceptable" in economic terms. The following table gives the latest Ministry of Economy and Finance figures on percentage growth rates for overall GNP and key sectors of the economy, clearly indicating the relatively poor performance of the Agricultural Sector.

	<u>1974</u>	<u>1975</u>
GNP	6.6	4.0
Agriculture	2.3	1.0
Fishing	40.0	-18.1 <u>2/</u>
Mining	2.5	-10.4 <u>2/</u>
Industry	8.0	6.0
Construction	19.0	15.0
Others	5.9	5.1

In 1969 the Peruvian government initiated a high priority comprehensive Agrarian Reform Program, designed to bring about a radical change in the structure of the traditional land tenure system. The target of the Agrarian Reform, perhaps the most ambitious undertaken in South America, is to redistribute approximately 10.5 million hectares of land to an estimated 342,000 farm families by the end of 1976. To date over 7.2 million hectares have been expropriated and 6 million hectares have been transferred to almost 250,000 families which have, for the most part, been consolidated into Agrarian Production cooperatives. 3/

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2/ Fishing and Mining both dropped drastically due to lower world prices for copper and fishmeal during 1975; the situation was worsened by increased strike and work stoppage activities in both sectors. The Mining sector was further weakened by the nationalization of the Marcona Corporation and Peru's inability to find markets for its iron ore.

3/ The bulk of Agrarian Reform beneficiaries have been organized into production and service cooperatives, agrarian societies of social interest, campesino communities and integrated land parcel cooperatives. In some cases, individuals hold title to small parcels of land, but the majority of land is held by the cooperative itself.

Redistribution of land has helped to solve some of the social inequities in the rural sector but the Agrarian Reform has not been able to effect a solution to the pressing economic problems of the agricultural sector occasioned by low productivity and a lack of arable land. As a result of the dearth of land available for agricultural purposes, the GOP has fostered an aggressive policy of land reclamation through the use of traditional irrigation methods -- the enormous Chira-Piura, Tinajones and Majes projects indicate the government's commitment to expand the country's agricultural base. At the same time, there is an increasing emphasis on small to medium sized irrigation projects. The DGA's 1975-76 action plan calls for basic studies of irrigation improvement projects involving 800 km. of canals which would affect the irrigation of over 300,000 hectares.

Recently the GOP has taken steps to prohibit urban expansion on agricultural lands. At the same time it has shown initial awareness of the importance of conserving the scarce supply of water available on the coast. Conservative figures indicate that coastal population centers presently discharge some 1.2 million metric tons (317 million gallons) of untreated sewage into nearby streams and the Pacific ocean every day. This not only wastes water rich in organic fertilizers but thoroughly contaminates the streams and ocean and disrupts the aquatic environment. This sewage effluent offers great potential for making selected desert areas highly productive. If collected before final discharge and treated the present volume of water being discharged could irrigate an estimated 14,000 hectares, thus converting selected areas of barren desert into needed food producing areas and at the same time provide a living for currently landless farmers.

The reclamation, development and management of selected desert lands is consistent with the GOP priorities of expanding the agricultural base and exploiting more intensively its scarce resources.

## 2. Project Background

The USAID and DGA have been working together in the development of small irrigation projects for the past two

years. The use of treated sewage effluent for irrigation is seen as an extension to traditional approaches, incorporating a new concept for irrigating with water otherwise being wasted, producing food crops in Peru and helping to solve serious environmental problems.

In March 1975 a potential project was identified adjacent to a city of Lima Pueblo Joven, named "Villa El Salvador". A PID was prepared based on that project site. Due to delays in getting local agencies started on definite plans for building the oxidation lagoons in Villa El Salvador the DGA and USAID jointly decided that another site was necessary in order to have a functioning project within the coming two years for demonstration purposes. For this reason, Tacna was identified as an alternative site. In October 1975, DGA officially requested a change to Tacna where there is a new aeration lagoon sewage treatment plant in operation. In December 1975 a Memorandum of Agreement was signed between DGA and USAID by which \$8,000 in Grant funds were made available to DGA to develop a feasibility study. This study, "Use of Treated Sewage for Irrigation-Tacna, Perú", has been recently completed and serves as the basis for this proposal.

#### B. Detailed Description of Project

The Logical Framework for this project appears in Annex D. Despite the fact that the Tacna project in and of itself is relatively small in nature, if it proves a successful demonstration and is replicated in other coastal areas it will be making a significant contribution to the solution of a major problem in Peru -- insufficient production of domestically produced food.

Most of Peru's major cities are located on the dry desert area along the Pacific coast. From these cities a large volume of sewage is currently dumped, untreated, into streams and the ocean, creating serious environmental hazards as well as the loss of a potentially rich resource, the organic-rich irrigation waters which could flow to neighboring desert areas. The secondary goal of the project is to create an awareness of the dual benefits which treated sewage for irrigation would bring: an improved environmental and increased agricultural land.

Since the Tacna project is designed to serve as a demonstration, the Project purpose is to show clearly the economic and technical feasibility of the process so that it will in fact be replicated in other areas.

To achieve both purpose and goals, inputs will be required from USAID (in the form of grant financial assistance and engineering guidance and monitoring), and four GOP entities, the Ministries of Agriculture, Health and Food, and the Agrarian Bank. Timely coordinated inputs from the above entities will result in the following outputs: (1) construction of basic infrastructure at the Tacna site; (2) 120 hectares brought into economic production by the end of the second year; (3) yields for selected crops; (4) a functioning demonstration site; and (5) the establishment of the agrarian production cooperative which will work the newly-irrigated land.

The Ministry of Agriculture's Directorate General of Waters (DGA) has completed the feasibility study for the Tacna pilot project site with funds made available from A.I.D. Under the proposed project, A.I.D. funds will assist in financing the design and construction of the irrigation infrastructure at the project site. Although the demonstration facility initially will encompass 120 hectares, the basic infrastructure will be built to specifications that will permit expansion of the site to 200 hectares at an estimated additional cost of \$31,000.

Final selection of crops to be grown will be made during the development of the final engineering design/study to be undertaken by the DGA. Crops selected will be from among the type presently permitted by Peruvian law to be grown with treated sewage effluent. However, a part of this demonstration project will be to experiment with other food crops, outside the "permissible list," e.g. tomatoes, lettuce and other garden crops. This will be done to demonstrate that high value foods of the raw edible type grown with treated sewage effluent are sanitary and safe for human consumption, with an end towards convincing the GOP to modify its policy and expand the number of crops that can be grown with treated

sewage effluent. A control plot of approximately 5 hectares will be set aside for this particular experimental purpose.

The DGA will be the primary agency responsible for implementing the project and will provide, *inter alia*, the services of a Chief Engineer as overall project supervisor. DGA will secure the coordination and collaboration of the Ministry of Agriculture's Agrarian Zone Office No. VII in Tacna (A. Z. VII) as well as the Ministry of Food's local office, for production and other technical advice, and the Agrarian Bank and the Ministry of Health Tacna offices. The Tacna branch of the Agrarian Bank will provide necessary production credit to the farmers participating in the project. The Ministry of Health's Tacna Office will provide technical expertise for overall project sanitary control and will assume primary responsibility for experimentation with selected food crops on the separate five hectare plot mentioned above. A portion of the A.I.D. project contribution will assist in setting up simple, but adequate, research facilities at the project site. Collaboration and coordination among all of the above mentioned parties has been very good during the development of the feasibility study; there are ample indications that this will continue in the future.

The immediate participants/beneficiaries of the project will be approximately 150 members of poor families who have migrated from the Sierra to the "pueblos jóvenes" of Tacna. These former landless farmers will be organized into a production cooperative, according to regulations established under Peru's comprehensive Agrarian Reform program. A list of eligible small farmer candidates already exists, and final selection of participants and legal incorporation of the cooperative will be undertaken simultaneously with construction of the irrigation infrastructure, so that the participating farmers will be ready to move into cultivation once the construction is completed. The land is currently public domain, without economic utility. It will be passed to the Agrarian Reform, which in turn will adjudicate it to the newly-formed cooperative. Since the land has been in the public domain there are no former owners to compensate so the cooperative will not be charged for the land.

PART III. PROJECT ANALYSIS

A. Technical Analysis

The most important structure in the system exists and is operating; this is the Tacna sewage treatment plant. This modern facility is comprised of four aeration lagoons and was designed by a USA engineering consultant firm. It has been operating satisfactorily since October 1975. This project will complete the infrastructure necessary to irrigate coastal desert lands using the treated sewage effluent from this plant.

The treated effluent will flow from the plant to the areas to be irrigated in a concrete lined canal 5 Km. long. The capacity of this canal will be 230 ft/sec.; thus it will adequately handle the maximum designed discharge of the treatment plant when this will be attained by 1985. Present effluent flows vary between 100 and 130 ft/sec., depending upon the hour of the day. This main canal will cross under the Pan-American highway just north of the Tacna airport. Here, as in most of its length, the road is six meters wide.

Eleven (11) Km. of smaller secondary canals will complete the distribution network for distributing water to all parts of the first 120 Has. to be developed. Provisions will be made for extending these canals, as necessary, to provide water to the increased hectarage (to a total of 200 Ha.) as more effluent becomes available from the treatment plant. The natural slope of the terrain of the site is 2%, thus 45 drops (small cascades) will be required in the secondary canals to dissipate the naturally developed hydraulic energy.

Nine kilometers of three meter wide, low-cost feeder roads will provide access to the project site. Ten culverts will be required at locations where secondary canals cross under these feeder roads. At 12 locations iron gates will be installed to provide control of the water to each area selected for irrigation at the time required. The entire system is to be built as simply as practicable, and will utilize labor-intensive methods with a minimum of equipment.

All preliminary work performed by DGA appears to be quite acceptable, including a 1/2,000 topographic map with one meter contour lines and a detailed soils study. These are in the feasibility study. Before construction starts final design will be made by the DGA. The soil quality is not uniform in the project area, varying from Class I to Class IV, i.e., good to poor.

Nevertheless, experience elsewhere with treated sewage irrigation has shown that the organic components quickly improve the quality of the soil.

The employment generation of the project corresponds favorably to other Peruvian irrigation projects. At the start 65 or more persons will work the land steadily and additional farm labor will be needed seasonally every year; later other workers will be added as the treatment plant effluent increases and as more land is incorporated into the system. The host government has the capability of adequately controlling operation and maintenance. The sewage treatment plant is presently under the control of Tacna Ministry of Health and Ministry of Housing offices. The irrigation system and lands will be controlled by the Agrarian Zone VII. Not too far distant in this same valley the Magoyo and La Yarada irrigation systems are good examples of managerial efficiency being demonstrated by the Agrarian Zone VII.

From an overall view, the development of this project should also achieve a significant environmental benefit. This is discussed in the environmental assessment, Annex C.

#### B. Financial Plan

Present cost estimates are as follows:

	<u>\$</u>	<u>GOP (\$)</u>	<u>AID (\$)</u>
Design Engineering cost	22,222	4,444	17,778
Supervision and Field Control <sup>1/</sup>	33,333	20,000	13,333
Construction Cost	121,070	20,514	100,556
Research and Production Management	46,666	22,222	24,444
Sub-total	223,291		
Contingency (15%)	33,494	11,272	22,222
Inflation (20%)	44,658	22,991	21,667
Construction & Research Sub-total	301,443		
Agrarian Bank credit	120,000	120,000	0
Total	421,443	221,443	200,000

It is expected that the Agrarian Bank will provide all needed production credit to the area beneficiaries; this will amount to \$120,000 for the first crop. The current rate of interest for production credit is 6% per annum.

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<sup>1/</sup> See Implementation Plan.

One item not included in the cost estimates is the cost of land. At the present time the land is unused and has no economic value. Estimates of its potential value with irrigation are varied and go as high as S/.7,000 (\$155) per hectare. Since the land will be given without charge to the project beneficiaries, the implicit value of the GOP contribution will rise by the total value of the land -- \$31,000, considering an eventual project size of 200 hectares valued at \$155 a hectare.

The research and operational control of the project will be closely coordinated with the Ministry of Health. A detailed program will be designed to provide scientific and technical information in sanitation, control of effluent quality, crop yields and soils control.

A 15% contingency is considered to be adequate considering the level of cost estimates made in the Feasibility Study. In the same manner a 20% inflation factor is realistic for Peru, given the fact that the construction period will be less than one year. Since these cost data are consistent with USAID/ENG experience with unit costs in comparable construction activities, the total cost of the project is considered to be reasonable. Adequate planning has taken place to produce a technically sound project; consequently Section 611(a) (1) of the Foreign Assistance Act has been fully complied with by the Feasibility Study made by DGA.

### C. Economic Analysis

Economic justification of the project is derived from two major benefits: (1) increased food supply to the Tacna areas; and (2) income which will be generated to the target population.

#### 1. Phase One - 120 Hectares (1978)

The 120 hectares which will be irrigated under the project are currently unused, due to the lack of water. The type of agriculture which is anticipated is one of "medium technology," under which crops traditional to the area will be cultivated. Double cropping will be possible, and crop rotation will be practiced to insure optimum land use. 115 hectares of the project area were originally studied by the DGA, and the following land use was calculated:

Alfalfa	40 has.	21.1%
Lima Beans	25 has.	13.2%
Potatoes	50 has.	26.3%
Corn	55 has.	28.9%
Squash	20 has.	10.5%
	<u>190 has.</u>	<u>100.0%</u>

Of these crops, alfalfa will be permanent for four years; squash and potatoes will be cultivated during the winter; corn and squash during the summer. This basic rotation will be repeated during the four-year period until the original alfalfa crop is discontinued. Total cultivated area will thus be 190 hectares, which, using 115 has. as the physical extension of the project, results in a land use intensity of 1.65. Table I shows anticipated costs and values of production, based on figures developed by the Agrarian Bank.

Based on the estimated net value of production of S/.2,682,920 or US\$59,620, projected family incomes in the project area come to \$2,384 per year, or \$397 per capita considering an average family size of six persons. These figures are average annual income; they actually will vary on a four-year cycle, due to the fact that every fourth year alfalfa must be replanted.

Production of the five crops is estimated as follows:

Alfalfa	:	2,185 metric tons/year
Lima Beans	:	30 metric tons/year
Corn	:	165 metric tons/year
Potatoes	:	600 metric tons/year
Squash	:	160 metric tons/year

## 2. Phase Two - 200 Hectares (1985)

By 1985, when the sewage treatment plant is operating at full capacity, the project will be able to effectively irrigate 200 hectares. Assuming increments in the production of the original five crops, 1985 land use -- again with double cropping-- would be approximately the following:

Alfalfa	75 has.	23.1%
Lima Beans	40 has.	12.3%
Potatoes	85 has.	26.2%
Corn	90 has.	27.7%
Squash	35 has.	10.7%
	<u>325 has.</u>	<u>100.0%</u>

Table 2 shows anticipated costs and values of production.

Table 1

COSTS OF PRODUCTION AND VALUE OF PRODUCTION

(Figures in Peruvian soles, calculated at rate of S/.45.- = US\$1)

CROP	No.Has.	GROSS VALUE OF PRODUCTION			COSTS OF PRODUCTION (S/.)			NET VALUE OF PRODUCTION (S/.)	
		Yield Kg/Ha.	Price S/.Kg.	Total S/.	<u>1/</u> Agro-Inputs	<u>2/</u> Labor	Total	Total	Per Ha.
<sup>3/</sup> Alfalfa	40	54,625	0.6	1,311,000	--	--	767,720	543,280	13,582
Corn	55	3,000	9.0	1,485,000	536,470	491,040	1,027,510	457,490	8,318
Squash	20	8,000	5.0	800,000	160,140	209,260	369,400	430,600	21,530
Potatoes	50	12,000	6.0	3,600,000	1,756,000	725,400	2,481,400	1,118,600	22,372
Lima Beans	25	1,200	16.0	480,000	172,675	174,375	347,050	132,950	5,318
	190			7,676,000 (\$ 170,578)			4,993,080 (\$ 110,957)	2,682,920 (\$ 59,620)	

1/ Agro-inputs include: fertilizer, seed, pesticides, machinery and water.

2/ Labor includes the cost of manual labor plus social benefits.

3/ Yields, cost of production and net value of production are the annual average of four years alfalfa production. Yields consider an average of 5% spoilage.

TABLE 2

COSTS OF PRODUCTION AND VALUE OF PRODUCTION (PHASE TWO = 200 Has.)

(Figures in Peruvian soles, calculated at rate of S/.45 = US \$1)

CROP	No. Has	GROSS VALUE OF PRODUCTION			COSTS OF PRODUCTION (\$)			NET VALUE OF PRODUCTION (S/.)	
		Yield Kg/Ha.	Price S./Kg.	Total S/.	1/ Agro-Inputs	2/ Labor	Total	Total	Per Ha.
Alfalfa <sup>3/</sup>	75	54,625	0.6	2,458,125	--	--	1,439,475	1,018,650	13,582
Corn	90	3,000	9.0	2,430,000	877,860	803,520	1,681,380	748,620	8,318
Squash	35	8,000	5.0	1,400,000	280,245	366,205	646,450	753,550	21,530
Potatoes	85	12,000	6.0	6,120,000	2,985,200	1,233,180	4,218,380	1,901,620	22,372
Lima Beans	40	1,200	16.0	768,000	276,280	279,000	555,280	212,720	5,318
	325			13,176,125 (\$ 292,802)			8,540,965 (\$189,799)	4,635,160 (\$103,003)	

1/ Agro-inputs include: fertilizer, seed, pesticides, machinery and water.

2/ Labor includes the cost of manual labor plus social benefits.

3/ Yields, cost of production and net value of production are the annual average of four years alfalfa production. Yields consider an average of 5% spoilage.

Assuming that the expanded land utilization will be able to support a total of 45 families (assuming approximately 4.5 has. per family), projected family incomes will be substantially the same as in the First Phase. These estimates are, however, based on the assumption of a constant level of technology and constant yields. Since such a situation is highly improbable, we can assume significantly higher incomes over time.

Production of the five crops in 1985 is estimated as follows:

Alfalfa	:	4,075 metric tons/year
Lima Beans	:	48 metric tons/year
Corn	:	270 metric tons/year
Potatoes	:	1,020 metric tons/year
Squash	:	280 metric tons/year

### 3. Employment Generation

The following table gives Agrarian Bank estimates on man days per year for one hectare of selected crop production in the Tacna Valley:

Alfalfa	:	75 days
Corn	:	64 days
Squash	:	75 days
Potatoes	:	104 days
Lima Beans	:	50 days
Garlic	:	140 days
Ají	:	120 days
Lettuce	:	126 days
Cabbage	:	130 days
Onions	:	160 days
Melons	:	115 days
Tomatoes	:	130 days

At the present time the majority of the above listed garden crops which have a high labor content (over 100 days per hectare) cannot, by law, be cultivated in areas served by treated sewage. Since an integral part of the Project will be research on cultivation of truck crops, it is hoped that GOP policy will be changed to allow for production of more labor-intensive crops, which would expand the employment base of areas where future treated sewage projects are initiated.

#### 4. Marketing of New Production

No difficulties are anticipated in marketing this production. In fact, it is reasonable to anticipate that for many years to come, the Toquepala and Cuacone mines will be eager to buy any excess food production which might be available from the Tacna Valley in the need to feed their large mining work forces.

The city of Tacna and its surrounding area is currently a net importer of foodstuffs. Given the limited agricultural possibilities due to lack of water for irrigating land, it seems that this condition will continue. Any irrigated lands that can be brought into production will, in some measure, help to alleviate the need to import food. The same can be said for all cities in the Peruvian coastal desert. Considering 8 of the major cities, there is presently sufficient sewage being wasted which, once treated, would irrigate some 14,000 has. Irrigable lands near these cities have been or can be readily identified. By 1995 the sewage output will double. Clearly, the potential is great for having this type of project copied in many cities along Peru's coastal desert. (See Map, Page 26)

#### D. Financial Analysis

##### 1. First Phase - 120 Hectares

Execution of the project works is programmed for completion in the first year. The total first phase investment is S/.13,494,975 (US\$299,888). Certain other costs will be incurred each year over the anticipated 25-year life of the project. These are summarized in Table 3. These yearly costs, along with production costs, and anticipated income derived from agricultural production are discounted using discount rates of 20% and 25%, to arrive at an internal rate of return of 23.94%. (See Table 4) The benefit-cost ratio of 1.13 is calculated in Table 5.

Considering the fact that this project will be the first time that treated sewerage will be used for irrigation purposes in a controlled and supervised situation it is considered essential that continuing research be programmed over the first two years, to determine the applicability of the process to other areas. Since these costs will result in an output which will have broad applicability they have been excluded from calculations to determine per hectare costs of the project, since to charge them exclusively to this project would be to overstate their significance in this one particular project. Considering an execution cost of



TABLE 3FLOW OF INVESTMENT, MAINTENANCE AND REPAIR COSTSDURING USEFUL LIFE OF PROJECT (25 YEARS)(PHASE ONE: 120 HECTARES)

ITEM	YEAR:	1	2	3	4	5	6	7	8	9	25
Investment		10,659,975									
Maint. & Repair of Works <u>1/</u>			50,000	50,000	50,000	50,000	50,000	60,000	60,000	60,000	103,680
Permanent Alfalfa			1,075,000	665,280	665,280	665,280	1,076,000	665,280	665,280	665,280	665,280
Rotated Crops			4,225,360	4,225,360	4,225,360	4,225,360	4,225,360	4,225,360	4,225,360	4,225,360	4,225,360
Research <u>2/</u>			1,417,500	1,417,500							
Total		10,659,975	6,767,860	6,358,140	4,940,640	4,940,640	5,350,360	4,950,640	4,950,640	4,950,640	4,994,320

1/ Maintenance and Repair Costs are increased 20% every five years.

2/ Research Costs do not form a part of the Project. Included are 15% Contingencies and 20% for Inflation.

TABLE 4

INTERNAL RATE OF RETURN CALCULATION  
(Phase One: 120 Hectares)

Year	Investment and Maintenance S/.	Production Costs S/.	Total Costs S/.	Income S/.	Net Cash Flow S/.	Discount Rate 20%	Present Value at 20%	Discount Rate 25%	Present Value at 25%
1	10,659,975		10,659,975		-10,659,975	0.8333	-8,879,759	0.800	-8,527,980
2	1,125,000	4,225,360	5,350,360	7,163,000	1,812,640	0.6944	1,258,697	0.6400	1,160,089
3	715,280	4,225,360	4,940,640	7,847,000	2,906,360	0.5787	1,681,911	0.5120	1,488,056
4	715,280	4,225,360	4,940,640	7,847,000	2,906,360	0.4822	1,401,447	0.4096	1,190,445
5	715,280	4,225,360	4,940,640	7,847,000	2,906,360	0.4019	1,168,066	0.3277	952,414
6	1,125,000	4,225,360	5,350,360	7,163,000	1,812,640	0.3349	728,500	0.2621	475,093
7	725,280	4,225,360	4,950,640	7,847,000	2,896,360	0.2791	808,374	0.2097	607,367
8	725,280	4,225,360	4,950,640	7,847,000	2,896,360	0.2326	673,693	0.1578	486,009
9	725,280	4,225,360	4,950,640	7,847,000	2,896,360	0.1933	561,314	0.1342	388,691
10	1,135,000	4,225,360	5,360,360	7,163,000	1,802,640	0.1615	291,126	0.1074	193,603
11	725,280	4,225,360	4,950,640	7,847,000	2,896,360	0.1346	389,850	0.0859	248,797
12	737,280	4,225,360	4,962,640	7,847,000	2,884,360	0.1122	323,625	0.0687	198,156
13	737,280	4,225,360	4,962,640	7,847,000	2,884,360	0.0935	269,688	0.0550	158,640
14	1,147,000	4,225,360	5,372,360	7,163,000	1,790,640	0.0779	139,491	0.0440	78,788
15	737,280	4,225,360	4,962,640	7,847,000	2,884,360	0.0649	187,195	0.0352	101,529
16	737,280	4,225,360	4,962,640	7,847,000	2,884,360	0.0541	156,044	0.0281	81,051
17	751,680	4,225,360	4,977,040	7,847,000	2,869,960	0.0451	129,435	0.0225	64,574
18	1,161,400	4,225,360	5,386,760	7,163,000	1,776,240	0.0376	66,787	0.0180	31,972
19	751,680	4,225,360	4,977,040	7,847,000	2,869,960	0.0813	89,830	0.0144	41,327
20	751,680	4,225,360	4,977,040	7,847,000	2,869,960	0.0261	74,906	0.0115	33,004
21	751,680	4,225,360	4,977,040	7,847,000	2,869,960	0.0217	62,278	0.0092	26,404
22	1,178,680	4,225,360	5,404,040	7,163,000	1,758,960	0.0181	31,837	0.0074	13,016
23	768,960	4,225,360	4,994,320	7,847,000	2,852,680	0.0151	51,633	0.0059	16,831
24	768,960	4,225,360	4,994,320	7,847,000	2,852,680	0.0126	35,944	0.0047	13,408
25	768,960	4,225,360	4,994,320	7,847,000	2,852,680	0.0105	29,953	0.0038	10,840
							1,731,865		-467,876

$$\text{IRR} = 20 + 5 \times \frac{1,731,865}{2,199,741} = 20 + 5 \times 0.7873 = 23.94$$

TABLE 5

## BENEFIT COST RATIO

(Phase One: 120 Hectares)

Year	Present Worth (Costs)	Present Worth (Income)
	S/.	S/.
	15%	15%
1	9,269,914	0
2	4,045,407	5,415,944
3	3,248,471	5,159,403
4	2,825,058	4,486,915
5	2,456,486	3,901,528
6	2,312,961	3,096,565
7	1,860,945	2,949,687
8	1,618,364	2,565,184
9	1,407,467	2,230,902
10	1,325,081	1,770,694
11	1,066,471	1,686,320
12	927,517	1,466,604
13	806,429	1,275,138
14	759,114	1,012,132
15	609,908	964,396
16	530,506	838,814
17	462,367	728,986
18	435,250	578,770
19	349,986	551,644
20	304,097	479,452
21	264,281	416,676
22	249,666	330,931
23	200,772	315,449
24	174,406	273,860
25	151,827	238,549
	<u>37,662,651</u>	<u>42,734,573</u>

$$\text{Ratio} \frac{\text{Benefits}}{\text{Costs}} = \frac{42,734,573}{37,662,651} = 1.13$$

\$253,222 (works minus research) which will benefit 120 hectares in the first phase, the per hectare cost comes to \$2110. This compares to an estimated \$2,500 per hectare on medium-sized coastal irrigation projects, such as those financed under IDB's Linea Global project, and an estimated \$5,750 per hectare on the large northern coast irrigation project of Chira-Piura. Sierra irrigation is much less expensive on a per hectare basis, since it involves the channelling and regulation of rainwaters, which are non-existent on the arid coast; expected agricultural yields are also significantly lower in the sierra, given the soil conditions and rugged terrain.

## 2. Second Phase -- 200 Hectares

Since the project infrastructure will be constructed to handle the 1985 estimated capacity of the sewage treatment plant, 200 hectares will eventually be irrigated. The additional construction cost for full utilization of 200 hectares is estimated to be \$31,000, which will be carried out in the seventh year of the project (1984). The phasing of costs over the twenty-five year life of the project is shown in Table 6. Table 7 calculates the new internal rate of return of 25.10% assuming a seventh year investment of \$31,000 and increased production costs and income starting in the eighth year (based on estimated production as given in Table 2 of the Economic Analysis). The benefit cost ratio, at 15%, is 1.16 (See Table 8).

Since the relatively small new investment of \$31,000 will bring 80 new hectares into production, the overall cost per hectare drops from \$2,110 in the First Phase to \$1,421 in the Second Phase.

## E. Social Analysis

The overall social impact of the proposed program will, in large part, depend upon the extent to which it is eventually replicated with similar projects in reclaiming pure desert lands near the urban centers of the country. The pilot area in its first phase is necessarily limited in both size, (120 hectares)<sup>1/</sup> and beneficiaries, (25 families or 150 persons).<sup>1/</sup> While the social impact upon this small area and these few beneficiaries will be significant, the full benefits can only be approximated for the pilot area. If, as is expected, this first project serves as a demonstration which other urban areas will follow, significant social problems could be alleviated on a nationwide scale.

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<sup>1/</sup> 200 hectares by 1985, capable of supporting 45 families or 270 persons.

TABLE 6

FLOW OF INVESTMENT, MAINTENANCE, REPAIR AND PRODUCTION COSTS  
DURING USEFUL LIFE OF PROJECT (25 YEARS)  
(PHASE TWO: 200 HECTARES)

ITEM/YEAR	1	2	3	4	5	6	7	8	9	10	25
Investment	10,659,975							1,395,000			
Maintenance and Repair of Works		50,000	50,000	50,000	50,000	50,000	50,000	50,000	83,333	83,333	83,333
Permanent Alfalfa I (40 has.)		1,075,000	665,280	665,280	665,280	1,075,000	665,280	665,280	665,280	1,075,000	665,280
Permanent Alfalfa II (35 has.)									940,625	582,120	582,120
Rotated Crops		4,225,360	4,225,360	4,225,360	4,225,360	4,225,360	4,225,360	4,225,360	7,101,490	7,101,490	7,101,490
Research		1,417,500	1,417,500								
TOTAL	10,659,975	6,767,860	6,358,140	4,940,640	5,350,360	5,350,360	4,940,640	6,335,640	8,790,728	8,841,943	8,432,223

TABLE 7

INTERNAL RATE OF RETURN CALCULATION  
(Phase two: 200 Hectares)

Year	Investment and Maintenance S/. 1/	Production Costs S/. 2/	Total Costs S/.	Income S/. 3/	Net Cash Flow S/.	Discount Rate 25%	Present Value at 25%	Discount Rate 30%	Present Value at 30%
1	10,659,975				-10,659,975	0.8000	-8,527,980	0.7692	-8,199,653
2	1,125,000	4,225,350	5,330,350	7,163,000	1,632,640	0.6400	1,044,890	0.5917	766,033
3	715,280	4,225,360	4,940,640	7,847,000	2,906,360	0.5120	1,488,056	0.4552	1,322,975
4	715,280	4,225,360	4,940,640	7,847,000	2,906,360	0.4096	1,190,445	0.3501	1,017,517
5	715,280	4,225,360	4,940,640	7,847,000	2,906,360	0.3277	952,414	0.2693	782,683
6	1,125,000	4,225,360	5,950,360	7,163,000	1,212,640	0.2621	317,833	0.2072	251,259
7	715,280	4,225,360	4,940,640	7,847,000	2,906,360	0.2097	609,464	0.1594	463,274
8	2,110,280	4,225,360	6,335,640	7,847,000	1,511,360	0.1678	253,606	0.1225	185,293
9	1,689,238	7,101,490	8,790,728	12,577,625	3,786,897	0.1342	508,202	0.0943	357,104
10	1,740,453	7,101,490	8,841,943	12,492,125	3,650,182	0.1074	392,030	0.0725	264,638
11	1,330,733	7,101,490	8,432,223	13,176,125	4,743,902	0.0859	407,501	0.0558	264,710
12	1,330,733	7,101,490	8,432,223	13,176,125	4,743,902	0.0687	325,906	0.0429	203,513
13	1,689,238	7,101,490	8,790,728	12,577,625	3,786,897	0.0550	208,279	0.0330	124,968
14	1,740,453	7,101,490	8,841,943	12,492,125	3,650,182	0.0440	160,608	0.0254	92,715
15	1,330,733	7,101,490	8,432,223	13,176,125	4,743,902	0.0352	166,985	0.0195	92,506
16	1,330,733	7,101,490	8,432,223	13,176,125	4,743,902	0.0281	133,304	0.0150	71,159
17	1,689,238	7,101,490	8,790,728	12,577,625	3,786,897	0.0225	85,205	0.0116	43,928
18	1,740,453	7,101,490	8,841,943	12,492,125	3,650,182	0.0180	65,703	0.0089	32,487
19	1,330,733	7,101,490	8,432,223	13,176,125	4,743,902	0.0144	68,312	0.0068	32,259
20	1,330,733	7,101,490	8,432,223	13,176,125	4,743,902	0.0115	54,555	0.0053	25,143
21	1,689,238	7,101,490	8,790,728	12,577,625	3,786,897	0.0092	34,839	0.0040	15,148
22	1,740,453	7,101,490	8,841,943	12,492,125	3,650,182	0.0074	27,011	0.0031	11,316
23	1,330,733	7,101,490	8,432,223	13,176,125	4,743,902	0.0059	27,989	0.0024	11,385
24	1,330,733	7,101,490	8,432,223	13,176,125	4,743,902	0.0047	22,296	0.0018	8,539
25	1,689,238	7,101,490	8,790,728	12,577,625	3,786,897	0.0038	14,390	0.0014	5,302
							31,843		-1,553,799

1/ Investment and Maintenance includes construction, supervision and maintenance, installation and maintenance of Alfalfa.

2/ Production Costs refers to corn, potatoes, squash and lima bean costs.

3/ Income is variable since every fourth year alfalfa must be installed. Two alfalfa rotations are used: Alfalfa I (40 has.) is installed in years 2, 6, 10, 14, 18, and 22; Alfalfa II (35 Has.) is installed in years 9, 13, 17, and 23. Production of rotation crops is constant changing only in year 9 when the additional hectareage is brought into production.

$$IRR = 25 + 5 \times \frac{31,843}{1,583,642} = 25 + 5 (0.0201) = 25.10\%$$

TABLE 8

## BENEFIT COST RATIO

(Phase Two: 200 Hectares)

Year	Present Worth (Costs)	Present Worth (Income)
	S/.	S/.
	15%	15%
1	9,269,914	--
2	4,045,407	5,415,944
3	3,248,471	5,159,403
4	2,825,058	4,486,915
5	2,456,486	3,901,528
6	2,572,341	3,096,565
7	1,857,187	2,949,687
8	2,071,121	2,565,184
9	2,499,204	3,575,819
10	2,185,728	3,088,053
11	1,812,085	2,831,549
12	1,575,982	2,462,618
13	1,428,493	2,043,864
14	1,249,367	1,765,137
15	1,036,320	1,619,346
16	901,405	1,408,528
17	816,659	1,168,461
18	714,429	1,009,364
19	592,785	926,282
20	515,209	805,061
21	466,788	667,872
22	408,498	577,136
23	338,975	529,680
24	294,285	459,847
25	267,238	382,360
	<u>45,449.435</u>	<u>52,896,203</u>

$$\text{Ratio } \frac{\text{Benefits}}{\text{Costs}} = \frac{52,896,203}{45,449,435} = 1.16$$

These 25 families will be selected by the A.S. VII, in conjunction with SINAMOS, from a list of eligible families who have indicated their interest in working the new farm area to be irrigated. At present 41 campesino families who previously were farming using untreated sewage in the Tacna area have signed up. In 1975 they were prohibited from using the untreated sewage and petitioned the Ministry of Agriculture to give them new lands.

The National University of Tacna recently conducted a study of the 41 families in an attempt to arrive at an overall socio-economic profile of the group and the results clearly indicate the marginal conditions in which they live. The principal results are summarized below:

1. 44% of the group is ten years of age or under, indicating a disproportionately high dependency ratio of population to potential working force.

2. Only 26% of the group is economically active and of this group 56% are categorized as eventuales, agricultural day laborers who work primarily during the limited planting and harvest seasons. Another 26% are classified as "independent" workers, which may generally be interpreted as tertiary sector services workers. A few carpenters and former soldiers comprise the rest of the population.

3. 55% of the group has migrated to Tacna from other geographical areas of the country -- 51.2% of these come from the altiplano department of Puno. Of the 45% who were born in the Department of Tacna, the majority are under ten years of age, children of migrants.

4. 93% of the dwellings occupied by this population are classified as "under construction", a situation typical of marginal urban areas in which phase construction is carried out -- as families save money, another room is added until the home is completed (studies conducted in Lima marginal areas by John Turner of M.I.T. have shown the average time needed for completion of a home is about eight years).

5. 80% of the houses lack potable water; 95% lack indoor plumbing; 84% lack electricity; 81% do not subscribe to municipal garbage collection services.

6. The majority of heads of household lack completed primary education, and four of the 41 were unable to sign their names to the membership list.

Per capita income in the Department is estimated at \$710, compared to the nationwide average of \$410 in 1972, and in terms of housing conditions, education and employment, the Department ranks above the national averages. The actual socio-economic characteristics of the pilot area would seem to demonstrate the dichotomies which exist throughout urban Peru or rural Peru immediately adjacent to the urban centers. Both the Department and Province of Tacna are atypical in that they rank high vis-a-vis other Departments and Provinces based upon selected socio-economic indicators. A recent Mission study on relative marginality showed that the Department of Tacna tied for first place with the Department of Ica while Tacna Province ranked third of the 150 Peruvian provinces.<sup>2/</sup>

Living conditions in the pueblos juvenes of urban Tacna however are little different than in other marginal urban areas of the country. The slums are characterized by crowded living conditions, few if any job opportunities outside of the unproductive tertiary service sector (street vendors, shoeshine people, etc.), and a substantial percentage of the residents are immigrants from highland farm areas of the country with little training for occupations outside of the agricultural sector. Nearly 40% of the Department's residents are migrants from other areas, and of these 57% come from the altiplano department of Puno, and 11% and 7% from the neighboring departments of Arequipa and Moquegua respectively. Coming from largely rural backgrounds, they generally find it difficult to adapt to the urban environment in terms of living conditions and employment opportunities. Since land pressures are a limiting factor to agriculture along the arid coast, including Tacna, migrants are unable to find work in the one area where they have some familiarity, and instead join the ranks of the underemployed. Income levels are well below the overall urban sector average and while urban living provides certain social benefits, such as schooling and availability of basic health services, the migrant families who populate the urban slums are generally no better off economically than when they left the sierra.

The proposed program is designed to directly benefit an estimated 25 marginal urban families and give them the opportunity to work cooperatively to turn 120 hectares of presently unproductive desert into agricultural production.

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<sup>2/</sup> The Mission is currently undertaking a study on relative poverty and marginality in Peru, and using such indicators as education levels, extent of use of indigenous languages, availability of health services, extent of use of agriculture machinery, etc. is preparing a marginality index of all departments and provinces within the country.

Women will benefit equally with men under the project. The Peruvian agricultural sector is one where women share workloads equally with men, and generally the distribution of income among men and women is much more equitable in rural areas than in urban areas, since women generally manage family budgets and handle most commercial transactions. By creating a new rural environment within the desert setting of the project area, near the city of Tacna, it is anticipated that those participating will have a greater degree of social and economic equity than under their present condition.

Additionally benefits which will accrue to Tacna and other project sites to be selected will accompany project objectives. At present, environmental contamination is prevalent in marginal urban areas throughout the country, and most pueblos jovenes are breeding grounds for epidemics caused by contaminated water supplies. Infant and child mortality is high, and work efficiency among the adult population is lessened as a result of illnesses. In those areas where similar projects are implemented, improved health conditions will be a non-quantifiable social benefit.

PART IV - IMPLEMENTATION PLANNINGA. Administrative Arrangements1. Participating GOP Agencies

Administration of Project activities will be carried out by the General Directorate of Water Resources (DGA) in the Ministry of Agriculture (MOA). The DGA will coordinate with the Agrarian Zone VII for physical implementation of the project in Tacna and also with the Agrarian Bank to assure availability of credit to farmers for production expenses.

Ancillary technical support will be furnished to the Project from the Tacna office of the Ministry of Food, the Directorate for the Preservation of the Environment in the Ministry of Health and through the Ministry's Field Office No. IV.

MOA

The MOA shares its leadership of certain aspects of the agricultural sector with the Ministry of Food (MOF), but is the GOP agency most directly concerned with the preservation, improvement, and efficient use of renewable agricultural resources and the promotion of rural organizations associated with agriculture. Organizationally the MOA has clear lines of internal responsibility among its directorates, its small number of autonomous dependencies and its zonal administrations. Though personnel management problems do exist, the MOA is moving toward a personnel classification and salary scale system which is intended to resolve these. (The same is true of the GOP as a whole). The MOA has been a leader in decentralization and in delegation of authority to zone administrations which play an integral part in planning and budgeting and have a high degree of autonomy for budget execution under authority granted by the Minister.

DGA

The Organic Law of the Agricultural Sector places the DGA in charge of the preservation, conservation, and utilization of water resources and the preservation of agricultural lands. Specific objectives of the DGA are: i) the efficient administration of water and land resources, ii) rehabilitation and preservation of agricultural soils, and increased water supplies for agricultural pro-

duction; iii) education of farmers on the importance of rational utilization and conservation of water and land resources; and iv) long term planning of water supplies to meet future demands.

In pursuit of these objectives the DGA prepares, executes, and evaluates short, medium, and long-term water utilization programs. It also engages in programs for river basin improvement and management, erosion and flood control, and irrigation and drainage infrastructure. In addition, the DGA in conjunction with its regional staffs in the Zonal Offices, coordinates and evaluates irrigated crop plans, supervises operation and maintenance of irrigation infrastructural works, establishes and enforces water tariffs and quotas, studies and implements surface and sub-surface water projects, and trains district irrigation technicians. The organization of the DGA appears in Chart A, Page 43.

The unit of DGA directly involved in the implementation of this Project will be the Directorate of Preservation and Conservation (DIPRECO), one of three divisions of DGA. The major function of DIPRECO is to inventory, analyze, and implement programs related to rehabilitation of agricultural lands affected by salinity and drainage problems in coastal and sierra regions, and to engage in projects to improve existing and implement new small scale irrigation systems. These activities are intended to contribute to increased food production through rational use of scarce water and land resources and by bringing new land into production. The staff of DIPRECO is composed of 52 engineers (5 of which hold an advanced degree), 72 non-degree specialists (technicians, surveyors, and draftmen), 51 clerical workers, and 78 laborers.

The total 1975-76 DIPRECO budget is \$ 5.19 million which represents a 49% increase over the 1973-74 biennial budget. A breakdown by category follows:

<u>DIPRECO BUDGET 1973-74, 1975-76</u>		
(\$000)		
<u>Budget Category</u>	<u>1974-75</u>	<u>1975-76</u>
Operations	141	1,313
Investment	2,239	1,153
Special Projects	<u>1,101</u>	<u>2,720</u>
Totals:	\$ 3,481	\$ 5,186

Source: DGA

MOA Agrarian Zone No. VII (A.Z. No. VII)

A.Z. VII has its headquarters in Tacna. Its physical jurisdiction includes the Departments of Moquegua and Tacna.

The major responsibility of A.Z. No. VII is to implement MOA programs at the field level, principally those related to Agrarian Reform, water and irrigation resources, forestry, rural enterprise promotion and development, and rural cadastre. The A.Z. VII organization is shown in Chart B, Page 44.

The staff of the A.Z. VII is composed of 45 professional, 162 employees and 287 laborers. The 1973-74 and 1975-76 budgets of A.Z. follow:

<u>Budget Category</u>	<u>1973-74</u>	<u>1975-76</u>
Operational	1'420,000	1'670,000
Investment	<u>1'190,000</u>	<u>4'780,000</u>
Totals	\$ 2'610,000	6'450,000

Source: Program Office of the A.Z. VII

The sharp increase in the investment budget for the current biennium is due mainly to the recent addition of funding for the Water Resources Improvement Project in the Tacna Valley. This project is being carried out by contracted personnel, thus the proposed project will not interfere with other activities of the A.Z. VII.

Agrarian Bank (A.B.)

The A.B. is responsible for promoting the development of agricultural production by providing agricultural credit to individual and associative farm units. It has an authorized capital of S/. 15,000 million (\$ 333 million). A discount facility with the Central Bank supports short-term production lending.

The A.B. offers short-and long-term credit, generally with preferential rates of interest for activities producing priority

foods including meats, milk, and other products. It also offers credits for food marketing activities and, to a limited extent, for the purchase or improvement of on-farm infrastructure such as silos and fences. Furthermore the new organic law of the A.B. (Decree Law 21227 dated 7/24/75) expands its authority to provide credit for food industries in coordination with the Industrial Bank; and for Agricultural Social Property Enterprises. The law also enables the Bank to participate as a share-holder in associative farm enterprises.

Under the current GOP Agrarian Reform policy the A.B. orients its financial resources toward serving the associative enterprises, such as agricultural cooperatives, indigenous communities, and SAIS. Farmers organized into Water User Associations are similarly eligible for similar preferential treatment by the Bank. At least 60% of the A.B.'s short-term credits are presently provided to these groups. It is also expected that the Agrarian Reform process will expedite the flow of credit to larger number of producers.

The organization of the Bank is shown in Chart C, Page 45.

The A.B. has 17 regional branches and 45 field agencies. Each regional branch can approve loans of up to S/. 3 million (\$ 66,667) and field agencies can approve loans up to S/. 600,000 (\$ 13,333). The Tacna valley has one regional branch in the city of Tacna.

The Bank's role will be a key one in the success of this project since it will finance the farmers' seed, fertilizer and other production costs, especially during the initial crop year. Since commercial lending activity in the agricultural sector has been curtailed due to the uncertainties created by the Agrarian Reform, the A.B. is virtually the only remaining source of regular bank credit available to farmers, in addition to being the only available source of concessional farm credit.

#### Ministry of Food (MOF)

The Ministry of Food is a relatively new organization having been established in December 1974. It is in charge of all activities related to the production and internal marketing of food products, including livestock, and their livestock processing. In addition to the normal administrative and supervisory staffing, the MOF has four

basic line divisions: Production, Research, Marketing and Infrastructure.

The MOF's programs are executed through its Zonal Offices which are, in effect, micro-models of the Ministerial organization. (Each zonal office has one head who is the regional equivalent of the Minister of Food). This form of organization is part of a nation-wide movement to decentralize governmental functions, including budgeting and administration. The Ministry establishes policy guidelines, provides leadership in the process by setting priority targets and advising zonal and sub-zonal offices on their probable budgetary requirements for personnel and support for field operations.

Decentralization has raised morale in the field by placing greater authority and responsibility at that level, lessening somewhat the preference for work in the city capital of Lima, and reducing the bureaucratic red tape.

The Tacna office of the MOF has jurisdiction over the Department of Tacna and Moquegua. The total personnel in the Tacna office numbers 191, of which 33 are professionals, 88 non-degree specialists with the balance being clerical workers and laborers. The Tacna office organization is shown in Chart D, Page 46.

## 2. AID

During the development of the Feasibility Study the DGA demonstrated good collaboration and a high degree of coordination with USAID, particularly in the selection of consultants, reviews of draft papers and technical design, and in joint field trips to various potential sites in the country. This is expected to continue throughout the implementation of the project; consequently, there appears to be no need for a rigid scheme of approval other than the following points:

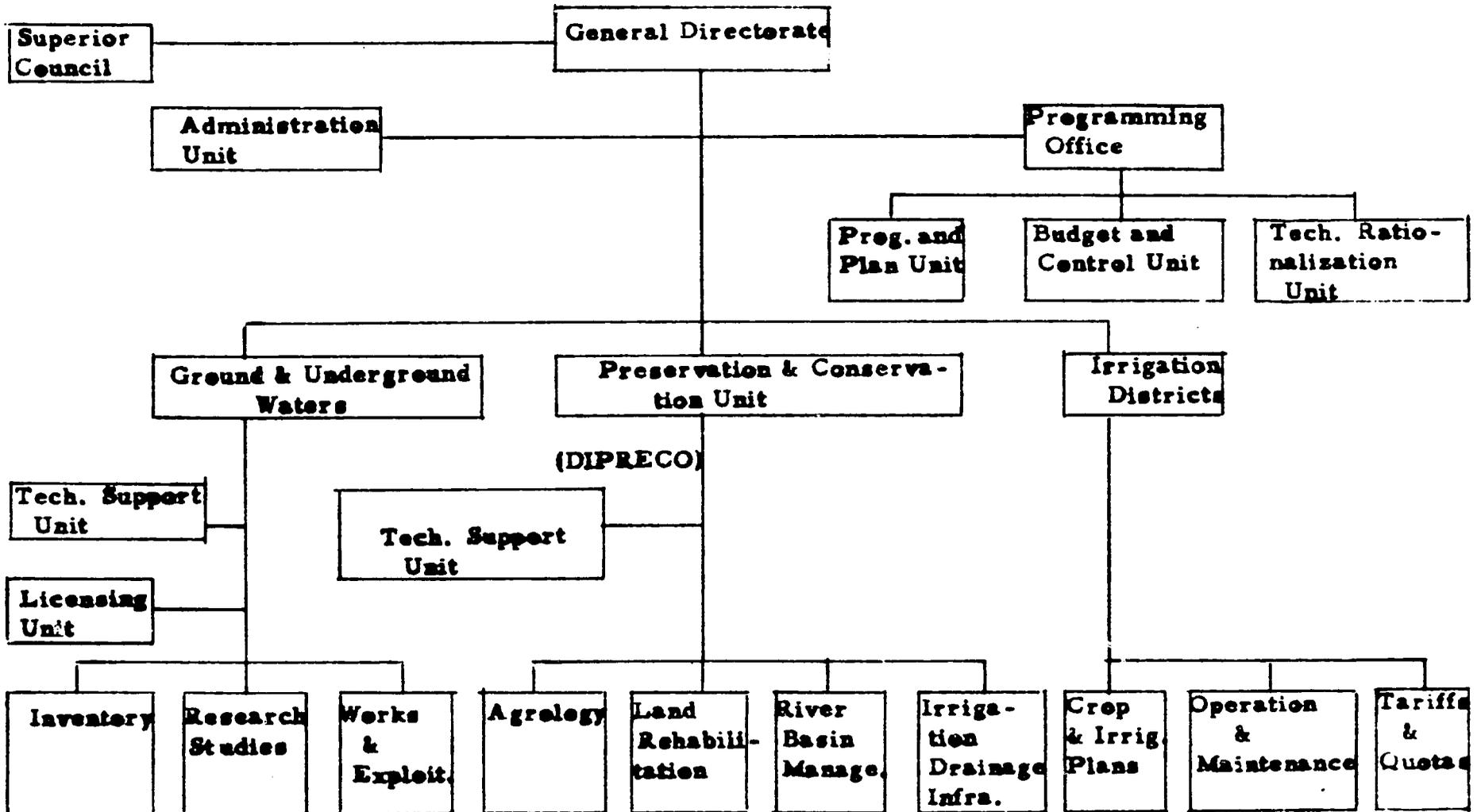
- Final Engineering study to be approved by USAID.
- A monthly expenditure report to be submitted to USAID by DGA.
- Quarterly Progress Reports to be submitted to USAID by DGA.

USAID Engineering has assigned one local engineer as the liaison officer for all project related offices in Lima and Tacna. The USAID Agriculture Office will provide support in all phases of the project, as needed.

Disbursement of funds through an Administration Contractor proved quite successful for the Feasibility Study and for this reason a similar service for the implementation of this Grant is deemed advisable by both DGA and USAID.

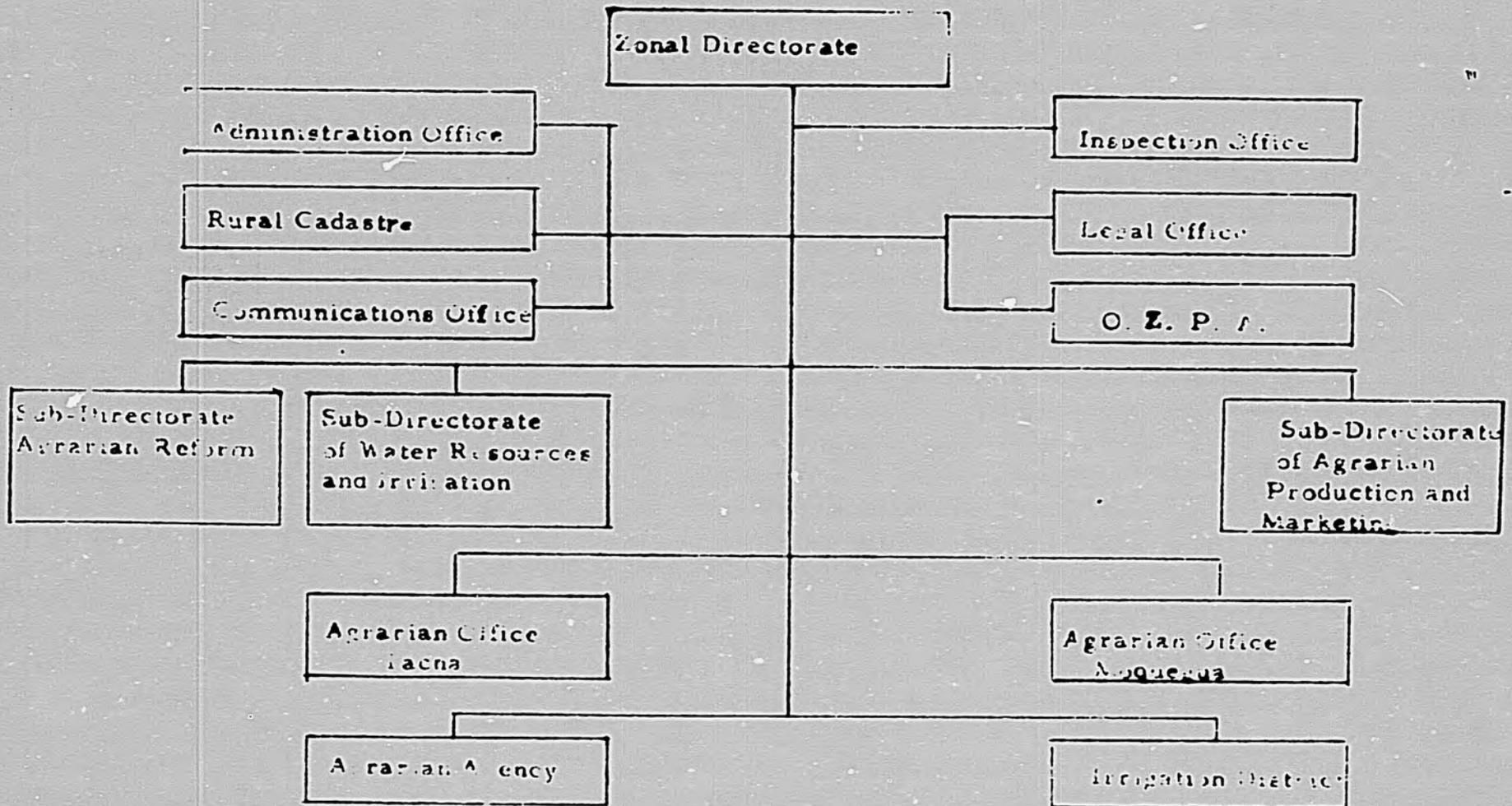
ORGANIZATION OF THE DGA

CHART A



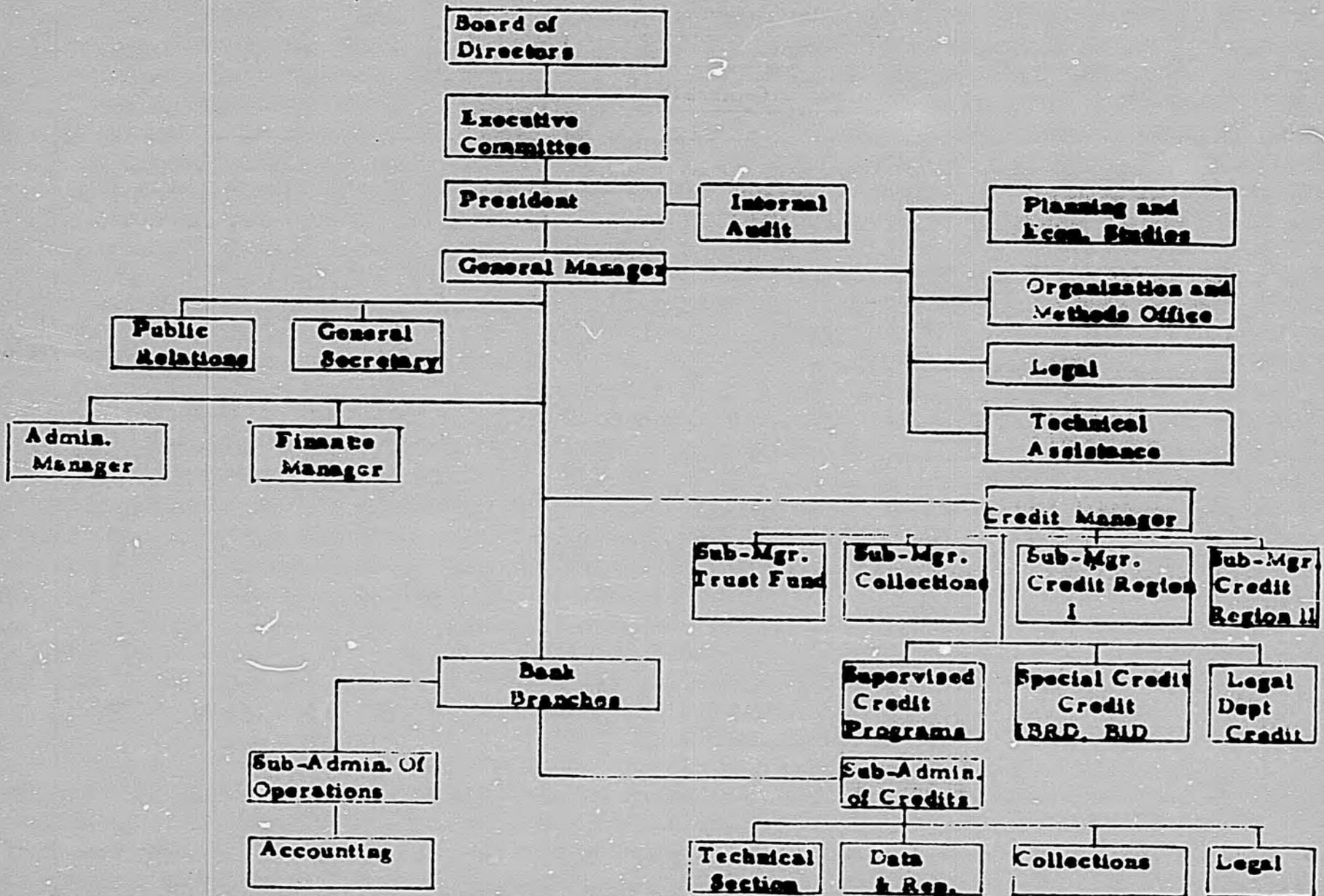
ORGANIZATION OF THE AGRARIAN ZONE VII - IACNA

Chart 5



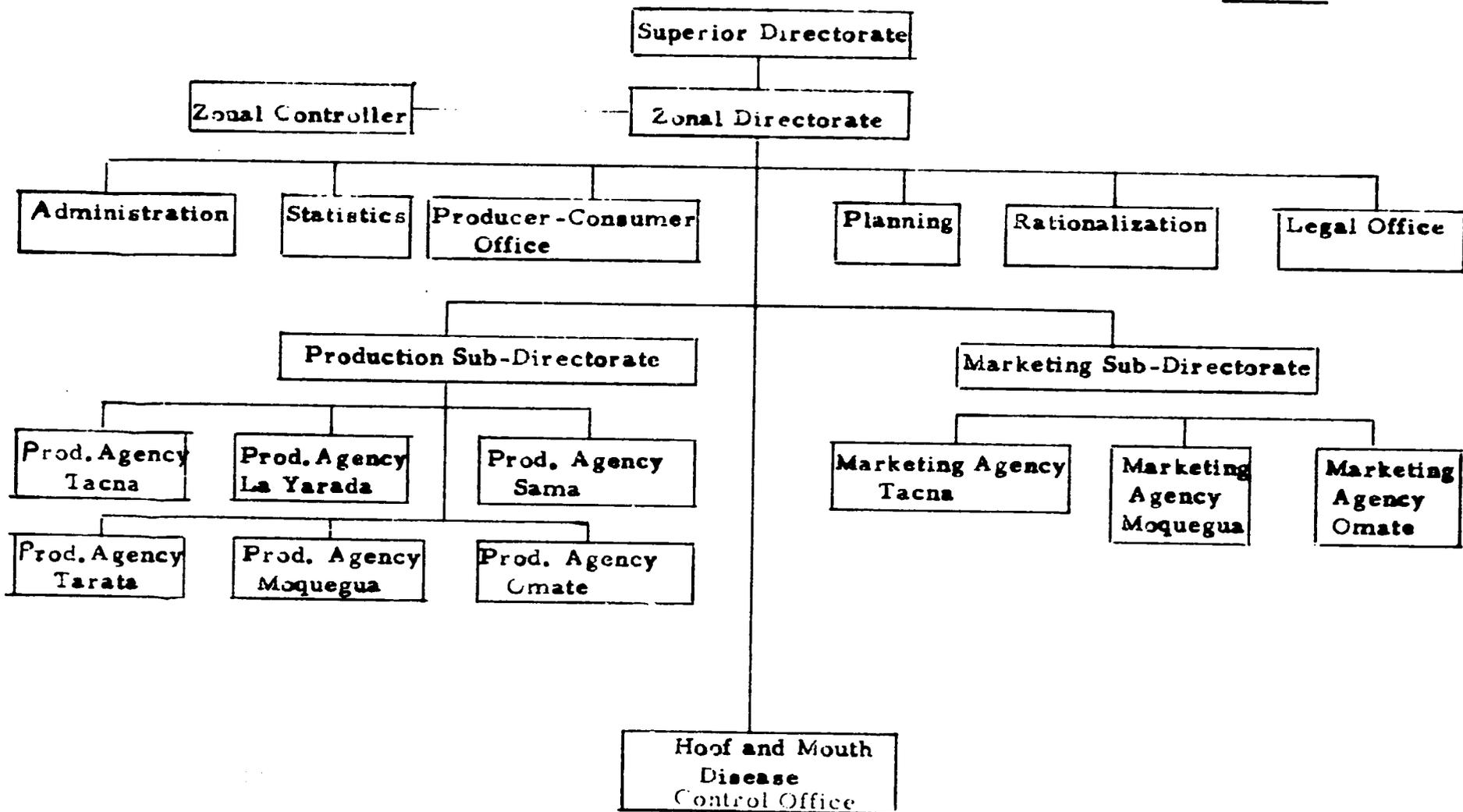
ORGANIZATION OF THE AGRARIAN BANK

Chart C



ORGANIZATION OF THE TACNA OFFICE OF THE MOF

Chart 1



## B. Implementation Plan

A project performance tracking network chart is presented in Annex E. It shows milestones against which project success and planned implementation are to be measured, the more significant milestones being:

<u>Action</u>	<u>Date<sup>1/</sup></u>	<u>Responsible Agency</u>
-ProAg signed	Sept. 76	USAID/GOP
-Final Engineering Study starts	Oct. 76	DGA
-Letter of understanding from A.B. to DGA assuring financing for production costs	Dec. 76	A.B./DGA
-Final Eng. Study completed and approved	Feb. 77	DGA/USAID
-Construction starts	March 77	DGA/A.Z.VII
-FY 78 ProAg signed	Oct. 77	USAID/GOP
-Cooperative legally organized	Aug. 77	A.Z.VII/DGA
-Coop. obtains credit from A.B.	Dec. 77	A.B./A.Z.VII/DGA
-Construction completed	Feb. 78	DGA/A.Z.VII
-Pilot crops started	Mar. 78	DGA/A.Z.VII/MOF/MOH/ Area No.4

The DGA is the implementing agency of the project and as such is responsible for developing the final engineering study and carrying out the execution of the project. In the latter aspect they will work in close coordination with the Agrarian Zone No.VII (A.Z. VII) which will provide partial local logistics and promotion of the project in Tacna.

A key contribution by the A.Z. VII will be the selection of beneficiaries and the constitution of a farmers' cooperative in order to have a base for obtaining needed credit from the Agrarian Bank for their first crop production expenses. The DGA is currently seeking a formal understanding with the Agrarian Bank relative to this production cost financing.

Jointly the MOH, DGA and A.Z. VII will develop a program for research and agricultural management of the project. This program will be conducted by an ad hoc research team over a two year period with partial USAID Grant financing. This team will also carry out

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<sup>1/</sup> Dates differ from the PPT. Those given here are the projected dates for completion of Actions. The PPT lists critical dates by which Actions must be completed. See also Annex B for detailed construction schedule.

some specific extension and training functions by conducting informal on-farm demonstrations with participating farmers. This team will basically be 3 persons, a professional and two assistants. However, they will coordinate with technicians of all parties involved in the project. A detailed Research Program will be developed in the Final Study and Report.

The final engineering design will be accomplished in a manner similar to the way the feasibility study was carried out for the project. DGA will coordinate the required collaboration of all personnel and also provide the technical supervision of the supplementary personnel contracted with Grant funds. USAID Engineering and Agricultural Offices will review and approve the final design.

The construction schedule is shown in Annex B. During the construction period the DGA will provide a graduate engineer as Project Engineer. All construction will be done by force account in accordance with the approved final design. To complement the DGA supervision of construction, USAID Engineering will monitor the project based on frequent visits to Tacna, probably monthly, during the construction period.

The financial aspects of the project Feasibility Study were very satisfactorily handled by an Administrative Contractor. Based on this the DGA and USAID have agreed to use the same systems for this Grant. The proposed disbursement procedure includes an advance of Grant funds.

Research will focus basically on sanitary aspects of water, soil and crops including variation in soil salinity and composition. Essentially the whole area of the project will be covered by the research program; however, a 5 Ha. plot will be reserved for experimentation with selected truck crops and other vegetables which Peruvian law presently forbids being produced for human consumption when irrigated with treated sewage effluents. The results obtained from this 5 Ha. experimental plot are expected to induce the authorities to change the regulations regarding the use of treated sewage for certain crops.

A secondary research element, which will be explored if necessary funds can be acquired for this purpose through cost savings or other sources, is the determination of the productive potential of fish culture in the 4 sewage treatment lagoons. Potentially some 4 to 8 metric tons (4 to 6 tons for Carp, 6 to 8 tons for Tilapia) of edible fish per year might be produced in each of these one hectare lagoons. Full facilities for a study are estimated to cost up to \$22,000 and would include small breeding ponds, early

growth ponds, fish handling facilities and technical assistance through one operational year of study on fishculture. If one of the 4 aeration lagoons were to be used as the breeding and early growth pond combined, then the handling facilities and technical assistance would require approximately \$10,000.

During the farm production period the Farmer Cooperative will receive strong support from the Tacna office of the MOF, particularly in getting needed advice on crop inputs and also in the marketing process of outputs. Once the project becomes operational, the USAID Agriculture Office will monitor all aspects of production control, marketing and research.

As noted in Part III, E, Social Analysis Section, a list of eligible small farmer candidates already exists and the selected participants will be incorporated into a cooperative. This action is not expected to be completed early enough for the selected farmers to take part in the decision making relating to project design and initial implementation. However, promptly following the formation of the farmer cooperative organization the farmers will have a primary involvement, as the beneficiaries, in project operations.

#### C. Evaluation Plan

Periodic evaluation is most essential since project success or failure may determine, in great measure, future GOP commitments to and budgetary support of expanded similar activities along Peru's coast.

Three periodic annual evaluations are scheduled starting in January 1978 through January 1980. Special additional evaluations will be carried out as needed.

The second and third periodic evaluations will have the combined benefits of the inputs of the Research Team and the farmer cooperative. Senior officers of the following institutions will participate in all evaluations:

- Directorate General of Waters (DGA).
- Ministry of Health (MOH).
- USAID.

The project specific baseline data in this case is simple because the area to be developed now produces nothing. The socio-economic baseline for the participants will be obtained during the selection process to be made by the A.Z. VII. The data collection process will

become a regular activity of the Research Team, starting in 1978.

Implementation progress will be evaluated against the target verifiable indicators set forth in the Logical Framework, shown in Annex D. The planning assumptions will also be controlled as to their validity at the evaluation time.

The third regular evaluation is intended to be the final one. It will evaluate the overall achievement of the project purpose with special emphasis on the receptivity of the demonstration and indications of interest, feasibility, etc., for its concept of being carried out at several locations in Peru. The socio-economic impact of the Project will be determined in terms of the following:

1. Production effects

- average yield per crop per hectare
- length of growing season
- crop diversity
- crop losses.

2. Income effects

- farm-generated cash income
- food consumption/nutritional level
- quantity and value of marketed production
- credit rating/borrowing behavior.

3. Sanitation effects

- incidence of any particular vector and disease (in crops and fish)
- presence of plagues
- quantity and quality of the effluent.

These illustrative indicators will be supplemented by others selected to provide a basis for a GOP decision whether to expand this type of Project to other coastal cities.

The DGA has expressed its strong support of Project evaluation. USAID will coordinate closely with the DGA in promoting maximum participation of other GOP agencies and high ranking Peruvian professional personnel will be strongly encouraged to participate in the evaluation process.

D. Conditions and Covenants

The Project Agreement for the first year's activities will contain the following condition precedent to disbursement of A.I.D. funds for construction:

1. The Directorate General of Waters (DGA) shall furnish a final engineering study acceptable to the USAID.

2. The Agrarian Bank Office in Tacna will provide a letter of understanding that credit will be available to the project farmers for the production costs of the first crop.

In addition to these CP's a covenant in the Project Agreement will require joint USAID-GOP annual reviews of the progress of the Project.

Annex A

Page 1.

Draft of Project Description for ProAg

One of the principal constraints to improve production of the agricultural sector in Peru is the very limited agriculturally productive land base, there being approximately 400 persons per Km<sup>2</sup> of arable land.

As a result of the country's dearth in arable land, the Government of Peru has fostered a policy of land reclamation through the use of traditional methods of irrigation. However, despite considerable efforts, there still remains a low arable land base. Due to limited supplies of natural water sources there is a limit as to what can be accomplished through conventional irrigation projects.

Meanwhile, substantial quantities of scarce water on Peru's coastal deserts are being lost every day by discharging all sewage, untreated, into the coastal streams and ocean fronts. This not only wastes water rich in organic fertilizers, but thoroughly contaminates the streams and ocean, and disrupts the aquatic environment. This sewage effluent offers great potential for making selected desert areas highly productive. Treating and utilizing the sewage of the coastal cities could bring literally thousands of coastal desert hectares into needed food production and provide a living to landless farmers. At the same time the use of low cost oxidation lagoon treatment of sewage would also have a favorable impact on the environmental and health conditions of much of Peru's large coastal population.

The purpose of this project is to demonstrate successfully the economic and technical feasibility of producing significant quantities of needed foodstuff by irrigating Peru's coastal desert lands with treated sewage effluents. This will be accomplished through the establishment of a pilot demonstration site outside Tacna city on Peru's extreme southern coast. Approximately 120 hectares of barren coastal desert will be under irrigation and cultivation at the project site by the middle of 1978 utilizing the treated sewage effluent from the aeration lagoons recently installed with the technical advice of a U.S. engineering consulting firm.

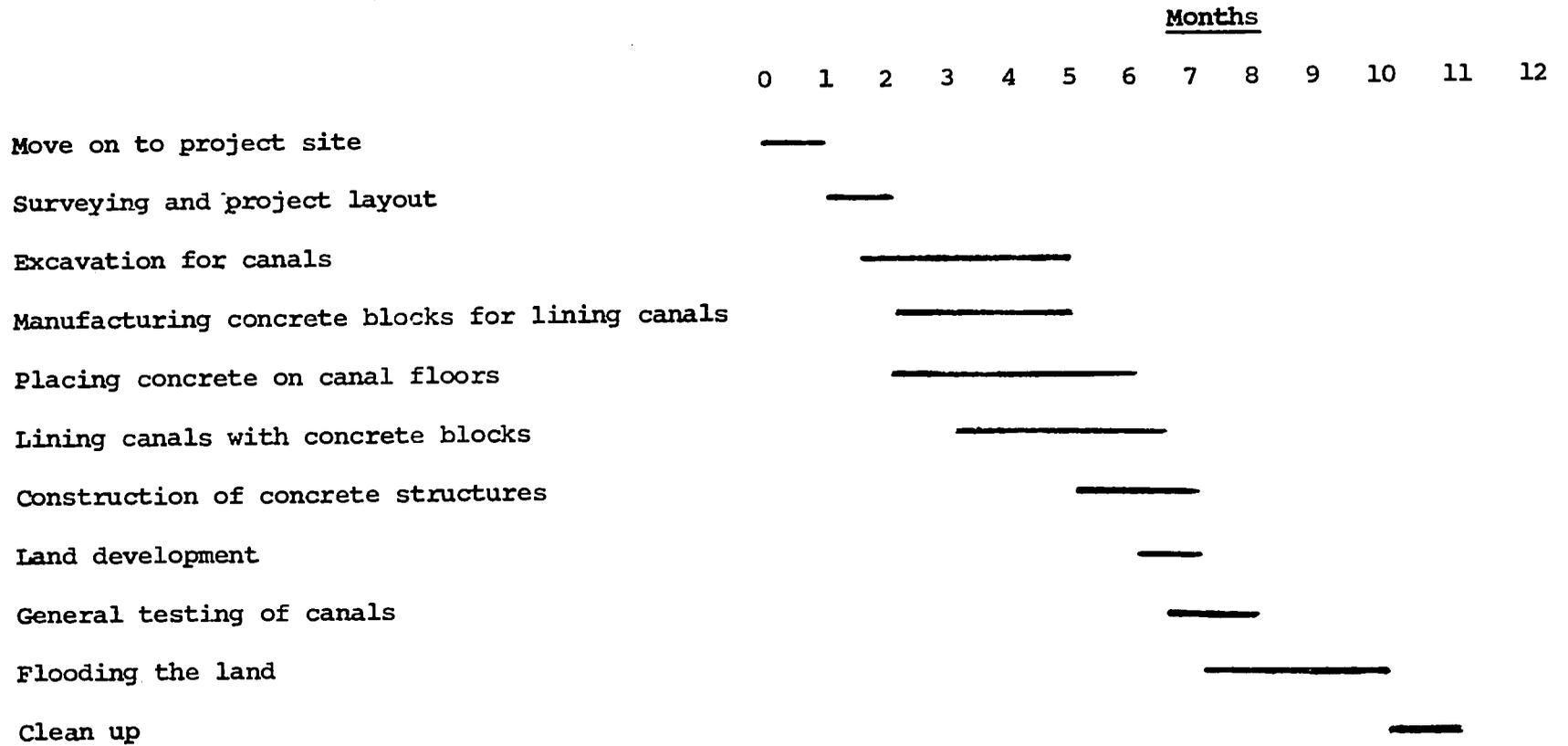
The Ministry of Agriculture's Directorate General of Waters (DGA) has already completed the feasibility study for the pilot project site, with support from AID. Under the proposed project, AID funds will assist in financing the final design and construction of the irrigation infrastructure at the project site. Although the demonstration facility initially will encompass 120 hectares, the basic infrastructure will be built to specifications that will permit expansion of the site to 200 hectares with relatively little additional effort and expense. Final selection of crops to be grown will be made during the development of the final engineering design/study to be undertaken by the DGA. Crops selected will be from among the type permitted by Peruvian law to be grown with treated sewage effluent. However a part of this demonstration project will be to experiment with other, high value, food crops, outside the "permissible list," e.g. tomatoes. This will be done to demonstrate that foods of the raw edible type grown with treated sewage effluent are sanitary and safe for human consumption. A control plot of approximately 5 hectares will be set aside for this particular experimental purpose.

The DGA will be the primary responsible Government of Peru agency for implementing the project and will provide, inter alia, the services of a chief engineer as overall project supervisor. DGA will secure the coordination and collaboration of the Ministry of Agriculture's Agrarian Zone Office in Tacna, as well as the Ministry of Food's local office, for production and other technical advice. The Tacna branch of the Agrarian Bank will provide necessary production credit to the farmers participating in the project. The Ministry of Health's Tacna office will provide technical expertise for overall project sanitary control and for testing the crops produced on the separate five hectare plot mentioned above. A portion of the AID project contribution will assist in setting up simple, but adequate, research facilities at the project site.

The immediate participants/beneficiaries of the project will be approximately 150 members of poor former farmer families who presently reside in the "pueblos jóvenes" of Tacna. They will be organized into a production cooperative. Final selection of participants and legal incorporation of the cooperative will be undertaken simultaneously with construction of the irrigation infrastructure.

The benefits of a successful project at the Tacna demonstration site will be two-fold. On the one hand it will demonstrate the actual and potential value of treated sewage effluent otherwise wasted to produce hundreds and eventually thousands of hectares of needed food crops along Peru's desert. It will also promote improved health environment by showing that relatively inexpensive lagoon treatment systems can readily minimize water contamination to the point where waters can be used for growing all types of food crops, safe for human consumption. Expectations are that in the short term the project will be replicated at other coastal urban sites where sewage effluent is presently treated, and in the longer run to motivate the installation of sewerage treatment plants along the coast for joint agricultural/environmental benefits.

CONSTRUCTION SCHEDULE



ESTIMATED TONNAGE YIELD PER YEAR

<u>Product</u>	<u>Hectares per Year</u>	<u>Ton/HA.</u>	<u>Tons</u>
Alfalfa	40	54.6	2,184
Corn	55	3.0	165
Squash	20	8.0	160
Potatoes	50	12.0	600
Lima Beans	25	1.2	30
<b>TOTAL:</b>	<b>190</b>		<b>3,139</b>

ANNEX CEnvironmental Assessment

Appendix 5C (Reserved) of Chapter 5 in Handbook 3 Part I is noted. Several of the aspects mentioned in the "Environmental Assessment Guidelines Manual" are covered already somewhere else in this PP and in the Feasibility Study made by DGA. Here we stress the most important environmental implications of the project starting with a general background.

The irrigation site is a barren area of sandy soil 4 Km.SW of Tacna. Recorded moisture fall at the nearby airport is less than 3 mm. (1/8") per year. Only very occasional cactus or other desert plants can be seen.

The sewage treatment plant (aeration lagoon system) is located about a kilometer from the nearest corner of the land to be irrigated. At present the treated effluent is being wasted into a natural draw in the desert which flows toward the sea. (See Figure 1 in Feasibility Study.)

The aeration lagoons, which have been functioning since October 1975, are being operated efficiently. For example, the secondary lagoons have more than 4 parts per million of dissolved oxygen in the waters, which is sufficient to support fish and the local Gambusia fish has recently been planted therein and is doing well. The most recent analyses show a 10 times reduction in the Bacillus coli count and zero count for Salmonella and Shigella bacteria. Algae of the Chlorella and Coelastrum type are present but, so far, none of the Euglenema type; these will be put into the lagoons in the near future.

The water table in the general area has been tested and is in excess of 50 meters (160 ft.) deep. It has been determined that there is no chance of ground water contamination due to phosphates in domestic detergents.

A potential problem could be created if, in the future, industrial plants should discharge their wastes into the sewerage system feeding the treatment plant. Industrial development in Tacna is presently at a very low level. The sanitary authorities will have to be cautioned of the need to be aware of the industrial waste problem and to enforce the existing Peruvian regulations control in the disposal of such wastes.

It is noted here that Peru's present Water Law establishes that it is permissible to irrigate with treated sewage effluent for the following:

- High stem food plants and those plants which must be cooked for human consumption;
- Food products which will be subject to industrial processing before human consumption.

These legal restrictions have been observed in designing the crop patterns for this project.

#### Resource linkage:

Implementation of the project will convert 120 Hectares of extremely dry desert into a fully productive green zone with the resulting environmental benefit. The agriculture technologies to be introduced will be the results of a permanent and systematic research activity to be carried out by the project research team. As a consequence of the project, habitats for wildlife will be created and a substantial change in the localized ecosystem is expected. This, also, will be closely monitored by the research team.

#### Physical Aspects:

The project site is presently subject to minor wind erosion and drifting sand. The change into agricultural land will tend to fix the soil and prevent these losses. Erosion and sedimentation problems associated with the canal network will be minimized because the main canals will be concrete lined and hydraulic slopes have been carefully planned to frequently dissipate accumulating hydraulic energy. In addition to these design features the farmers' cooperative will be instructed in and will have to provide adequate maintenance for the system.

The introduction of plant diseases, insects or rodents is a possibility. These will have to be controlled and the research team will have the responsibility of keeping them controlled to permissible limits.

During the final engineering study a detail program will be designed for chemical and bacteriological effluent quality control, taking into consideration both normal operations and overload operation of the sewage treatment plant.

**Social-cultural aspects:**

Former farmers, now landless in Tacna, are eager for a piece of land to cultivate. Most of the selected beneficiaries are expected to be former farmers who at one time used raw sewage to irrigate (prior to 2 years ago). Thus the project will represent a positive step forward for the users. All beneficiaries will receive basic information as to how to put up their homes. A water main will bring potable water from the nearby Tacna Airport.

**Public health aspects:**

The potable water, mentioned above, will be available to farmers by means of public faucets conveniently located to minimize health hazards or nuisance at public watering sites.

A joint effort of the research team and the MOH Zone No. 4 will be needed to monitor sanitation, new diseases and vector patterns which may be introduced by the new water-related ecosystem, as well as the safety precautions related to pesticide/herbicide/fertilizer storage and use.

PROJECT DESIGN SUMMARY  
LOGICAL FRAMEWORK

10-1-78

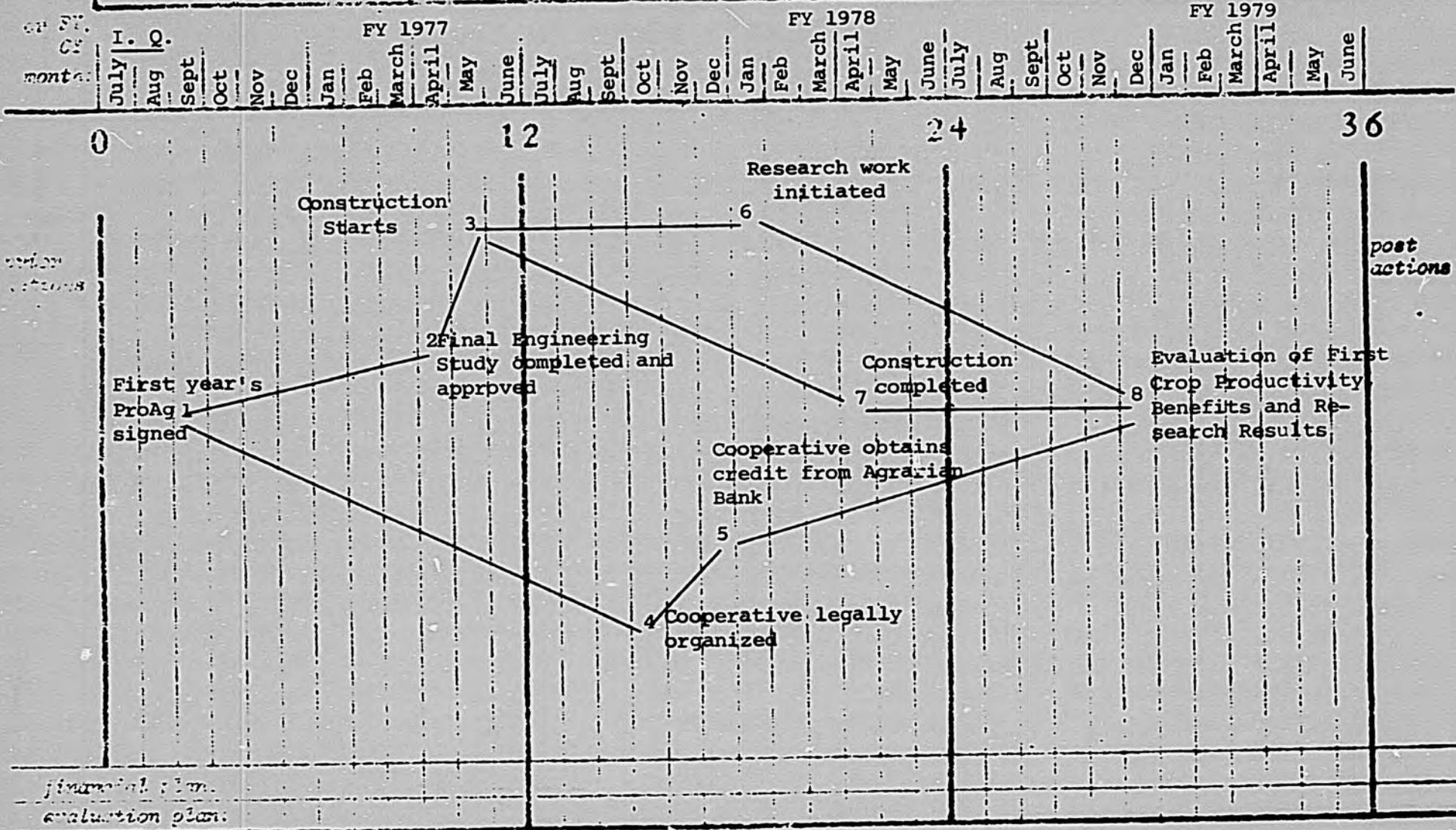
Life of Project:  
From FY 76 to FY 78  
Total U. S. Funding \$200,000  
Date Prepared: April 1976

Project Title & Number: Use of Treated Sewage for Irrigation (527-15-120-150)

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><b>Program or Sector Goal:</b> The broader objective to which this project contributes: To increase food production through expansion of arable land along Peru's populated coastal desert.</p> <p><b>Secondary Goal:</b> Promote concern for environmental sewage contamination along Peru's coast, as well as the recognition of the economical benefit that can be derived through uses of <u>treated sewage</u>.</p> <p><b>Project Purpose:</b></p> <p>To successfully demonstrate the economic and technical feasibility of producing significant quantities of needed foodstuffs by irrigating desert lands with treated sewage effluent.</p>	<p><b>Measures of Goal Achievement:</b></p> <ul style="list-style-type: none"> <li>- increase in arable coastal hectare available for production of food.</li> </ul>	<ul style="list-style-type: none"> <li>- MinAg and Min. of Food production statistics.</li> <li>- ONERN baseline studies</li> <li>- Census baseline data for agriculture</li> </ul>	<p>Assumptions for achieving goal targets:</p> <ul style="list-style-type: none"> <li>- Continued GOP high priority for increasing agricultural food production.</li> <li>- GOP interest in reclaiming coastal desert lands, continues as high priority.</li> </ul>
<p><b>Outputs:</b></p> <ol style="list-style-type: none"> <li>1. Construction of basic infrastructure at pilot site - irrigation canals and small water control structures.</li> <li>2. Hectare brought into cultivation at pilot site.</li> <li>3. Economic yields for selected crops according to established crop design patterns.</li> <li>4. Establishment of demonstration site to test use of treated effluent on crops.</li> <li>5. Establishment of Agr.Cooperative.</li> </ol>	<p><b>Conditions that will indicate purpose has been achieved: End of project status.</b></p> <ul style="list-style-type: none"> <li>- Establishment of on-going demonstration site.</li> <li>- At least 120 hectares at Tacna pilot site under cultivation by 1978.</li> <li>- Crop yields.</li> </ul>	<ul style="list-style-type: none"> <li>- MinAg Agrarian Zonal Office No. VII data.</li> <li>- Project Monitoring and Evaluation (joint DGA/USAID).</li> <li>- Agrarian Bank Zonal Office data.</li> <li>- Ministry of Health.</li> </ul>	<p>Assumptions for achieving purpose:</p> <ul style="list-style-type: none"> <li>- Adequate support for project (by Agrarian Zone No. VII).</li> <li>- GOP agencies involved in project (MinAg, MOH, MinFood, Ag. Bank) will continue to support project.</li> <li>- Continued adequate operation of Tacna sewage treatment plant.</li> </ul>
<p><b>Inputs:</b></p> <p><b>A. USAID:</b></p> <ol style="list-style-type: none"> <li>1. Grant financial assistance</li> <li>2. Engineering guidance/monitoring</li> </ol> <p><b>B. GOP: 1. MINAG</b></p> <p><b>a. DGA</b></p> <ol style="list-style-type: none"> <li>1. Administrative &amp; Technical Staff</li> <li>2. Final Engineering Design Study</li> </ol> <p><b>b. Agrarian Zonal Office No. VII</b></p> <ol style="list-style-type: none"> <li>1. Supervisory personnel and partial local logistics</li> <li>2. Land</li> </ol> <ol style="list-style-type: none"> <li>2. Agrarian Bank provides credit</li> <li>3. Ministry of Health</li> <li>4. Ministry of Food</li> </ol>	<p><b>Magnitude of Outputs:</b></p> <ul style="list-style-type: none"> <li>- See Annex B for Construction Schedule.</li> <li>- At least 120 hectares by end of second year.</li> <li>- See Annex B for projected food tonnage yield per year.</li> <li>- Research control program operating in second year.</li> <li>- Approximately 150 coop beneficiaries.</li> </ul>	<ul style="list-style-type: none"> <li>- On-site inspection by DGA and USAID technicians.</li> <li>- MinAg Agrarian Zone Office No. VII.</li> <li>- Agrarian Bank Zonal Office.</li> <li>- Project Monitoring by MOH Zonal Office No. IV (for sanitary controls).</li> <li>- MinAg Agrarian Zone Off. VII &amp; SINAMOS.</li> </ul>	<p>Assumptions for achieving outputs:</p> <ul style="list-style-type: none"> <li>- Construction materials available without major delays.</li> <li>- Willingness of farmers to form a coop and participate in the project.</li> <li>- Availability of agricultural credit from the Agrarian Bank for participating farmers.</li> </ul>
<p><b>Implementation Target (Type and Quantity)</b></p> <ul style="list-style-type: none"> <li>- \$200,000 grant for local construction and supplies and equipment.</li> <li>- One Civil Engineer (local direct-hire on part time basis).</li> </ul> <p><b>Study completed approximately 7 mos. after Project initiation (by April 30, 1977).</b></p> <ul style="list-style-type: none"> <li>- 120 hectares demonstration site.</li> <li>- Estimated agricultural production credit to cooperative: \$120,000</li> <li>- Part time services of lab technicians and sanitary engineer.</li> <li>- Technical assistance</li> </ul>	<ul style="list-style-type: none"> <li>- Project monitoring</li> <li>- On-site inspections</li> <li>- Agrarian Bank records-number of loans made to project cooperative members.</li> <li>- Periodic reports of analysis</li> </ul>	<p>Assumptions for providing inputs:</p> <ul style="list-style-type: none"> <li>- Timely GOP budgetary &amp; staff support.</li> <li>- Timely availability of AID resources, especially beyond first year of project.</li> <li>- Inflation does not exceed project budget estimates.</li> <li>- Agrarian Bank will honor its commitment to provide credit to participating farmers.</li> </ul>	

TABLE 207

Country PERU	Project No. 527-15-120-150	Project Title Use of Treated Sewage for Irrigation	Year 6/76	X / original / revision#	EPT 477
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PROJECT PERFORMANCE NETWORK

## SAMPLE FORM

	project no: 527-15-120-150	project title: Use of Treated Sewage for Irrigation	date: 6/76	/X / original / / revision #	approved:
<u>OPERATIVE</u>					
<u>Action Agent</u>	<u>Event</u>	<u>Date</u>			
USAID/GOP	1. First Year's ProAg signed	9/30/76			
GOP/USAID	2. Final Engineering Study completed and approved	4/30/77			
GOP	3. Construction starts	5/31/77			
GOP	4. Cooperative legally organized	10/31/77			
GOP	5. Cooperative obtains credit from Agrarian Bank	12/31/77			
GOP/USAID	6. Research work initiated	1/31/78			
GOP	7. Construction completed	4/30/78			
USAID/GOP	8. Evaluation of First crop productivity, benefits and research results	12/31/78			

AID 1240-2 (5-74)

CHECKLIST OF STATUTORY CRITERIA

(Alliance for Progress)

In the right-hand margin, for each item, write answer or, as appropriate, a summary of required discussion. As necessary, reference the section(s) of the Capital Assistance Paper, or other clearly identified and available document, in which the matter is further discussed. This form may be made a part of the Capital Assistance Paper.

The following abbreviations are used:

FAA - Foreign Assistance Act of 1961, as amended.

FAA, 1973 - Foreign Assistance Act of 1973.

App. - Foreign Assistance and Related Programs Appropriation Act, 1974.

MMA - Merchant Marine Act of 1936, as amended.

BASIC AUTHORITYAnswer or Discussion

1. FAA § 103; § 104; § 105;  
§ 106; § 107. Is loan being made

a. for agriculture, rural development or nutrition;

For agriculture and rural development

b. for population planning or health;

c. for education, public administration; or human resources development;

d. to solve economic and social development problems in fields such as transportation, power, industry, urban development, and export development;

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AID 1240-2 (5-74)

*e. in support of the general economy of the recipient country or for development programs conducted by private or international organizations.*

## COUNTRY PERFORMANCE

### Progress Towards Country Goals

2. FAA § 208; §.251(b).

A. Describe extent to which country is:

*(1) Making appropriate efforts to increase food production and improve means for food storage and distribution.*

*(2) Creating a favorable climate for foreign and domestic private enterprise and investment.*

The GOP has an active policy to increase food production, including extensive credit programs. A top priority activity is the Agrarian Reform program which among other things is consolidating and redistributing land holdings in an attempt to bring additional lands under cultivation. A new Ministry of Food has been established with responsibility for technical assistance in production and marketing of food crops.

In the context of its industrial reform program (Industrial Law) and its balance of payment management, the GOP is seeking foreign and domestic private investments in areas identified as being essential to growth. Also see Item No. 4.

AID 1280-2 (6-74)

*(3) Increasing the public's role in the developmental process.*

Programs in Industry (Industrial Law), fishing (Fishing Law), mining (Mining Law), Agrarian Reform, and Social Property are especially designed to achieve this objective, as are efforts to mobilize rural population.

*(4) (a) Allocating available budgetary resources to development.*

Sizeable portion of the GOP national budget are being allocated to the top priority programs of educational, agricultural and industrial reform (18%, 10% and 5% respectively).

*(b) Diverting such resources for unnecessary military expenditure (See also Item No. 20) and intervention in affairs of other free and independent nations.) (See also Item No. 11)*

"See item N° 19".

*(5) Making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangements, and making progress toward respect for the rule of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise.*

In recent years, tax collections have improved, the rule of law continues to be respected, and land reform has received top priority. Since the recent change of Government, deportees have been invited to return and previously closed newsmagazines been permitted to reopen.

*(6) Adhering to the principles of the Act of Bogota and Charter of Punta del Este.*

Sound monetary and fiscal policies leading to real growth in GNP, and relatively stable prices, coupled with significant economic and social reforms designed to restructure the Peruvian society along more equitable lines. indicate Peru's compliance with Alliance for Progress goals.

AID 1240-2 (5-74)

(7) Attempting to repatriate capital invested in other countries by its own citizens.

Recent decrees requiring full repatriation of foreign capital of Peruvians have had an important impact on the balance of payments and make available resources for investments in Peru.

(8) Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.

The GOP appears to be responding to the economic, political and social concerns of its people, particularly the poor, and has intensified self-help efforts as indicated above.

B. Are above factors taken into account in the furnishing of the subject assistance?

Yes.

Treatment of U.S. Citizens by Recipient Country

3. FAA § 620(c). If assistance is to government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) debt is not denied or contested by such government?

No known instance.

4. FAA § 620(e)(1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities?

The Government of Peru is fully aware of USG requirement for prompt, adequate and effective compensation regarding expropriation of U.S. investments. To date there have been several expropriation claims which have been settled to the satisfaction of GOP and the USG. The only outstanding expropriation claim is that of the U.S. Marcona Mining company which is still subject to further negotiations.

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AID 1240-2 (5/74)

5. FAA § 620(c); Fishermen's Protective Act. § 5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing vessel on account of its fishing activities in international waters,

a. has any deduction required by Fishermen's Protective Act been made?

No deduction has been required.

b. has complete denial of assistance been considered by A.I.D. Administrator?

The Administrator has taken into consideration prior seizure of U.S. fishing vessels by the GOP in his determination to continue to furnish assistance to Peru. There have been no such seizures or sanctions since the 1972-73 fishing season.

Relations with U.S. Government and Other Nations

6. FAA § 620(a). Does recipient country furnish assistance to Cuba or fail to take appropriate steps to prevent ships or aircraft under its flag from carrying cargoes to or from Cuba?

No longer applicable.

AID 1240-2 (5-74)

7. FAA § 620(i). If assistance is to a government, has the Secretary of State determined that it is not controlled by the international Communist movement? Yes.
8. FAA § 620(j). If assistance is for any productive enterprise which will compete in the United States with United States enterprise, is there an agreement by the recipient country to prevent export to the United States of more than 20% of the enterprise's annual production during the life of the loan? Any production increases resulting from efforts under this project will be consumed or marketed within Peru
9. FAA § 620(f). Is recipient country a Communist country? No.
10. FAA § 620(i). Is recipient country in any way involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression? No.
11. FAA § 620(j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U.S. property? No.

AID 1240-2 (5-74)

13. FAA § 620(l). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, in convertibility or confiscation, has the A.I.D. administration within the past year considered denying assistance to such government for this reason?
13. FAA § 620(n). Does recipient country furnish goods to North Viet-Nam or permit ships or aircraft under its flag to carry cargoes to or from North Viet-Nam?
14. FAA § 620(q). Is the government of the recipient country in default on interest or principal of any A.I.D. loan to the country?
15. FAA § 620(t). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption?
16. FAA § 620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the A.I.D. Administrator in determining the current A.I.D. Operational Year Budget?

The Administrator has taken Peru's limited guaranty program into consideration in determining to continue to furnish assistance to Peru.

No longer applicable.

No.

No.

In March 1976 State/IO advised the following with respect to Peru's UN obligations: The amount currently owed by Peru to the UN is not sufficient to trigger the 620(u) provisions." According to State/IO this statement would apply over the next year even if Peru makes no payments to the UN this year.

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AID 1240-2 (5-74)

17. FAA § 481. Has the government of recipient country failed to take adequate steps to prevent narcotic drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully?
- No. The GOP has taken such measures as are within its capacity to control narcotics traffic and in cooperating with U.S. efforts to eliminate production and trade in narcotics.
18. FAA, 1973 § 29. If (a) military base is located in recipient country, and was constructed or is being maintained or operated with funds furnished by U.S., and (b) U.S. personnel carry out military operations from such base, has the President determined that the government of recipient country has authorized regular access to U.S. correspondents to such base?
- Not applicable.

Military Expenditures

19. FAA § 620(a). What percentage of country budget is for military expenditures? How much of foreign exchange resources spent on military equipment? How much spent for the purchase of sophisticated weapons systems? (Consideration of these points is to be coordinated with the Bureau for Program and Policy Coordination, Regional Coordinators and Military Assistance Staff (PPC/RC).)
- Approximately 15% of the 1975-76 GOP budget was allocated to military expenditures. The widely publicized GOP policy is to seek limitation of armaments throughout Latin America.

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AID 1240-2 (5-74)

CONDITIONS OF THE LOANGeneral Soundness

20. FAA § 201(d). Information and conclusion on reasonableness and legality (under laws of country and the United States) of lending and relending terms of the loan. Not applicable.
21. FAA § 251(b)(2); § 251(e). Information and conclusion on activity's economic and technical soundness. If loan is not made pursuant to a multilateral plan, and the amount of the loan exceeds \$100,000, has country submitted to A.I.D. an application for such funds together with assurances to indicate that funds will be used in an economically and technically sound manner? For the reason given in the Project Paper the project is considered economically and technically sound.
22. FAA § 251(b). Information and conclusion on capacity of the country to repay the loan, including reasonableness of repayment prospects. Not applicable.
23. FAA § 251(b). Information and conclusion on availability of financing from other free-world sources, including private sources within the United States. The participation of other donors was considered when calculating the amount of AID's contribution to the project.

AID 1240-2 (5-74)

24. FAA § 611(a)(1). Prior to signing of loan will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the United States of the assistance?

Yes.

25. FAA § 611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of loan?

No such legislative action expected to be necessary.

26. FAA § 611(e). If loan is for Capital Assistance, and all U.S. assistance to project now exceeds \$1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project?

Not applicable.

Loan's Relationship to Achievement of Country and Regional Goals

27. FAA § 207; § 251(a); § 113. Extent to which assistance reflects appropriate emphasis on: (a) encouraging development of democratic, economic, political, and social institutions; (b) self-help in meeting the country's food needs; (c) improving availability of trained manpower in the country; (d) programs designed to meet the country's health needs;

Project activities are uniquely designed to meet the objectives of (a), (b) and to a limited degree (c). Improved health (d) should result from increased food production. The project will also introduce the concept of using sewage effluent that has been treated. Replication of the project will require installation of sewage treatment facilities thereby contributing to general improvement of health conditions and environment. This will also thwart the illegal but nevertheless common practice of cultivating food crops with untreated sewage effluent.

AID 1240-2 (6-74)

(e) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and Voluntary Agencies; transportation and communication; planning and public administration; urban development, and modernization of existing laws; or  
(f) integrating women into the recipient country's national economy.

28. FAA § 209. Is project susceptible of execution as part of regional project? If so why is project not so executed?

Not susceptible.

29. FAA § 251(b)(3). Information and conclusion on activity's relationship to, and consistency with, other development activities, and its contribution to realizable long-range objectives.

The project will be consistent with other GOP development activities, will contribute to development of the rural sector, and is consistent with A.I.D. activities and goals.

30. FAA § 251(b)(7). Information and conclusion on whether or not the activity to be financed will contribute to the achievement of self-sustaining growth.

Expansion of arable coastal desert lands available for cultivation by small farmers will contribute to self-sustaining growth.

31. FAA § 209; § 251(b)(8). Information and conclusion whether assistance will encourage regional development programs, and contribute to the economic and political integration of Latin America.

The relatively small assistance to this project is not expected to have a significant impact on the economic and political integration of Latin America.

AID 2240-2 (574)

32. FAA § 251(g); § 111. *Information and conclusion on use of loan to assist in promoting the cooperative movement in Latin America.*
33. FAA § 251(h). *Information and conclusion on whether the activity is consistent with the findings and recommendations of the Inter-American Committee for the Alliance for Progress in its annual review of national development activities.*
34. FAA § 281(a). *Describe extent to which the loan will contribute to the objective of assuring maximum participation in the task of economic development on the part of the people of the country, through the encouragement of democratic, private, and local governmental institutions.*
35. FAA § 281(b). *Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.*

Small farmers to be selected for participation in the project will likely be organized into one of the types of associative enterprises which are promoted under Peru's Comprehensive Agrarian Reform program, thereby contributing to the cooperative movement.

The IBRD Consultive Group Meeting on Peru emphasized the justifiable need of international financial and technical assistance to Peru's development program.

The project is designed to assist small farmers (who will likely be organized into some type of cooperative enterprise) and thus encourage maximum participation at the local level in economic development.

The project contemplates significant involvement at the small farmer level and therefore strengthens democratic processes at the grass-roots level.

AID 1240-2 (6-74)

36. FAA § 601(a). Information and conclusions whether loan will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture, and commerce; and (f) strengthen free labor unions.

The project is uniquely designed to demonstrate improved agricultural technology by utilizing treated sewage effluents, rich in mineral fertilizer thereby economizing on the high cost of chemical fertilizer and water resources scarce to Peru's coastal desert area.

37. FAA § 619. If assistance is for newly independent country; is it furnished through multilateral organizations or plans to the maximum extent appropriate?

Not applicable.

Loan's Effect on U.S. and A.I.D. Program

38. FAA § 251(b)(4); § 102. Information and conclusion on possible effects of loan on U.S. economy, with special reference to areas of substantial labor surplus, and extent to which U.S. commodities and assistance are furnished in a manner consistent with improving the U.S. balance of payments position.

The total amount of costs under the project, although local in nature, is so small as to have negligible effect on the U.S. economy and insignificant adverse effect on U.S. balance of payments.

39. FAA § 252(a). Total amount of money under loan which is going directly to private enterprise, is going to intermediate credit institutions or other borrowers for use by private enterprise, is being used to finance imports from private sources, or is otherwise being used to finance procurements from private sources.

There will be considerable procurement of supplies and equipment from local Peruvian private sources.

AID 1240-2 (5-74)

"See item No. 38"

40. FAA § 601(b). Information and conclusion on how the loan will encourage U.S. private trade and investment abroad and how it will encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).

41. FAA § 601(d). If a capital project, are engineering and professional services of U.S. firms and their affiliates used to the maximum extent consistent with the national interest?

Services of Peruvian Government and/or private firms will be used for procurement of good and for construction, as appropriate.

42. FAA § 602. Information and conclusion whether U.S. small business will participate equitably in the furnishing of goods and services financed by the loan.

Information for or about small businesses will be made available in accordance with A.I.D. policies.

43. FAA § 620(h). Will the loan promote or assist the foreign aid projects or activities of the Communist-Bloc countries?

No.

44. FAA § 621. If Technical Assistance is financed by the loan, information and conclusion whether such assistance will be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis. If the facilities of other Federal agencies will be utilized, information and conclusion on

No utilization of other USG agencies is anticipated.

whether they are particularly suitable, are not competitive with private enterprise, and can be made available without undue interference with domestic programs.

Loan's Compliance with Specific Requirements

45. FAA § 110(a); § 208(e). Has the recipient country provided assurance that it will provide at least 25% of the costs of the program, project, or activity with respect to which the Loan is to be made? Yes.
46. FAA § 112. Will loan be used to finance police training or related program in recipient country? No.
47. FAA § 114. Will loan be used to pay for performance of abortions or to motivate or coerce persons to practice abortions? No.
48. FAA § 201(d). Is interest rate of loan at least 2% per annum during grace period and at least 3% per annum thereafter? Not applicable.
49. FAA § 604(a). Will all commodity procurement financed under the loan be from the United States except as otherwise determined by the President? Procurement will be in accordance with AID grant procurement regulations.
50. FAA § 604(b). What provision is made to prevent financing commodity procurement in bulk at prices higher than adjusted U.S. market price? Not applicable.

AID 1240-2 (674)

57. FAA § 604(d). If the cooperating country discriminates against U.S. marine insurance companies, will loan agreement require that marine insurance be placed in the United States on commodities financed by the loan? Not applicable.
58. FAA § 604(e). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity? Not applicable.
59. FAA § 604(f). If loan finances a commodity import program, will arrangements be made for supplier certification to A.I.D. and A.I.D. approval of commodity as eligible and suitable? Not applicable.
54. FAA § 608(a). Information on measures to be taken to utilize U.S. Government excess personal property in lieu of the procurement of new items. Consideration of excess availabilities will be given at time of procurement.
58. FAA § 611(b); App. § 101. If loan finances water or water-related land resource construction project or program, is there a benefit-cost computation made, insofar as practicable, in accordance with the procedures set forth in the Memorandum of the President dated May 15, 1963? Not applicable.

All 1240-2 (6-74)

56. FAA § 611(c) If contracts for construction are to be financed, what provision will be made that they be let on a competitive basis to maximum extent practicable? Not applicable.
57. FAA § 612(b); § 638(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the United States are utilized to meet the cost of contractual and other services. No excess U.S. owned foreign currencies are available in Peru. About 27% of direct project costs will be borne by the GOP.
58. App. § 213. Will any of loan funds be used to acquire currency of recipient country from non-U.S. Treasury sources when excess currency of that country is on deposit in U.S. Treasury? No. Peru is neither an excess nor a near excess currency country.
59. FAA § 615(j). Does the United States own excess foreign currency and, if so, what arrangements have been made for its release? No. U.S. owned excess foreign currencies available.
60. FAA § 620(g). What provision is there against use of subject assistance to compensate owners for expropriated or nationalized property? No such financing contemplated.

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AID 1240-2 (5-74)

61. FAA § 620(k). If construction of productive enterprise, will aggregate value of assistance to be furnished by the United States exceed \$100 million? No.
62. FAA § 636(i). Will any loan funds be used to finance purchase, long-term lease, or exchange of motor vehicle manufactured outside the United States, or any guaranty of such a transaction? No.
63. App. § 103. Will any loan funds be used to pay pensions, etc., for military personnel? No.
64. App. § 105. If loan is for capital project, is there provision for A.I.D. approval of all contractors and contract terms? Any contracts financed by project funds will be subject to AID approval.
65. App. § 107. Will any loan funds be used to pay UN assessments? Not applicable.
66. App. § 109. Compliance with regulations on employment of U.S. and local personnel. (A.I.D. Regulation ?). Not applicable.

AID 1240-2 (5-74)

67. App. § 110. Will any of loan funds be used to carry out provisions of FAA §§ 209(d) and 251(h)?

No.

68. App. § 114. Describe how the Committee on Appropriations of the Senate and House have been or will be notified concerning the activity, program, project, country, or other operation to be financed by the Loan.

This project was included in the FY 1974 Congressional Presentation.

69. App. § 601. Will any loan funds be used for publicity or propaganda purposes within the United States not authorized by the Congress?

No.

70. MMA § 901.b; FAA § 640C.

(a) Compliance with requirement that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed with funds made available under this loan shall be transported on privately owned U.S.-flag commercial vessels to the extent that such vessels are available at fair and reasonable rates.

Not applicable

(b) Will grant be made to loan recipient to pay all or any portion of such differential as may exist between U.S. and foreign-flag vessel rates?

Informal Translation of Ministry of  
Agriculture letter (No.831-76-DGA-DM)  
Submitted to USAID/Peru, dated June 2,  
1976

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Mr. Donald Finberg  
Director  
Agency for International Development (AID)

Subject: Use of Treated Sewage Effluents for Irrigation -  
Tacna

We refer to subject project, the feasibility study of which  
has been developed by the Directorate General of Waters of  
the Ministry of Agriculture.

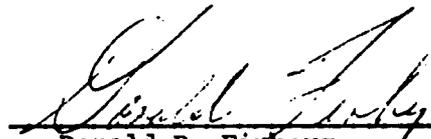
I would like to thank you for your collaboration in the  
implementation of this important study and inform you  
that this Ministry is highly interested in the execution  
of this project. Accordingly, we have submitted through  
official channels a request for USAID financial assistance  
under a Technical Cooperation Program.

Sincerely,

General Enrique Gallegos Venero  
Minister of Agriculture

ANNEX HCERTIFICATION PURSUANT TO SECTION 611(e) OF THE  
FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

I, Donald R. Finberg, the principal officer of the Agency for International Development in Peru, having taken into account among other factors the maintenance and utilization of projects in Peru previously financed or assisted by the United States, do hereby certify that in my judgement Peru has both the financial capability and the human resources capability to effectively maintain and utilize the capital assistance project: USE OF TREATED SEWAGE FOR IRRIGATION.

  
Donald R. Finberg  
Director, USAID/Peru

ANNEX IDRAFT PROJECT AUTHORIZATION

PERU

Use of Treated Sewage for  
Irrigation  
Project No. 527-15-120-150

Pursuant to the Authority vested in me as \_\_\_\_\_, Agency for International Development (A.I.D.) by the Foreign Assistance Act of 1961, as amended (The "Act"), and Delegation of Authority issued thereunder, I hereby authorize the furnishing of a Grant pursuant to Part I, Chapter I, Section 103 of said Act to the Government of Peru (The Cooperating "Country") of not to exceed One Hundred and Twenty Five Thousand United States Dollars (\$125,000) to assist in financing local currency costs of goods and services for the project described below.

The project consists of assisting the Ministry of Agriculture's Directorate General of Waters to design and construct a 120 hectare pilot irrigation experimental site to successfully demonstrate the economic and technical feasibility of producing significant quantities of needed foodstuffs by irrigating selected areas of Peru's vast coastal desert with treated sewage effluent.

I hereby authorize incremental funding for this Project. I approve the total level of A.I.D. appropriated funding planned for this Project of not to exceed Two Hundred Thousand United States Dollars (\$200,000) Grant, of which \$200,000 will be Grant funded, including that amount authorized above, during the period FY "TQ" through FY 1978. I therefore authorize the funding of an additional increment during the period of Grant Funding up to \$75,000, subject to the availability of funds in accordance with A.I.D. allotment procedures.

I hereby authorize the initiation of negotiations for execution of the Project Agreement that will be subject to the following terms, covenants and conditions:

a) Source and Origin of Goods and Services:

Goods and services financed by A.I.D. under this Project shall have their source and origin in the Cooperating Country or in the United States.

b) Prior to any disbursement of A.I.D. funds for construction under the Project Agreement: The Directorate General of Waters (DGA) shall furnish a final engineering study acceptable to USAID/Peru.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date