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**UNCLASSIFIED**

UNITED STATES INTERNATIONAL DEVELOPMENT COOPERATION AGENCY  
AGENCY FOR INTERNATIONAL DEVELOPMENT  
Washington, D. C. 20523

BELIZE

**PROJECT PAPER**

INCREASED PRODUCTIVITY THROUGH BETTER HEALTH  
AMENDMENT NUMBER 1

AID/LAC/P-705  
(CR-224)

PROJECT NUMBER: 505-0018

**UNCLASSIFIED**

AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT DATA SHEET

1. TRANSACTION CODE

**A** A = Add  
C = Change  
D = Delete

Amendment Number

1

DOCUMENT CODE

3

COUNTRY/ENTITY

Belize

3. PROJECT NUMBER

505-0018

4. BUREAU/OFFICE

LAC/CAR

5. PROJECT TITLE (maximum 40 characters)

Increased Productivity Through Better Health

6. PROJECT ASSISTANCE COMPLETION DATE (PACD)

MM DD YY  
09 30 93

7. ESTIMATED DATE OF OBLIGATION

(Under 9:" below, enter 1, 2, 3, or 4)

A. Initial FY 85 B. Quarter 2 C. Final FY 93

8. COSTS / \$000 OR EQUIVALENT \$1 =

A. FUNDING SOURCE	FIRST FY 85			LIFE OF PROJECT		
	B. FX	C. LIC	D. Total	E. FX	F. LIC	G. Total
AID Appropriated Total						
(Grant)	1,300	200	1,500	6,590	690	7,285
(Loan)						
Other: 1.						
U.S. 2.						
Host Country	28	782	810	125	6,695	6,820
Other Donor(s) PAHO	32		32	74		74
<b>TOTALS</b>	<b>1,360</b>	<b>982</b>	<b>2,342</b>	<b>6,789</b>	<b>7,385</b>	<b>14,179</b>

9. SCHEDULE OF AID FUNDING (\$000)

A. APPRO- PRIATION	B. PRIMARY PURPOSE CODE	C. PRIMARY TECH. CODE		D. OBLIGATIONS TO DATE		E. AMOUNT APPROVED THIS ACTION		F. LIFE OF PROJECT	
		1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan	1. Grant	2. Loan
(1) HE	520	542		6,865		420		7,285	
(2)									
(3)									
(4)									
<b>TOTALS</b>				<b>6,865</b>		<b>420</b>		<b>7,285</b>	

10. SECONDARY TECHNICAL CODES (maximum 6 codes of 3 positions each)

11. SECONDARY PURPOSE CODE

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

A. Code

B. Amount

13. PROJECT PURPOSE (maximum 480 characters)

To control the incidence of malaria and dengue fever and to expand safe water supplies and sanitation through sustainable program activities.

14. SCHEDULED EVALUATIONS

Interim MM YY MM YY Final MM YY  
09 17 87 03 18 91 01 17 93

15. SOURCE/ORIGIN OF GOODS AND SERVICES

000  941  Local  Other (Specify)

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

The purpose of this amendment is to extend the Project Assistance Completion Date from March 31, 1991 to September 30, 1993 and to increase the life of project funding by \$285,000. Activities under this extension will focus on (a) strengthening institutional capabilities of the implementing agencies, (b) developing community capabilities, and (c) systematically phasing out of water supply and sanitation activities.

17. APPROVED BY

Signature

Mosina H. Jordan

Title

A.I.D. Representative

Date Signed

MM DD YY  
01 25 91

18. DATE DOCUMENT RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION

MM DD YY  
| | | | | |

**PROJECT PAPER SUPPLEMENT**

**Increased Productivity Through Better Health  
Project Number: 505-0018**

**USAID/BELIZE  
January 25, 1991**

6

PROJECT PAPER SUPPLEMENT  
Increased Productivity Through Better Health  
(Project 505-0018)

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#### ANNEXES

A: List of Abbreviations	
B: Logical Framework	
C: Short-term Technical Assistance Requirements FY 91-93	
D: Operational Research and Special Projects	
E: Commodity Requirements FY 91-93	
F: Planned GOB and community contributions to the Project FY 91-93	
G: Distribution of VHCs, CHWs and VCs	
H: Organizational Chart, MOH	
I: Reported Cases of Malaria in Belize 1975-1989	
J: Summary of Planned Training Activities	

## PROJECT AUTHORIZATION AMENDMENT

Name of Country: Belize

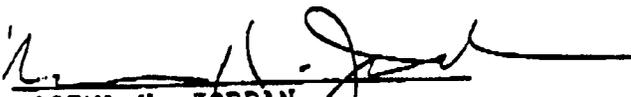
Name of Project: Increased Productivity Through Better Health

Number of Project: 505-0018

1. Pursuant to Section 104 of the Foreign Assistance Act of 1961, as amended, the Increased Productivity Through Better Health Project for Belize was authorized on March 21, 1985. That authorization is hereby amended as follows:

- a. The planned life of the Project is extended to eight and one half (8.5) years from the date of initial obligation.
- b. Planned total obligations under the Project will not exceed seven million two hundred and eighty five thousand United States dollars (US\$7,285,000) in grant funds over the life of the project, subject to the availability of funds in accordance with the A.I.D. OYB/allotment process, to help in financing foreign exchange and local currency costs for the project.

2. The authorization cited above remains in force except as hereby amended.

  
 MOSINA H. JORDAN  
 A.I.D. Representative  
 USAID/Belize

Date: 3/19/91

Drafter: HPM: BEssama: 0828; sc  
 Clearances: DHPM: ACadle draft Date 1/25/91  
 GDO: PMcDuffie draft Date 1/25/91  
 PDO: PSisek draft Date 1/25/91  
 CONT: DDolley draft Date 1/26/91

Authority delegated by STATE 080678

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## PART I. RECOMMENDATIONS AND SUMMARY

### A. Recommendations

USAID/Belize recommends that the Increased Productivity Through Better Health Project (IPTBH) be amended to extend the Project Assistance Completion Date by thirty months, from March 31, 1991 to September 30, 1993, and to increase the life of project (LOP) funding by two hundred and eighty five thousand United States dollars in grant funds to provide additional short-term technical assistance in institutional analysis, development and policy dialogue, to support training in community development and health education, and to cover remaining construction and logistical support costs.

The planned level of effort for each of the three major components of the Project is \$1,775,000 for vector control, \$3,600,000 for water supply and sanitation, \$1,827,000 for technical management support, and a contingency allowance of \$83,000. These inputs result in a total level of \$7,285,000 in A.I.D. funds.

### B. Project Summary

This Amendment is partially in response to the January 1989 evaluation of the project which recommended that "...USAID concentrate its technical assistance resources on providing advice and assistance to the Ministry of Natural Resources (MNR) and Ministry of Health (MOH) mainly in the areas of project management, supervision and training in community development."

The purpose of this Amendment is to:

1. allow for the systematic phasing out of the water supply and sanitation (WS&S) component of the Project;
2. strengthen the institutional capabilities of both the MNR and the MOH to ensure the sustainability of the vector control and water supply and sanitation (WS&S) programs;
3. develop the capability of communities to undertake a greater role in the planning and continued management of vector control and WS&S activities;
4. prepare for the involvement of other donors in both vector control and water supply and sanitation.

The Grantee continues to be the Government of Belize (GOB). The implementing agencies will be the Ministry of Health (vector control) and the Ministry of Natural Resources (water and sanitation). Additionally, the MOH, through its Water Quality Laboratory, has the responsibility for monitoring the safety of rural water supplies through systematic sampling and testing of improved water sources.

The project goal remains unchanged; however, the project purpose has been revised slightly to address weaknesses in organization and management, health education, and community participation as noted in project evaluations. The revised purpose is to control the incidence of malaria and dengue fever and to expand safe water supplies and sanitation in rural communities through sustainable program activities. A sub-purpose is to strengthen the institutional, educational and technical capabilities of the GOB to determine effective demand for vector control and water and sanitation and to promote greater community responsibility in the planning, implementation and overall management of those programs. The project is designed to assist the GOB to undertake an improved level of vector control and to develop sustainable, community-based water supply and sanitation facilities by providing technical assistance, training, and commodities. The project is also designed to encourage greater coordination between community organizations to promote optimal use of local resources, thus making the program more sustainable when external assistance ends.

Ensuring sustainability in water supply and sanitation is critical to attaining anticipated health benefits from water. At one time, the prevailing wisdom in the water supply and sanitation development community was that once improved sources were constructed people would realize their importance and use them. It quickly became apparent, however, that the benefits of improved facilities did not occur automatically. Lessons learned during the decade indicate clearly that health benefits will not occur unless sustainability is ensured. Sustainability is unrelated to the numbers of systems constructed over the course of a project. Rather, it refers to the long-term ability of communities to use and manage their facilities. Success, therefore, must be measured not in terms of how many wells are constructed or latrines built, but in terms of whether the necessary community institutions are developed and how well community members are trained to take responsibility for and manage the improved systems.

Short-term technical assistance, combined with funds for coordination meetings and training workshops, will be provided to strengthen coordination at the central, district, and community levels and to integrate vector control and WS&S more fully within the MOH as well as to encourage collaboration between agencies working in these two sectors. Training and workshops for managerial and technical personnel within the vector control and water supply and sanitation programs, collaborating departments and institutions, and for community volunteers will also improve planning, managerial skills, and procedures at all levels.

Health education and community participation (HE/CP) will be coordinated and strengthened through technical assistance, training for health education staff, and in-country training-of-trainers workshops. Vector control and WS&S staff from relevant MOH and MNR departments, and collaborating agencies will be targeted, as well as members of village health committees (VHC), community health workers (CHW), and malaria voluntary collaborators (VC). Funds will be provided for information, education, and communications (IEC) media messages as well as commodities.

Although the emphasis during the extension period will be on addressing the deficiencies noted above, the program's technical activities described in the original Project Paper will continue to increase support to strengthen their effectiveness. Technical assistance, training, and commodities will be provided to continue development of the technical capabilities of the vector program and support its efficient operation. Funds will be provided for operational research on auxiliary or substitute methods of vector control and on other topics pertaining to transmission and control. Similar inputs will be provided for the WS&S program to improve its efficiency as well as its sustainability at the community level.

The project provides for a final evaluation to assist the GOB in improving the performance, impact, and cost-effectiveness of both the vector control and the WS&S components of the project.

The project development team has found the project to be administratively, financially, socially, and technically feasible. The project is consistent with the development objectives of the GOB and in accord with the objectives of the current USAID Country Development Strategy Statement (CDSS).

C. SUMMARY FINANCIAL PLAN

Table 1

Total Estimated Life of Project Funding by Component  
(US\$000)

Fiscal Years 1985-1993

<u>Project Component</u>	<u>USAID</u>	<u>Counterpart</u>		<u>PAHO</u>	<u>Total</u>
		<u>GOB</u>	<u>Community</u>		
I Vector Control	1,775	4,276	551	52	6,654
II Water Supply & Sanitation	3,600	*2,544	751	22	6,917
III Project Management (includes Audit)	1,827	N/A	N/A	N/A	1,827
IV Contingency	83	-	-	-	83
Total	<u>7,285</u>	<u>6,820</u>	<u>1,302</u>	<u>74</u>	<u>15,481</u>

\*Includes MOH contributions to the Water Quality Program.

Table 2:

Summary Cost Estimate and Financial Plan (USAID Funding):

	<u>Original LOP</u>	<u>Increase/ Decrease</u>	<u>Revised LOP</u>	<u>Obliga- ted To date</u>	<u>Future Obliga- tion</u>	<u>Total Contribution</u>	
						<u>FX</u>	<u>LC Total</u>
I Vector Control	1,886	(111)	1,775	1,775	0	1,530	245 1,775
II Water Supply & Sanitation	3,008	592	3,600	3,230	370	3,300	300 3,600
III Project Management	1,892	(65)	1,827	1,777	50	1,677	150 1,827
IV Contingency	214	(131)	83	83	0	83	- 83
- Total	<u>7,000</u>	<u>285</u>	<u>7,285</u>	<u>6,865</u>	<u>420</u>	<u>6,590</u>	<u>695 7,285</u>

**D. PROJECT ISSUES SUMMARY**

The overriding issue dealt with in developing this Amendment is the long-term sustainability of the vector control and WS&S programs. This will be addressed by reducing costs and developing more effective structures and managerial capacities. Within this issue are four sub-issues which have guided the project design:

1. the need for greater integration and coordination;
2. the need to strengthen community participation in prevention for vector control and in developing community based and managed water and sanitation facilities;
3. the need to decrease dependence on imported insecticides for vector control and for government financed and maintained WS&S systems; and
4. the need for improved management.

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## PART II. PROJECT BACKGROUND AND DESCRIPTION

### A. Background

#### 1. Country Setting

The geographic and ethnic characteristics of Belize are described in the original Project Paper and have not changed. The population has increased to an estimated 200,000, 56% of which resides in urban areas. The population density remains very low, only 6 persons per square kilometer. The annual population growth rate was 2% between 1976-1983. Although the birth rate is high (36 per 1,000) and the death rate is declining (4 per 1,000), emigration has until now kept the growth rate relatively low. However, the country's population has increased substantially in recent years (growing by 21.2% from 1970 to 1980, and projected to grow by 27.8% from 1987 to 1997).

Demographic data indicates that Belize has the potential for a much higher growth rate because of the recent influx of Central American refugees and illegal immigrants and their presumed high fertility rates. According to the USAID/Belize 1989 CDSS, this new migration is estimated by the United Nations High Commission for Refugees to be as high as 25-30,000 or about 15% of Belize's population, composed mainly of peasants from Guatemala and El Salvador. Based on these estimates, the population of Belize is projected to increase by 50% by 1995, of which one third will be newly arrived refugees.

The rapid growth in this segment of the population, which has a very different political, social, and linguistic background and acute economic, educational, and health needs, constitutes a serious challenge. These immigrants are straining the resources of the health and school systems of some areas, destroying tropical forests through slash-and-burn agriculture, and causing political repercussions among Belizeans who resent assistance to refugees at the expense of services for their own needs. This influx also means that Belize is becoming increasingly Spanish speaking, although English remains the official language.

The 1991-1995 CDSS and the 1988 Health Sector Assessment indicate an improved economic situation over that described in the original Project Paper. According to the Health Sector Assessment, Belize has benefitted from an upturn in exports since 1984 and has also received substantial new foreign investment and expanded economic assistance, all of which have

given a boost to the economy. Exports are expected to rise from 55% of the Gross Domestic Product (GDP) in 1987 to 70% of the GDP in 1990, according to the World Bank. Local and foreign private investment dominate the economy and ownership of economic production is mostly in private hands. Public sector activities represent only 25% of the GDP. The GOB's major sources of revenue are import duties and direct taxes, with taxes on foreign trade representing more than 50% of total revenue.

Heavy reliance on foreign development assistance poses some concern, as do constraints on access to business credit, lack of infrastructure (especially roads), reliance on only two major export crops (sugar and citrus), and the lack of experienced managers in the public and private sectors. On the positive side, however, Belize's fiscal and balance of payments situations are stable due to the implementation of prudent economic and financial policies. Most economic observers are relatively optimistic about Belize's economic future at this point and that conditions are at least potentially favorable for the financing of health care costs. Nevertheless, the CDSS warns that, although the economy has performed well in the past few years, it is fragile because of its small size and dependence on trade agreements and concessions outside its control for its limited exports.

## 2. Problems and Constraints

### a. Vector Control

Malaria is endemic in Belize. In 1984, when the original project was approved, malaria was widespread and its incidence increasing. The control of the disease, consequently, became one of the top health priorities of Belize. While control efforts began in 1957 as part of the worldwide malaria eradication program, fiscal constraints caused a cutback of spraying operations between 1974 and 1979, resulting in a dramatic rise in incidence. By 1983, malaria had reached epidemic proportions, with a significant increase in the most dangerous form of malaria, falciparum malaria. In 1984, with technical and financial support from USAID, the GOB reorganized and strengthened the National Malaria Control Program (NMCP). Beginning in 1985, a downward trend in cases has been observed and the epidemic has been curbed. Despite a slight rise in incidence levels reported for 1989, preliminary data suggest lower rates for 1990. Two and a half more years of continued targeted interventions in highly affected areas

should further reduce the incidence and consolidate the gains made in the past four years.

Dengue is not endemic to Belize. The country is, however, at risk of dengue outbreaks as long as urban areas remain highly infested with the vector mosquito, *Aedes aegypti*. Epidemics could occur if the virus were introduced from outside the country by an infected traveller. This apparently happened in 1982 when an epidemic swept the country and 443 cases were reported. The GOB recognizes that dengue is a serious threat to the health and economic welfare of the country and that the only practical dengue control measure is control of the vector mosquito. The *Aedes aegypti* Control Program (AACP) has now developed a proven capacity to control the vector at low levels of infestation in urban areas so that the probability of dengue epidemics is kept low.

The final evaluation carried out in January 1989 confirmed that substantial progress has been made in achieving the technical targets of the NMCP and the AACP. However, it also indicated that less progress has been made in transforming the NMCP from a vertical, eradication-focused organization into an integral part of general health services. Neither has it yet been possible to make the AACP a permanent control program with permanent staff. Much remains to be done to integrate these two programs into a single, permanent, and sustainable vector control program within the general health system. There are no major technical constraints to the control of malaria or *Aedes aegypti* at the present time. Current control methodologies are effective and the vector control personnel have the required technical skills to implement them. Financial constraints, however, have helped restrict the operations of both vector control programs in the past, especially lack of funds for travel, per diem, gasoline, and maintenance of vehicles. Additionally, there is a growing concern in some communities over the potential long-term effect of insecticides. Much more effort is needed to promote community education and participation in vector control and enhance community support for control interventions.

The major constraints are institutional and managerial, along with the lack of an effective health education/ community development capability. These are the constraints which will effect the sustainability of the program once external assistance ends. Without cost savings from coordination of available resources, avoidance of administrative duplication,

and shifts from expensive pesticides toward community-supported preventive measures, it is unlikely that the GOB can sustain an effective vector control program.

The purpose of this Amendment is to shift greater attention to overcoming these institutional constraints to develop a more integrated and coordinated vector control program. The purpose is also to enhance prevention of vector-borne diseases by strengthening health education and community participation, and to continue support for ongoing technical activities and technological research.

b. Water Supply and Sanitation

Reliable health statistics, particularly those for the water supply and sanitation sector, are lacking for Belize. Based on the 1988 Health Sector Assessment, infectious intestinal diseases are listed as the fifth most common cause of death and the fourth most common cause of hospitalization. Children under five years of age account for 68% of the reported cases of infectious intestinal diseases. In the area of environmental health, sewage disposal, open wells, and contaminated drinking water, especially from unsanitary rainfall collection devices, remain major problems.

The water supply sector in Belize uses a range of technologies in regard to potable water in rural and urban populations. Some of these technologies have proven more reliable than others. These technologies were examined by CARE in an analysis conducted in May 1990 and are briefly described below.

o Unimproved Sources: In Belize, unimproved sources of water for domestic use include drawing of water from streams and rivers, reliance on open, hand-dug wells for all or the majority of the year, and simple rainfall collection devices at the home (using only the most basic collection and storage devices).

o Rainfall Collection: This technology deserves special mention given its pervasive use in Belize to supplement or provide sole source water supplies for domestic use. Rainwater is preferred especially for cooking, drinking and, when available, for washing. This is due both to its low mineral content and its relative "softness" (low calcium and magnesium content) compared to groundwater and also to the quantities of rainwater available throughout the year and

around the country. Homes, both urban and rural, will use this source whenever possible, even when yard taps and handpumps are available. Most homes employ simple methods to collect and store rainwater and this raises the question of sanitary conditions. Most methods of collecting rainwater (oil drums, thatch roof, etc.) are considered unimproved, with the exception of more modern methods used on a large scale by the Mennonite communities and on some of the cayes.

o Boreholes and Handpumps: This technology has been used throughout Belize in recent times. This is because groundwater supplies are reasonably shallow and of good quality and the technology, when properly applied, ensures that quality at the tap. It is also more cost effective when dealing with dispersed populations without electrical supplies.

o Rudimentary Water Supply Systems (RWS): There are 30 RWS systems currently operational in Belize. All involve the filling of a central reservoir or tank (via pumps or gravity) and then feeding individual homes, usually with yard taps, through a network of pipes. They can be differentiated from public metered supplies mainly by the use of flat-rate tariffs and their characteristic community-based management system of operation and maintenance. Where local conditions of energy supply and population density are met, they can be an excellent choice to maximize community involvement. One problem in their construction has been the failure to correctly size pumps and diesel generator systems to the well capacity and community needs. This issue must receive careful consideration in the design process. RWS systems provide access to over 17,000 (9%) people.

o Metered Supplies: The national Water and Sewerage Authority (WASA) provides treated potable water to 104,000 users in Belmopan, Belize City, each of the district centers, and some of the communities surrounding them. This represents 58% of the population. With metered supplies there is a much higher percentage of in-house connections. During the dry season the Ministry of Public Works also trucks water supplies to several communities where hydrogeologic conditions have not permitted wells to be constructed. These communities are not included in the section on coverage that follows.

The type of technologies used in Belize in the sanitation sector include:.

o Unimproved Sanitation: A large percentage of the population, an average of 70% as opposed to the 25% that lacks access to clean water, lacks access to basic sanitary

facilities. In the rural areas, open pit latrines prevail and they are usually (but not always) enclosed. In the urban areas, the use of buckets for eventual disposal in the canals or drainage ditches is still common. Both of these are considered unimproved facilities.

o Ventilated Improved Pit (VIP) Latrines: Recent water and sanitation projects have done much to increase the construction and use of VIP latrines. While overall the use of this type of latrine is still limited, its popularity and suitability to local conditions mark it as the technology with the most potential for widespread acceptance. Pour-flush, or water seal latrines are so uncommon that they are not covered in this analysis. Composting latrines have been tried on a very limited basis where water tables prohibit the installation of pits, and their use deserves further consideration.

o Septic Tank Systems: The use of septic tanks is sporadic and difficult to determine.

o Public Sewerage Connections: Only two municipalities in the country (Belize City and Belmopan) have piped sewerage with treatment provided by WASA; both have metered water supplies. There are currently 5,800 connections that have paid a one-time fee of US\$25 for this service. It is interesting to note the differences in service coverage for water and sewerage in these two municipalities. Indeed, in Belize City there are only one-half as many paid sewerage connections as there are for water. The figures for Belmopan are equal, thereby suggesting that the simultaneous provision of these linked services in this municipality greatly increased coverage.

Water quality is an issue of much importance within households, if only for its chemical composition and not for its bacteriological contamination. High mineral content, expressed by individuals as "salty", and high calcium and magnesium levels are noticed in cooking time for beans and in difficulty in washing with soap. This fact translates into distinct preferences by people for water sources free of these characteristics. In planning water supply programs, projects must take this into account. One requirement would be to

include a complete water test before construction to ensure these elements are within guidelines. In addition, health education programs must be responsive to this preference for rainwater even when alternatives are available.

The predominant bacteriological problem encountered in rural areas is fecal contamination due to the close proximity of latrines to water sources. This is especially problematic because of very high water tables in large sections of Belize and to the extremely porous nature of some of its subsoils.

WASA employs a system of primary treatment in its two sewage treatment facilities at Belmopan and Belize City. It consists of consecutive stabilization ponds before release into the environment. The quality of the effluent and its impact on the immediate hydrologic system are not known. However, it should be noted that these cities are two among very few others in Central America practicing any kind of treatment on collected sewerage.

The GOB has two separate laboratories capable of doing water quality testing. One is operated in Belize City by the MOH and has received much assistance from USAID under this project. The second is operated by WASA at Mile 12 on the Northern Highway where the Belize City water treatment facility is located. Both laboratories offer a complete series of physical, chemical, and bacteriological tests.

## B. PROJECT DESCRIPTION

### 1. Goal and Purpose

The goal, as in the original project, is to improve the health and productivity of the Belizean population.

The revised purpose is to control the incidence of malaria and dengue fever and to expand safe water supplies and sanitation through sustainable program activities. A sub-purpose is to (a) strengthen the institutional, educational and technical capabilities of the GOB to determine effective demand for vector control and for water and sanitation; and (b) promote greater community responsibility in the planning, implementation and overall management of vector control and WS&S programs.

### 2. End of Project Status Indicators

The objectively verifiable indicators which will be used in

evaluating whether the project purpose has been achieved have been revised to include the following:

- a. Malaria incidence is reduced to 12 cases/1,000 or less and *P. falciparum* is controlled so that it represents no more than 5% of the total number of malaria cases.
- b. The total number of *Aedes aegypti* positive localities in urban areas do not exceed 5% of the total localities.
- c. At least 80% of the rural population in the project districts have access to safe water and at least 70% have access to and are using improved sanitation facilities.
- d. At least 95% of the wells sampled in the project districts are free from bacterial contamination.
- e. The organizational structure and staffing of the MOH and MNR is suitable to support community-based efforts to improve vector control and water supply and sanitation.
- f. Community-based committees or structures manage vector control interventions and improved WS&S facilities in 90% of project villages.
- g. 90% of all handpumps are maintained in working status by the communities in the three project districts, including those previously installed.

### 3. Project Activities

#### a. Institutional Activities

##### o Integration and Coordination

Effective vector control in Belize is dependent on the maximum use of available resources. Organizational development will be supported through technical assistance to achieve integration of the NMCP and AACP, integration of vector control with related health programs within the MOH and with other relevant Ministries, and coordination with other public and private agencies.

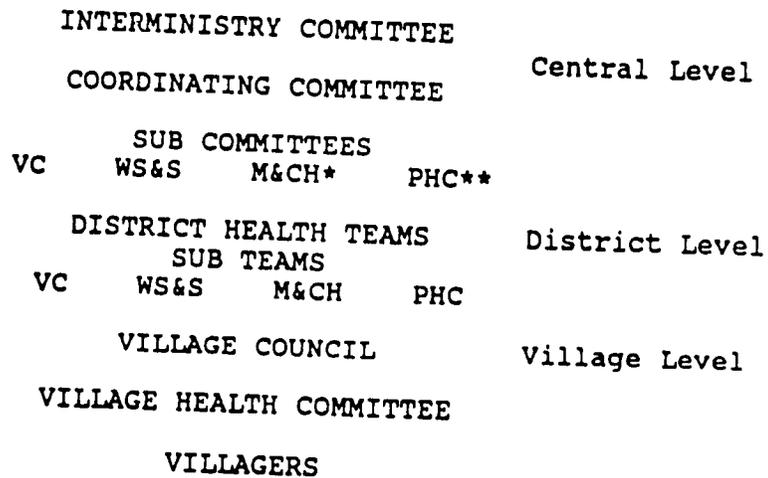
Similarly, effective water supply and sanitation activities will require enhanced communication between the MNR and MOH, integration of community-based water and sanitation

activities into existing MOH programs, coordination with other public and private agencies, and more effectively managed and facilitated community-based technologies.

The principal means of bringing about greater integration and coordination will be through the creation, adaptation, and strengthening of coordinating mechanisms at the central, district, and community levels.

Short-term technical assistance in organizational development and management will be provided under this project to assist the MOH and the MNR in outlining institutional responsibilities and mechanisms for communication and reporting. This organizational arrangement (illustrated in Diagram A below) is already in place and needs to be reactivated and strengthened.

Diagram A: Organizational Structure for Intersectoral Coordination and Cooperation



\* Maternal and Child Health

\*\* Primary Health Care

At the central level, the MOH and the MNR will be responsible for establishing and maintaining a mechanism to bring together representatives of relevant GOB Ministries and other agencies which could collaborate directly or indirectly. A two-tier mechanism would appear to be the most functional, consisting of a technical oversight committee

chaired by the MOH/MNR project "overseer" who will, in turn, be assisted by a coordinator from a local organization linked to the Inter-Ministerial Committee.

The coordinating committee will be established at the beginning of the project extension period and meet at least quarterly (perhaps more frequently in the early months). It will be composed of the heads of the functional departments within the MOH, including the vector control directorate, the Environmental Health Service (EHS), the Primary Health Care Office (PHC), the Health Education and Community Participation Bureau (HECOPAB), and the public and rural health nursing system, as well as other agencies which are or could become directly involved in the vector control and WS&S efforts. Other agencies include the Urban/Rural Development and Women's Affairs departments of the Ministry of Labor and Social Services (MLSS); public and private tourism entities; Non-Governmental Organizations working in health (such as CARE, Medicin san Frontier, and Project HOPE); women's organizations (such as the Belize Rural Women's Association); and donors such as PAHO, UNICEF, UNHCR, in addition to USAID.

This committee will then work directly with and transmit annual plans and quarterly reports to the Inter-Ministerial Committee to inform the policy advisors in key Ministries of programs and activities, solicit their input and support, and enhance overall coordination of activities and budget resources impinging on vector control. Relevant subcommittees composed of organizations with specific interests in vector control, WS&S and such cross-cutting issues as health education and community participation would be established.

At the district level, the District Health Team (DHT) will be strengthened through technical assistance and training to serve as a more effective coordinating mechanism for vector control and WS&S activities. All agencies represented on the central level coordinating committee would instruct their staff working at the district level to collaborate with the DHTs and support the vector control and improved water supply and sanitation efforts. All relevant DHT members, as well as vector control field staff, will be eligible for district level training workshops in management and health education/community participation provided under this project (detailed under Inputs). Such workshops will enhance their knowledge and ability to collaborate in vector control, and provide an incentive for participation through acquisition

of new skills which can also be applied to other activities in which they are involved. The assistance provided to the DHTs will enhance their ability to coordinate the objectives and activities of departments and institutions with regard to the establishment, orientation and supervision of Village Health Committees.

At the community level, integration of voluntary workers will be enhanced by requiring that all new community health workers (CHW) be trained in vector control and malaria detection and treatment, and by training those already in place who need it; by avoiding training of new malaria volunteer collaborators (VC) in communities already served by CHWs; and by giving preference to existing VCs for training as CHWs as the PHC system expands. Similarly, village health committees will be created where feasible and existing VHCs strengthened through training and improved supervision to promote and coordinate vector control and water and sanitation activities at the community level. The project will provide for annual workshops to train VHC members in management and health education/community participation concepts, as well as the basic technical aspects of vector control.

An integrated community volunteer system should result in lower training costs and make the program more sustainable. However, an effective, integrated system, with regard to vector control and malaria detection and treatment, will depend on an adequate level of supervision. This project provides for participation of all district-level supervisory staff represented on the DHTs. This will enable malaria evaluators and *Aedes aegypti* inspectors to coordinate supervision with public and rural health nurses, NGO staff and others who may contribute to supervision and support. In this way, volunteers would be supervised and assisted by multiple sources, since no single program has sufficient staff to be the sole supervisor. Furthermore, this project is expected to improve volunteer performance and reduce turnover by providing incentives in the form of annual training workshops and commodities.

With respect to WS&S, the role of the MNR at both the central and district levels will continue to be that of providing the capability and technical expertise in a wide array of technologies, including hand-dug wells, spring capping, and various improvements on rainwater catchments. The role of MOH/PHC will be one of identifying the demand for improved sources from communities. At times, its role might also be

to create such demand by providing health education relevant to community health priorities which might be solved by improved water sources. MOH/PHC would notify district-level MNR representatives which, in turn, would investigate the request, determine the type of technologies, and provide the relevant community participation and hygiene education. The community would have the ultimate responsibility of determining what it can "buy" in terms of technology, how to maintain and operate the technology, and how to collect fees and manage them. The following diagram schematically illustrates this relationship:

<u>MNR</u>	<u>MOH/PHC</u>	<u>COMMUNITY</u>
<ul style="list-style-type: none"><li>o technical expertise</li><li>o training</li><li>o operations &amp; maintenance</li></ul>	<ul style="list-style-type: none"><li>o motivation</li><li>o facilitation</li><li>o support for HE/CP</li></ul>	<ul style="list-style-type: none"><li>o decision-maker</li><li>o builder</li><li>o operations &amp; maintenance</li><li>o financier</li><li>o utilizer</li></ul>
<ul style="list-style-type: none"><li>o health education/community participation (HE/CP)</li></ul>		

o Organizational Development

Over the period of this extension, the MOH and MNR may come to the conclusion that long-term responsibilities for improved WS&S technologies require a different group of individuals at the community level than those serving as VHC members. It is therefore important at this stage to use an approach of learning-by-doing until agreement is reached as to what might be the most effective way.

o Management Improvement

Internal planning and evaluation capabilities will be developed by requiring, at the central level, annual plans which detail management, education/community participation and technical objectives and means of achieving them, in consultation with the coordinating mechanism described earlier. The coordinating body will, on a quarterly basis, review the progress made in achieving these objectives and in so doing help make optimal use of resources, avoid duplication

and promote greater accountability. To avoid duplication of effort, the minutes of these review meetings will serve as a basis for the quarterly reports required by USAID.

Other management improvements will include greater decentralization of decision-making to allow field personnel more latitude in selecting strategies and procuring expendable supplies, increasing use of data from the information system in making management decisions and for internal evaluation, developing new job descriptions reflecting the changing structure and priorities of the vector control program, and incorporating health education and promotion as activities expected of all vector control workers.

The Health Education/Community Participation Bureau of the MOH (HECOPAB) will be called upon to play a more active role in the planning, implementation and evaluation of health education/community development activities for both the vector control and WS&S components of the project. The director of HECOPAB, in collaboration with the Director of Vector Control and the Manager of the Rural Water Supply and Sanitation program (RWSSP), will develop annual work plans for the health education and related training activities under the project.

b. Educational and Community Participation Activities

Health education staff will be targeted for short-term technical assistance and training in-country and abroad to enhance their planning, management, and technical capabilities. They will be assisted in developing policies and procedures for supervising and coordinating health education and community participation (HE/CP) activities at the district and community levels as well as in training, in collaboration with HECOPAB and the DHTs.

Strengthening the capabilities of vector control and WS&S field staff and DHT members to engage in health education and promotion of community participation and to train community volunteers in vector prevention and control, malaria case detection and treatment, and maintenance of environmental sanitation will be achieved through annual training workshops at the district level.

The project will also provide technical assistance and training in development and presentation of health education materials and in the methodologies for promoting and

supporting community participation, again in coordination with HECOPAB. Requiring coordination through HECOPAB would help to avoid duplication of effort and increase the HE/CP expertise of vector control health education staff, as well as encouraging HECOPAB to incorporate vector control and WS&S into its overall program.

Community participation will be increased by promoting the formation of new VHCs, in coordination with the DHTs, and by providing increased support and supervision for all VHCs in target areas as mechanisms for promoting vector control activities (such as source eradication and general clean-up) and encouraging preventative measures such as installation of screens. It is expected that vector control and WS&S staff will participate directly in organizing and orienting new and existing VHCs with regard to control and management of sources. They will also encourage other DHT organizations to form and support VHCs and use vector control and environmental sanitation staff as technical resources when needed. The project will also seek to broaden the base of support for the VHCs by working with the Community Development (CD) and Women in Development (WID) staff of the Ministry of Labor and Social Services (MLSS) through such means as leadership training.

CHWs and VCs will also be encouraged to promote community involvement by supplementing their technical training in case detection and treatment with annual workshops and distribution of materials emphasizing prevention (through HE/CP). Similarly, CHWs, VCs or village mechanics will be able to take more responsibility for operating and maintaining improved WS&S facilities. Greater coordination of supervision and support for community workers will also help avoid duplication of effort in the training and deployment of CHWs and VCs and contribute toward their eventual integration into an overall PHC system.

By coordinating community outreach efforts through the DHTs, it is expected that other organized community groups can be reached and encouraged to participate in vector control and management of improved sources for WS&S, as well as to seek timely diagnosis and treatment for malaria. Inclusion of Community Development and WID officers (from the MLSS) on the DHT and encouragement from their superiors to participate should facilitate their willingness to bring in vector control and environmental health staff to educate the women's and youth groups with regard to vector control and environmental sanitation. These groups could also be a potential source

for the selection of CHWs or VCs. Conversely, vector control and WS&S staff could facilitate entry and communication with these groups by taking the CD and WID officers along when they visit communities in which youth and women's groups exist. This would provide an incentive for collaboration by MLSS staff because transportation is a major problem for them.

Increasing public awareness of the need for vector control, malaria testing and treatment and the improvement of existing WS&S facilities will be promoted through health education presentations to groups at all levels. Development and distribution of educational materials such as posters, flyers, pamphlets, "photonoelas" (photo illustrated story pamphlets), and media spots and advertisements will be timed to coincide with the periods of greatest incidence.

c. Technical Activities for Vector Control

An important objective of this phase of the vector control program is to begin to shift program emphasis away from sole reliance on insecticides, wherever feasible, through increased emphasis on prevention and operational research on alternative means of control. At the same time, the incidence of malaria will be controlled by traditional means in highly affected areas so that it is no longer a public health problem. Dengue outbreaks will be prevented by controlling the infestation of *Aedes aegypti* in urban areas. The traditional methods proposed are the same as described in the original Project Paper so are not described in detail here. Support will be provided under this Amendment for technical assistance and training to carry out these activities. A modest amount of commodities will be provided to strengthen technical activities and capabilities.

Operational research will be carried out to test auxiliary or substitute methods to minimize the need for house spraying. Other topics pertaining to transmission and control will also be covered. A particular need is an epidemiological study of malaria in refugees. Such a study would provide information on how best to treat these groups and prevent reintroduction. It is essential to have a research coordinator identified among the professional staff of the MOH to ensure coordination of research activities and prevent any duplication of effort. Several organizations are currently carrying out or promoting vector-borne research in Belize

among them USAID, PAHO, and the Uniformed Services University of the Health Sciences in Bethesda, Maryland. It is possible that other organizations, such as universities or private foundations, could be encouraged to carry out operational research in Belize which would be relevant to the needs of the MOH, not only in vector control but also in other environmental health areas. The research coordinator would review proposals and receive research progress reports.

Malaria will continue to be controlled through intradomiciliary spraying with DDT, together with passive case detection by VCs and CHWs, health centers and other health care providers and chemotherapy of positive cases.

*Aedes aegypti* will be controlled through inspection of premises and treatment of positive containers with larvicides, source reduction in urban areas, and ultra-low-volume (ULV) spraying of highly positive blocks during the rainy season.

d. Technical Activities for WS&S

An important objective of this final phase of the WS&S component is to begin shifting program emphasis, as much as possible, away from construction of facilities to developing the basic institutional support required to ensure the sustainability of facilities already in place. Steps towards the realization of this objective will require the following:

- Wherever possible, shift emphasis from MNR being the sole provider of specific technologies for water and encourage community-based technologies.
- Increase reliance on communities for operation and maintenance of the facilities.
- Facilitate access of communities to a supply of spare parts and the delivery of spare parts by the private sector to communities.
- Expand environmental sanitation to include educational/technical aspects of ground water drainage and proper protection of water from contamination from the source to the household. These additions will complement the current focus on latrine construction.
- At the central level of the government, develop clear lines of communication and outline responsibilities between the MOH and MNR.

- Create awareness among high-level decision-makers that the increased reliance on communities will require their continued political support.

To achieve the above objectives, technical assistance will be required in the following areas:

o **Institutional analysis and organizational development:**  
This component of the Amendment is designed to provide some of the basic building blocks required in the delivery of sustainable WS&S programs. Activities will be aimed primarily at smoothing out some of the organizational and institutional constraints found at the central level and among high-level decision-makers in the GOB. Another aspect of the technical assistance is aimed at providing basic components and information upon which to assess what and how much communities can realistically support in a sustainable WS&S strategy. The most important question to be addressed on the institutional side is, "Given the experience of the WS&S sector over the past decade and given the resources and constraints in the GOB, how can this sector be best organized and what needs to be done to improve sectoral performance?" A consultancy on institutional analysis will attempt to determine why coordination across Ministries has not worked in the past. It will also determine whether the institutional arrangement proposed in this Amendment is the best option and, if not, alternative options will be identified.

o **Training and Workshops:** These will be primarily aimed at creating the critical mass of staff at the district level with the capability to deliver sustainable community-based programs. The workshops will also develop the capability at the district level of a cadre of trainers able to provide continued training in hygiene education, community participation, and other relevant skills.

#### 4. Project Outputs

The project outputs are summarized below. These will be the result of project activities implemented with the inputs described in the next section. Specific indicators of achievement of these outputs are set forth in the Logical Framework presented in Annex B.

- a. Safe water supply and sanitary facilities are installed and functioning in the three project districts.

- b. A targeted, stratified vector control strategy is adopted.
- c. A functioning, effective and continuous epidemiological, parasitological and entomological surveillance system is in place.
- d. An active vector control program is in place in pilot areas to replace or supplement house and ULV spraying.
- e. An effective chemotherapy program responsive to surveillance data is in place .
- f. MOH and MNR staff (vector control staff, public health inspectors, health educators, nurses) and personnel of collaborating agencies at the central and district levels and VHCs, CHWs and VCs are adequately trained in management, health education and technical aspects of vector control and water supply and sanitation.
- g. An effective mechanism is established to coordinate vector control and water and sanitation efforts with overall health and development activities in Belize.
- h. A functioning national water quality control program is established.
- i. Active community involvement is established in vector control interventions and the planning, construction and maintenance of water systems.
- j. Alternative community-based technologies for water supply are developed and introduced in at least four communities.
- k. Effective program planning, management and evaluation are carried out.

5. Project Inputs

- a. Technical assistance will be provided to the project through a series of short-term consultancies designed to assist with timely interventions in operational vector control, institutional building relevant to vector control and WS&S activities, and training.

o Operational Vector Control

The following represents consultancies to be carried out in collaboration with the staff of the vector control program:

- Four short-term consultancies will provide assistance in NMCP/AACP operations.
- Three specialists in operations research, along with Belizean counterparts, will conduct research on the status and nature of malaria among refugees in Belize, the susceptibility of vectors to present control methods and the applicability of impregnated bednets.

o Institution Building

This section addresses the GOB institutions and decision-makers with specific responsibilities for vector control and water and sanitation. At this level the long-term objectives of the vector control and WS&S programs, as they pertain to sustainability, converge. Accordingly, the Technical assistance (TA) listed below will require participation of both the MOH and MNR.

Institutional Analysis/Management: This will be the first in a series of short-term TA activities. Its purpose relates to the roles and responsibilities of the MOH and MNR relevant to the management of services. This TA will also identify the institutional changes needed within the MNR and MOH to create increased and effective transfer of responsibilities to communities and outline the specific management issues between central and district levels that can be ameliorated through training. Tasks for the consultancy will include analyzing the various elements of the AACP and NMCP and planning their integration within the MOH, visiting to project sites at the district level to understand further the institutional changes involved in the implementation and handing over of community-based programs, and identifying an appropriate structure for the responsibility and management of sustainable programs.

o Operations and Maintenance (O&M) Management: The purpose of this TA is to study the implementation of the current strategy for operations and maintenance, and to outline any additional roles for the community. This consultancy will also assess the viability of delivering spare parts and O&M functions through the private sector in Belize and address some of the technical needs of the MOH and MNR.

o **Community Analysis and Willingness to Pay:** The purpose of this assessment is to determine the degree of responsibility communities can take over from government. The consultancy will also outline different options and models used by various donors and NGOs in implementing water supply and sanitation and PHC activities. The consultancy should result in a format that will outline a process for analyzing the ability and willingness of communities to participate in PHC and water and sanitation programs.

b. Training

The following short-term, in-country training and workshop activities will be needed to achieve the outputs described in section 5.

o A 3 day-workshop for high-level government officials (Permanent Secretaries and Directors) to outline strategies and processes for institutionalizing approaches which require greater dependency on communities. The end product of this workshop might include an outline for the legal and policy structure required in the implementation of such a strategy. The implementation and context of this workshop would be dependent upon the findings from the institutional analysis.

o A workshop for relevant MNR/MOH central- and district-level staff in management and supervisory skills. The content of such a workshop might be best implemented in two parts with a three-to-four month interval.

o At the district level, skills training for relevant district sub-teams in hygiene education and community participation.

o Workshops for relevant district personnel on O&M. The number and content will be outlined during the TA consultancy in O&M management.

o Workshops for relevant district personnel on alternative appropriate technologies. The number of workshops and their content will be outlined during the TA consultancy on O&M management.

o Workshop for district sub-teams in community financial management. This workshop will outline the types of activities required for different technologies and train community committees in simplified bookkeeping and ledger entries.

c. Commodities

There are presently adequate quantities of DDT (donated by the Government of Mexico) available for vector control. Although most major procurements have been made, a modest amount of commodities for a total estimated value of \$350,000 remains to be procured to continue to carry out the technical interventions and support the revised strategy. These commodities include a vehicle, analytical supplies for the vector control and water quality laboratories, drilling spare parts and related supplies, 20 handpumps and related parts, motorcycles and bicycles for the environmental and vector control field personnel, and health education and training materials. These commodity requirements are listed in Annex E.

d. Construction

No major construction is anticipated during the remaining assistance period. A small but secure storage facility will be constructed in the Dangriga district, adjacent to the district hospital, to serve as a storage unit for insecticides and project commodities. Additionally, funding will be provided to construct two RWSs and 20 wells equipped with handpumps.

C. Financial Plan

The total estimated cost of this proposed 2.5 year project extension is \$4,616,000, of which USAID will contribute \$1,388,000. Of this amount, \$420,000 remains to be obligated and the balance is obligated but uncommitted prior year funding. USAID funding will be used to finance short-term technical assistance training, commodities, and the construction of a storage facility and water supply systems. This would bring total USAID funding to \$7.285 million, which constitutes approximately 47% of the total funding to the project.

The Government of Belize will contribute approximately \$2,811,000 for the extension. This amount includes projected expenditures for salaries, travel and per diem, materials and supplies, and vehicle operation and maintenance. The total GOB contribution to the project will amount to \$6,820,000, which represents approximately 44% of the total project cost.

Communities will contribute to the vector control and WS&S programs by providing local materials and voluntary labor.

Community support to the project is estimated at \$417,000 for the extension period and \$1,302,000 for the life of the project. A breakdown of planned GOB and community and other contributions to the project is presented in Table 1 (Summary Financial Plan) and Annex F. The total life of project cost is estimated at \$15,481,000.

#### D. PROJECT RELATIONSHIPS

##### 1. Relationship to GOB Development Plans

The basic relationship of this project to the GOB development plan as described in the original Project Paper remains valid. The GOB number one long-term priority remains agricultural development and diversification as outlined in its draft (still under review) second five year plan (1990-1994). The GOB number one short-term priority is tourism development. These two sectors constitute the two principal areas of projected growth in the Belizean economy.

The GOB recognizes the need to raise the standard of living, including the level of health care, to meet its economic goals of slowing rural-to-urban migration, increasing the output of the agricultural sector and avoiding public health problems which would impact negatively on tourism. The GOB is the largest health care provider in Belize. While health care in Belize has been heavily oriented to curative care, there is a growing recognition of the need for preventive public health. The MOH's PHC is growing as a result of donor assistance and a significant number of CHWs have been trained and deployed. However, human and financial resource constraints have hampered the effectiveness of public health and PHC services.

This project supports GOB development priorities by improving the health status and effectiveness of the workforce engaged in agriculture and industry through the control of malaria and dengue fever. Malaria occurs in Belize primarily in adult males of working age (20-40) living in rural areas--the primary agricultural workforce. Dengue, while not an endemic problem, is a threat to the urban workforce because of the prevalence of the vector mosquito and the lack of immunity of the population. If the virus were introduced, an epidemic could quickly result. Both these diseases are also threats to tourism, through the negative impact they would have should epidemics occur and through the more subtle effects on the workforce in the tourism industry in the cities as well as in rural areas where archaeological sites are located.

Furthermore, this project will contribute to strengthening public health activities and the PHC system by promoting

integration of water and sanitation within the health system and by extending in-country training opportunities to related departments and agencies, to water and sanitation staff, and to all volunteers. The project's emphasis on community participation will augment GOB efforts to involve communities in self-help activities and strengthen coordination among the various agencies promoting community development and participation.

## 2. Relationship to USAID Strategy and Programs

The USAID/Belize CDSS for 1991-1995 focuses on the same two priorities as the GOB, agriculture and tourism. These two areas are Belize's top foreign exchange earners, the areas in which domestic and foreign private investment are concentrated, and in which growth potential is greatest. If poorly managed, however, they pose the greatest threats to Belize's natural resource base. USAID's goal is sustainable economic growth, driven by private sector investment, with special emphasis on resource planning and management. The strategy is to help the GOB develop the capacity to rationally plan and manage its resources to guide economic growth, while continuing to address key constraints to growth (i.e., lack of roads, shortage of managerial and technical skills, and a narrow export base). The program thus aims to maximize job creation and government revenue while protecting the resource base.

This strategy signifies phasing out support for many social areas, including education, health, and population. However, continued support for vector control is recommended in the CDSS to counterbalance the likely increase in malaria resulting from opening new areas for agriculture and tourism and to reduce the incidence of malaria in areas with a high degree of refugee influx. Vector control can also help to avoid the negative effects of a major malaria or dengue outbreak on the Belizean workforce, foreign investment, and tourism.

The thrust of USAID's program under the 1984 CDSS was toward short-term economic stabilization, which has largely been accomplished, and toward longer-term economic development assistance in agricultural diversification, export promotion, infrastructure development and selected human resource development. This extension will contribute to USAID's overall strategy of increasing the institutional and managerial capabilities of both central- and - district-level staff.

USAID's current program focuses on agricultural production and improving basic infrastructure. Both new and ongoing agricultural projects such as the current Livestock Development, Commercialization of Alternative Crops, and the Toledo Agricultural Marketing projects, which are trying to improve production of diversified crops and products for export or import substitution, will continue to benefit from malaria control in the rural areas where improved farmers' health will contribute to greater productivity. In addition, the increased focus on community participation and training should stimulate community organization and development in rural areas.

The Rural Access Roads and Bridges Project has, to date, financed the rehabilitation of 285 miles of rural roads and the construction of 15 bridges, thereby providing access to many villages previously accessible only by boat and facilitating outreach for preventative and curative health services.

Extension of the vector control and WS&S projects is also of clear benefit to USAID's current projects in export and investment promotion, which are encouraging private sector investment in tourism and other types of enterprise. Foreign investors are unlikely to invest in areas with poor health conditions because of both the direct risks and the impact on productivity. The implications for tourism are very clear, as has been noted earlier.

The revised focus of the Increased Productivity Through Better Health Project will also strengthen the linkage between this project and other USAID-funded health projects, since it is directed toward integration and coordination of public health services, health education and community participation. The project will encourage incorporation of all GOB field staff and volunteers in the water and sanitation effort. It will coordinate efforts of the PVOs (e.g., CARE, MSF/Holland) and other donors (UNICEF/UNHCR) involved in CHW training to avoid duplication of effort.

### 3. Relationship to Other Donor Plans and Programs

#### a. Vector Control

USAID provided a grant to the Pan American Health Organization (PAHO), under the Latin American and Caribbean Health Technologies Project, for the period 1985-1989 to support regional activities in malaria control and essential drug system improvement. Under this project, PAHO has carried

out training and research activities and provided commodities directly complementary to the USAID-supported vector control program.

PAHO has made direct contributions to the malaria program for well over a decade, including insecticides, drugs, vehicles, spray equipment, laboratory equipment, supplies, and an entomology laboratory unit. Through the Latin American and Caribbean Health Technologies Project, it supported a small program for Belize to provide complementary technical assistance to the malaria program. PAHO has also provided short-term technical assistance, long- and short-term training for nursing and public health personnel and supplies and equipment to various MOH programs, which all complement an integrative focus of this project extension for support to the vector control program. PAHO has supported health education and community participation efforts and is interested in continuing to do so, thus constituting an additional resource for this aspect of the vector control project.

The effort to incorporate vector control into general primary health activities envisions direct communication and coordination with PHC activities supported by other donors. UNICEF is supporting the MOH Child Survival/MCH program as well as vector control in the Toledo District. The UNHCR is supporting the training and deployment of CHWs in areas with a high refugee population and MSF/Holland is supporting mobile health clinics in Cayo.

Health Talents International has trained, equipped, and employed CHWs and malaria VCs in Cayo and Stann Creek districts for the past three years. They have now left Belize and their activities have been incorporated into other ongoing CHW training and support activities. Project Concern International (PCI) pioneered the CHW concept in Belize and has been training them for the past eight years. However, the PCI program currently suffers from lack of funding following the expiration of the USAID matching grant.

Another important contribution to the success of the vector control program has been the donation by the Government of Mexico of a more than five-year supply of DDT for the malaria control program, together with occasional assistance in the spraying of Corozal and reading of malaria slides.

b. Water Supply and Sanitation

To date, the WS&S component of IPTBH has made a number of contributions to sectoral development in Belize. It also

has contributed a number of lessons in implementing WS&S programs.

Prior to the IPTBH project, the MOH vehicle maintenance and repair function consisted of two apprentice-level mechanics working with totally inadequate handtools housed in a ramshackle shed. The roof of the shed was shot full of rust holes and provided little, if any, protection against frequent tropical storms. Because of this limited maintenance and repair capability, the MOH vehicle fleet was constantly breaking down and hampered project activities.

Through the IPTBH project and spearheaded mainly by the long-term vehicle maintenance advisor, the MOH now has a well-built, spacious vehicle maintenance and repair shop, a full complement of quality handtools and mechanical equipment, and a staff including mechanics trained to the journeyman level. This facility is now geared to provide preventive maintenance as well as quality and comprehensive repairs. This activity has had a positive impact on the MOH vehicle fleet and on program activities.

A comparison of the IPTBH, UNICEF, and CARE water supply and sanitation programs shows that while there are many similarities, there are enough differences to make a direct and equitable comparison impossible. For example, the CARE project made little or no capital investments in the purchase or major repair of well-drilling rigs. The IPTBH project made the largest investment in well-drilling rigs, vehicles, spare parts and repairs. It also provided a larger percentage of project funds for technical assistance, focusing on institution building and training.

There are also major differences in project design and implementation strategies. The CARE project is relatively self-contained. It hires and utilizes its own local staff to plan, implement, and manage its operations. It also operates its own procurement, and logistics systems. It is dependent on the GOB solely for engineering and well-drilling services.

In comparison, the IPTBH project strategy was just the opposite of CARE's. The major thrust of the IPTBH project was to assist in building a GOB institution capable of sustaining development in the rural water supply and sanitation sector. The strategy was to put the GOB institution in full charge of the project. This has necessitated working with and through two government bureaucracies, GOB and USAID, with all of their rules and regulations. In effect, decision-making authority, as well as responsibility, was diluted and made complex.

As a result, project implementation slowed down in two specific areas where bureaucratic constraints were evident: USAID procurement and GOB personnel actions.

The UNICEF project strategy falls somewhere between those of CARE and IPTBH. Because it operated in only one district, the UNICEF project was less dependent on the central GOB office than was the IPTBH project. It did, however, depend on GOB district personnel to implement its program. UNICEF was more concerned with developing an institutional capacity at the district level than at the national level.

PART III. PROJECT ANALYSIS

A. Institutional Analysis

1. Institutional Organization

The GOB is the major provider of health care and disease prevention services. Most of these services, including vector control, are provided through the MOH; the responsibility for rural water and sanitation was transferred from the MOH to the MNR in 1986.

The MOH provides health services through a network consisting of one secondary/tertiary hospital in Belize City, six district hospitals offering mainly secondary care, and 28 health centers throughout the country providing mainly immunizations, maternal and child health services, and minor curative care. From these centers, nurses operate mobile health clinics, visiting surrounding villages approximately every six weeks and providing support to an emerging PHC system based on VHCs and CHWs. There are currently about 68 VHCs distributed among the six districts, although it is estimated that about 20% of them are currently inactive. About 90 CHWs are now in place and functioning in the six districts, with an additional 86 currently being trained (see Annex G).

The PHC program also oversees an important coordinating mechanism at the district level, the DHTs. A DHT has been established in each district, is headed by the District Medical Officer, and incorporates all health personnel in the district as well as some field staff of other Ministries, (MNR and MLSS), teachers, NGOs and PVOs, and representatives of Village Councils, VHCs and CHWs. A smaller core committee of key personnel operates within each DHT.

a. Vector Control

Although some progress has been made in bringing together the AACP and the NMCP under a single vector control program, a lot of work remains to be done to fully integrate both programs within the health system. The vector control program is currently being managed as an autonomous program separate from the broader Environmental Health Service (EHS) division. It is headed by the Director of Vector Control and AIDS, a physician-epidemiologist who recently completed graduate training under the project. The program director reports directly to the Director of Health Services, who is

responsible for the coordination of all the health services in the MOH. Malaria control is primarily a rural health activity, while *Aedes aegypti* control focuses on urban areas.

The NMCP currently has 69 employees, including an Administrative Officer, a Chief of Operations, 6 District Supervisors (one in each district), 12 Evaluators, 5 Supernumeraries, 33 spray-team members and 3 microscopists, plus mechanic, clerical and security personnel. About 20 of these employees are permanent career staff, including those in the first four positions above, and headquarters clerical staff. In addition to paid staff, the malaria program has a network of unpaid VCs throughout the country who constitute the major element of its passive case detection (PCD) system. The VCs are selected either by the Village Council or directly by malaria staff. Currently, there are 260 VCs trained and in place to take blood smears and administer treatment. However, it is not clear whether all of these VCs are active (see Annex G).

The AACP has 29 employees, including a Senior Supervisor, 3 District Supervisors, 17 Inspectors, 2 Health Educators (still officially classified as Inspectors), 3 ULV drivers/spraymen and support staff. None of the AACP employees are permanent career staff, a situation which has resulted in an abnormally high turnover rate and high training costs for new employees.

Both the AACP and NMCP have existed in one form or another for over 20 years and, as a result, have an institutional base and experienced personnel. Both are now capable of applying the appropriate interventions to control vectors. The malaria program has also developed a good training system and an effective mechanism for geographical reconnaissance and passive case detection.

There appears to be a general recognition within the MOH and the vector control programs that a far greater level of integration and coordination is needed to reduce costs and contribute to greater effectiveness and sustainability. The first step toward integration of the vector control program has been taken with the recent establishment of the position of Director of Vector Control and AIDS, and the subsequent appointment of a full-time permanent public health professional in that position.

Although the AACP and NMCP operate differently in the field, significant savings can be achieved by integrating administrative, clerical, and other support functions to a greater degree at the central level. As stratification progresses and the incidence of malaria and infestation of

*Aedes aegypti* vector decreases, it may eventually be possible to carry out integration at the operational level, with the same field staff carrying out control measures against both vectors.

b. Water Supply and Sanitation

The GOB structure includes several institutions with responsibilities for the WS&S sector. The most important for the direct provision of services is the national Water and Sewerage Authority (WASA). WASA estimated coverage of urban and semi-urban populations today is 100,000 people or about 45% of the total population. It is well organized and operates with a surplus, and it can generate revenues for capital investments.

The MNR also plays an important role in the WS&S sector through its Rural Water Supply and Sanitation Program (RWSSP). It is equipped with both air-rotary and cable-tool rigs for drilling, installation, and maintenance of water wells in rural areas. However, RWSSP lacks sufficient staff to operate year-round at full capacity and receives limited financial resources from the GOB to purchase materials to implement the program. Accordingly, the program is very dependent on external assistance. The RWSSP meets regularly with WASA (at least twice a month) to coordinate inputs and review the implementation status of joint projects. Daily contact on specific problems is also maintained. Significant steps have been taken by the MNR over the past three years to increase staffing of the RWSSP. These measures include the appointment of a Chief of Operations (in April 1987) to coordinate field drilling activities; appointment of a Chief Health Educator (in October 1987) to manage the health education program; recruitment of a new Program Manager (in July 1989) to fill the vacancy left following the departure of the Program Manager to the U.S. for long-term training, and the subsequent reorganization of the well-drill rig crew in each district to include one well-rig operator, an assistant well-rig operator and two helpers.

The National Coordinating Committee (NCC) was established by MNR to coordinate financial, technical and human resources to ensure adequate water and sanitation facilities for rural Belize; share information on technical, administrative and policy matters; study implementation issues affecting the national program; and, coordinate water and sanitation projects among participating Ministries and agencies. The committee is chaired by the Chief Executive Officer of WASA

and membership includes representatives of the Ministries of Health, Labor, Education, and donor agencies.

The NCC has prepared a "National Policy for the Construction and Maintenance of Water Supply and Sanitation Systems". This policy concerns the procedural, technical, and administrative requirements for rural water and sanitation development. The policy has been accepted by the MNR as national policy.

The NCC has not met for the past several months and it is apparent that its national coordinating function is not being realized. As a result, its terms of reference are currently under review to seek ways of reactivating membership at the Permanent Secretary level, and it is also being proposed that meetings be held as required rather than at fixed (monthly) intervals.

Both the MNR and MOH have staff to conduct health education programs. However, each Ministry has a different focus, with the MNR concentrating on community organization aspects as they relate to WS&S interventions and the MOH focusing on health issues. Both Ministries do work together in many areas, given the natural overlap of their respective mandates. Closer collaboration between the two could result in a greatly expanded and more effective program.

The EHS of the MOH is currently headed by a senior public health officer who manages all other environmental health activities (exclusive of vector control) and oversees the operations of the water quality laboratory. This senior officer also reports directly to the Director of Health Services.

Several non-governmental organizations work in the WS&S sector in Belize and provide assistance in either construction or health promotion (health education), or both. CARE is one of the most active and has worked for some years in water supply, sanitation, maternal and child health and primary health care. It has adequately trained personnel and extensive field experience in WS&S. It has established strong linkages with the GOB (MOH and MNR) and has the capacity to generate supplemental funding for WS&S projects through its international donor network.

## 2. Health Education and Community Participation (HE/CP)

### a. Organization and Current Status of HE/CP Efforts

The GOB has a dispersed structure for the delivery of health education programs. Within the MOH, two offices are involved - the HECOPAB and the PHC.

HECOPAB was established in 1983 with help from UNICEF. Although it is a small unit operating with very limited resources, HECOPAB has staff trained in health education, expertise in the production of health education materials, and a good inventory of audiovisual equipment. HECOPAB has a staff of eight including a director (currently completing a MPH degree at Tulane), four health educators, a visual aids officer and support staff. Three of the four health educators are expatriates (two Peace Corps Volunteers and a British health professional on a GOB contract). The Belizean health educator is paid by UNICEF, leaving only two Belizean professionals (the director and the visual aids officer) and support staff on the government payroll. Plans are underway to recruit two additional Belizean health educators on two-year contracts initially and subsequently as permanent GOB employees.

The PHC office consists of a director (on the GOB payroll), a principal trainer (paid by UNICEF) and a secretary. It is responsible for the implementation of the PHC strategy to support technical program interventions and for overseeing the field activities of VHCs and CHWs. Due to limited logistical support and staff, the PHC office depends heavily on donor support and other MOH technical departments for the supervision of its volunteer field workers (VHC and CHWs).

The RWSSP staff (MNR) also plays an important role in HE activities. The program is managed at the central level by a Chief Health Educator who is assisted in his task by an Assistant Health Educator. The program also has six district health educators (one in each district of whom three are funded by USAID under the IPTBH project, two by CARE under the Village Level Water and Sanitation Project and one by MNR).

Progress achieved to date in integrating health education and community participation in vector control interventions has been relatively limited. This progress can be summed up by the following accomplishments: two AACP inspectors have been assigned the responsibility for health education under the vector control program; some manuals on health education

and community participation for dengue control have been developed (most of their content can be applied to vector control in general) and MOH vector control and health education staff have been trained in their use; three "photonoelas" and cloth flip charts on vector control have also been developed and field tested. The "photonoelas" and the manuals are being printed and the cloth flip charts have been provided to each district supervisor. In addition, a number of health education sessions on malaria and dengue fever have been held with school children and DHTs and a few clean-up campaigns have been successfully carried out in urban areas. Malaria personnel have begun mapping mosquito breeding sites in some districts to identify those which can be eliminated through community action.

All these efforts, albeit encouraging, have been sporadic and not the result of a coherent health education and community participation strategy. Very few of the VCs are currently engaged in health education or in promoting preventive health measures such as source eradication and the use of screens and/or mosquito nets. Most VCs still only take slides and administer pills.

HE/CP activities in the WS&S sector have been relatively satisfactory in the rural communities where they have been introduced. The three major WS&S projects funded by CARE, UNICEF and USAID have mobilized communities and completed approximately 2,500 VIP latrines serving 15,000 people and the technology has been accepted by the majority of the project beneficiaries. Villages receiving rudimentary water supply systems have established functioning operation and maintenance structures for collecting fees and ensuring repairs. This is obviously the result of effective community level education. Village health committees have been established and trained and serve as an effective vehicle for disseminating health information. Some radio and newspaper spots on water and sanitation have also been developed and disseminated, in collaboration with HECOPAB. However, much remains to be done, particularly with school children. The GOB must investigate ways of getting the Ministry of Education (MOE) more active in health education, perhaps by modeling a program along the lines of the child-to-child strategies used in other Central American countries. Furthermore, at the present time, the GOB WS&S program is very dependent upon external assistance to achieve health education targets. While such an arrangement has ensured the continuation of project activities in the short run and facilitated the achievement of physical targets,

this strategy has not helped the GOB to increase its capacity in this regard. This issue will be reconsidered in future WS&S activities.

b. Strategies for Enhancing HE/CP in Vector Control and WS&S

There is a growing awareness by the GOB that more effort is needed in the areas of health education and community participation to enhance prevention of vector and water borne diseases and help keep program costs at a sustainable level. This Amendment is designed to help promote these two major objectives by outlining a coordinated strategy and strengthening HE/CP capabilities at all levels through technical assistance and training.

The strategy proposed in this Amendment to enhance coordination calls for the creation of a coordinating committee at the central level, to be linked with the existing Interministerial Committee. At the district and community levels, existing mechanisms (DHTs and VHCs) will be used and strengthened as described in Part II B.

Similarly, in health education and community participation, HECOPAB will be called upon to play a greater role in the remaining period of the project than it has in previous years.

While HECOPAB has so far primarily focused on the production of materials and devoted most of its attention to maternal and child health issues and AIDS, its staff has collaborated with the vector control program in developing materials and media spots. HECOPAB is interested in becoming more involved in other areas of health (including water and sanitation) and in training. With the projected additional staff, its capabilities will increase significantly. To avoid duplication and to strengthen this institution, it is recommended that all HE activities (including allocation of related commodities) under this Project be tightly coordinated with HECOPAB and, if possible, channeled directly through it to make best use of its resources. The MNR health education staff therefore must work closely with HECOPAB and be administratively seconded to it, if possible, to work specifically on developing materials, carrying out information, education, and communication activities through the media, and conducting training workshops for DHTs.

Case detection and treatment for vector control will be increased through coordination with the PHC system and its network of VHCs and CHWs. The MOH has now developed a

standard curriculum for training CHWs, which includes malaria prevention, detection, and treatment, although most of the actual training and some supervision is done by a variety of NGOs and PVOs. Most of the CHWs now in place have had some malaria training; those trained under CARE's Child Survival Project in the two northern districts had not had such training and are currently being retrained to broaden their knowledge and skills in these areas.

With the current network of 260 VCs, the use of CHWs in vector control would add another 176 volunteers (of whom at least 66 would need technical training in malaria) when all those currently in training are placed, for a total of 436, assuming all those reported to be in place are active. Activation of the approximately 60 existing VHCs to promote individual and community involvement in vector control (not to take smears or give treatment) would expand this network by approximately another 300 volunteers, assuming that these VHCs are functioning and have an average of five members per VHC. It is expected that at least another 20 VHCs (approximately 100 community members) will be organized and trained in vector control under this project extension. Because of the higher malaria incidence in refugee areas, an effort will be made to organize VHCs and recruit CHWs and VCs among the refugee population.

A major concern in integrating the VC and CHW system is their differing intensity of supervision. Currently, VCs are visited by malaria evaluators approximately once a week, while CHWs are supervised by rural health nurses about every six weeks. No single program has the staff to adequately supervise a greatly expanded number of volunteers. Adequate supervision of volunteers will receive priority attention under this project extension. It is expected that improved coordination through the DHTs will promote better supervision for these volunteers through joint efforts by vector control personnel, rural health nurses, public health inspectors, health education staff and possibly CD personnel from MLSS. They will receive some type of supervision weekly or at least biweekly when slides are picked up and supplies delivered.

Another institutional linkage that this project extension seeks to strengthen is the linkage between the vector control program and health facilities (hospitals and health centers). While doctors and nurses and other health professionals are supposed to take blood smears for malaria and administer treatment, not all do so. Because the malaria service has been vertically organized and separate from other health

services for many years, other MOH personnel often consider malaria to be outside their direct responsibility. This now appears to be changing as some of the nurses interviewed during the preparation of this Amendment reported that they take smears and administer treatment. More also needs to be done to decentralize laboratory facilities for the reading of malaria slides. This is now underway under the NMCP in four districts, but the ultimate aim must be to integrate this function into district hospital laboratory facilities rather than establishing parallel district-level laboratory capabilities under the NMCP.

The coordination mechanisms and training workshops proposed under this Amendment are expected to contribute to greater collaboration within the health system and between MOH and collaborating institutions in malaria detection and treatment and in greater community participation in program activities.

### 3. Planning and Management Considerations

#### a. Managerial Issues Specific to Vector Control

Under the original Project, planning, management, and direct implementation functions were assigned to the resident long-term technical assistance team rather than to MOH staff. This was cited in the evaluation as a key reason why progress was limited in upgrading planning, management, and administrative skills of the senior program staff.

MOH steps to improve the overall planning process are already underway. MOH department heads recently completed a two-week workshop to analyze MOH structure and functions, identify needed changes, and define priority areas and objectives as the basis for a new MOH five-year plan. This process sets a pattern for the type of vector control planning envisioned under this Project Amendment by placing the responsibility for planning and management on a program manager, a position recently established and filled with the appointment of a Director of Vector Control and AIDS in the MOH. The MOH will now be responsible for reviewing progress in achieving planned objectives on a quarterly basis. An important benefit of this review process will be the strengthening of the internal monitoring and evaluation capacity within the MOH and related agencies. There will no longer be long-term advisors. The need for short-term assistance under this project will be determined by the project manager and program staff in consultation with the USAID project officer.

Structural and management problems were identified as key constraints by program personnel at both the central and district levels. They identified a number of management issues which require attention if the vector control program is to function optimally. They are discussed below.

o Integration of AACP and NMCP

A key issue in integrating the two components of the vector control program is the lack of communication between them at present. As a result, there has been little collaboration in the use of resources that could be shared to a greater degree, considering that the two programs at both the central and districts levels are usually housed in the same office or in adjoining facilities.

o Lack of clearly defined levels of responsibility and delegation of authority

This complaint was heard from both central- and - district-level supervisors. By-passing intermediate supervisors and going directly to the top to resolve problems were mentioned as problems. Administrative and technical decisions are now made at the central level. Lack of clear authority to make operational decisions in the field often paralyzes work because permission must come from the top, and serious delays are experienced in obtaining it. The ability to shift control strategies and make other operational decisions should be delegated and it should be made clear which decisions are made by the central district supervisor and which are made by district supervisors. In the same light, the use of data generated by the new information system should be clearly defined (i.e., how this information should be used at each level of the system) and steps taken by program manager and supervisors to ensure that reports are made in a timely manner and actually used in decision-making.

Similarly, the inability of supervisors to purchase expendable supplies has caused problems for field operations. There is at present no petty cash system or other means of obtaining supplies for daily use except by requisitioning them from the central level, which entails long delays. A system is needed to allow local purchase of expendable items such as flashlights and batteries for AACP inspectors or bags for supplies.

o Logistical support deficiencies

Long delays in receiving money for repairs of vehicles or equipment, or payment of fuel, per diem, and travel expenses were cited as a major problem. While a share of this problem is due to scarce resources, it is also partially due to inefficient management of these resources, including cumbersome procedures for request, approval, and disbursement of funds.

o Personnel issues

Personnel qualifications and job descriptions need to be revised and clearly set forth to avoid duplication of responsibilities. The fact that all program personnel (not just health educators) are responsible for health education and community participation activities also needs to be clearly stated in job descriptions to enhance accountability for this function. Qualifications and performance expectations for health educators for vector control also need to be clearly defined to ensure that they perform this key function adequately, as should a requirement for supervision through HECOPAB.

A standard reporting form for health education/community participation activities would also be helpful to program staff in monitoring and evaluating these activities. Additionally, an inventory of health education materials, equipment, and written procedures for their use should be developed and disseminated to increase the use of these resources. Lack of clearly specified procedures for borrowing equipment has led to problems in the past and discouraged its use by health education field staff.

Finally, more attention should be given to the ways in which program field personnel relate to communities and especially to volunteers. To enhance the community participation aspects of the program, a clear protocol for field visits should be developed for all vector control workers with a requirement that they coordinate all activities through the DHTs and VHCs (or Village Councils where there are no VHCs) and that CHWs and VCs be involved in activities at the community level whenever possible. The only incentive for community volunteers is their sense of usefulness in the work they do and the recognition they receive for it. If they are bypassed or ignored by program staff visiting their communities, their motivation to participate is likely to weaken.

Resolution of these problems will be facilitated by the technical assistance and management training proposed under this Project Amendment. The institutional analysis undertaken during the preparation of this Amendment indicates that the program is already moving in the direction indicated in this design and that, while problems certainly exist, key persons are aware of these problems and have expressed willingness to try to resolve them.

b. Managerial Issues Specific to WS&S

Recent activities in the WS&S sector present excellent opportunities for future programs to build upon. One of the most important of these involves advances made in the health education and community participation components of several projects. The USAID IPTBH project has completed a Community Development Manual for WS&S projects which represents a big contribution toward planning, implementing, and evaluating projects. The UNICEF and CARE projects have also developed relevant educational materials for community organization, construction, and health education. These same participants also have a wealth of experience in educational methods, proven technologies, and information on field conditions in Belize. This project as well as future programs should consider bringing the GOB agencies and their partners together for a sector planning workshop to build upon these experiences.

The level of community participation in the planning, construction, and management of rudimentary water supply systems (RWS) is outstanding and offers a model that might be extended to other interventions. The GOB and WASA have given every indication that existing community management and financial structures will be maintained and supported via fee-for-service arrangements. RWS systems should receive consideration wherever appropriate, even where a higher initial investment is required. In all WS&S communities, the village health committees offer a formula for continued introduction of general community development and health education themes. It would be worthwhile for future programs to develop indicators of functioning committees and support these committees whenever possible.

The VIP latrine has gained acceptance in many rural communities and offers a potential for broader application in all districts. Future programs should concentrate on low-cost variations with maximum family contributions.

Human resources represent perhaps the biggest challenge to the GOB's assumption of all WS&S activities. Qualified and experienced staff are difficult to locate and, when available, agencies lack the financial resources to hire them permanently. Until Belize develops educational institutions to meet every sector's needs and until the WS&S agencies receive sufficient funding on an annual basis, this will continue to hinder efforts in this sector. These factors make inter-agency collaboration all the more important.

Belize faces considerably higher investment costs for its WS&S program than other countries in the region. This is partially due to the need to import virtually every commodity, the import tax structure, local salary scales, and even the lack of sand and gravel in many areas. This situation is unlikely to change and planners will continue to face Central America's highest per capita completion costs when developing new WS&S programs for Belize.

Other limiting factors include climatic conditions and the seasonal availability of labor. Taking into account rainy season closures and the different harvests (rice and cane), up to 50% of the year can be closed to effective water and sanitation activities depending on the district.

## B. Financial Analysis

### 1. Vector Control

#### a. Financial Analysis

USAID will contribute \$1.775 million to the vector control program, which represents a little over 24% of the total USAID funding to the project. The USAID contribution to the vector control component is less than the originally planned level of \$1.886 million. The decrease in funding was made based on the fact that integration of the AACP and NMCP is expected, coupled with an emphasis on interministerial collaboration and coordination of inputs, particularly at the district level. The reduction in funding represents a significant step in strengthening the institutional capability of the MOH.

As a corollary, the GOB (MOH) total contribution to the vector control program will be greater than originally planned, totalling \$3.840 million compared with the original projected amount of \$2.278 million.

b. Recurrent Costs

The MOH budgeted \$752,000 in FY 1990/91 to cover recurrent costs for the vector control project. ESF funds which were used to supplement the project for the period FY 1985/86 through FY 1989/90 have been largely expended and the project must now depend on increased contributions from the GOB to meet its intended objectives. It is expected that the MOH will be able to achieve this with improved management (an area of emphasis during the project extension) as well as increased GOB revenues and through cost-containment measures discussed below.

Tables 1, 2 and 3 in Annex F show the recurrent costs estimated for the various program components. It should be noted that the significant increases in FY 1990/91 and FY 1991/92 for vector control are due for the most part to the addition of career staff (permanent civil service) with its resulting increase (almost four-fold) on the travel and subsistence budget line item; and to a substantial increase in the MOH budget for vehicle operation and maintenance.

The employment of some staff as career employees makes sense for several reasons. First, the project has suffered from a high turnover rate during the last four years due to the absence of any career prospects for many of its staff. Young men and women who have received training, such as field inspectors and microscopists, and who know their jobs leave the program after one or two years. The loss of this valuable human resource cannot be measured solely in monetary terms. Secondly, the absence of any career prospect limits the possibility of achieving the integration of the AACP and the NMCP within the MOH.

c. Cost Containment and Sustainability

The project will strengthen the management capabilities of vector control staff as well as personnel of collaborating agencies and volunteers. Improved management at central and field levels will provide the program and the MOH with new insights in planning and budgeting, development of workplans, personnel evaluations and information systems. The intention of the project to fuse the AACP and the NMCP into the health system is, by itself, an acknowledgment by the MOH of the need to make better use of local human and material resources. As has been mentioned, the project will require, at the central level, annual plans detailing management, education/community participation, and technical objectives as well as the means

to achieve them. A beginning of this process was recently realized when PAHO sponsored a three-week planning workshop for MOH personnel. The project can complement and expand upon this significant beginning through the various interventions described in this Amendment. It is expected that, through the proposed technical assistance and training consultancies, the program will identify duplication of health efforts where they may exist and strengthen the health sector in general through a revised allocation of personnel and improved coordination with other private and public institutions. Obviously, integrating the water and sanitation program with the health services will eliminate the verticality of the NMCP, which can only result in cost savings.

Another cost containment measure anticipated during the LOP and, hopefully, after will be the diminishing use of insecticides to control vectors. Although sufficient DDT for the next several years presently exists, it is anticipated that with continuing research perhaps new and less expensive measures for control will be developed.

Vehicle repair represents another possibility for containing project costs. The garage established under the project is now servicing and repairing vehicles for the entire MOH. The present recurrent cost reflects the importance of this, as all departments have not budgeted for vehicle maintenance and repair. Costs can be saved through timely servicing and the project vehicle recently turned over to the garage will now permit the MOH garage to provide service outside Belize City.

A fourth cost measure would be the purchase of drugs from the GOB through its national pharmacy rather than from outside sources. Time did not permit an examination of this possible alternative but it will be studied in greater detail within the context of the new USAID/MOH initiative in health care financing.

## 2. Water Supply and Sanitation

### a. Financial Analysis

This section attempts to summarize the cost for installations and facilities to meet the projected need in the WS&S sector by the year 2000. These estimates are derived from a document entitled "Water Supply and Sanitation Situation Analysis in Belize" by CARE and UNICEF (1990).

By the year 2000, Belize will require additional water supply installations for 45,000 urban supply users, 28,000 RWS users and 41,000 handpump users. Additional sanitation facilities will be required for 30,000 city sewerage users, 56,000 septic system users and 88,000 VIP latrine users.

o Urban Distribution and Extensions: WASA estimates that construction of water and sewerage facilities for Belize City costs an average of \$800 per capita. Using this figure for extensions and/or new construction for both water and sewerage coverage for 45,000 additional users would amount to \$36,000.

o Rudimentary Water Systems: Current projects use a rough figure of \$100,000 to complete an RWS for approximately 500 to 1,000 users. 28,000 additional users will require \$2,800,000.

o Boreholes Equipped with Handpumps: Estimates today for a fully outfitted well and pump, including wages and drill rig overhaul and depreciation, to serve 60 people are around \$4,000 per facility. To fully cover the need, and allowing for an 80% success rate (dry holes cost \$1,000), will require an additional \$2,900,000.

o Septic Tank Installations: Septic systems are considerably more expensive than VIP latrines and require extra plumbing and a household water connection. To assist candidate households at the same level as VIP latrine users (\$175 per 6 persons) or to install these when plumbing is lacking will require \$1,635,000.

o VIP Latrine Construction: Even with assistance from families, the lack of materials requires subsidies that amount to around \$175 per facility. To complete sufficient facilities, serving 6 persons each, will require \$2,570,000.

Based on the above estimates, the total cost of facility construction for the period 1990 - 2000 will amount to \$45,905,000.

Operationally, the projected needs will require annual targets of 750 urban water supply connections, 3 rudimentary water supply systems, 85 water wells with handpumps, 500 urban house sewerage connections, 930 septic tank systems and 1,460 VIP latrines.

Financially, the program is very ambitious, considering that the current urban infrastructure was constructed almost

exclusively via grants and credits from bilateral sources and the international financial markets. Assuming this could again be the case, and removing that sum (\$36,000,000) from the above total, \$9,905,000 (or an annual funding of \$1,000,000) would still be required to meet needs in the rural sector. This level of contributions from development assistance programs is much more realistic but is still difficult to secure. A comprehensive water and sanitation program would also entail supplemental funding of related program elements such as health education (estimated at \$200,000 for the ten-year period) and institutional development (\$100,000). These additional inputs would bring a complete program for 100% coverage in the rural areas to an annual investment of \$1,300,000 over each of the 10 years.

b. Availability of Financial Resources to the WS&S Sector

The GOB has budgeted a total of \$491,000 for the water and sanitation program in FY 1990/91. As for vector control, ESF funds which have been used to supplement this component since June 1985 are expected to be depleted by the end of FY 90/91 and increased contributions from the MNR will be required to meet its targets.

Generating an annual investment of \$1,300,000 over 10 years to achieve complete coverage in rural areas will not be easy. While local services and the GOB cannot be expected to fund these levels, they can nonetheless provide significant contributions. WASA usually operates with an annual surplus, most of which is directed towards capital investment. The two Ministries (MOH and MNR) already have annual budgets supporting existing staff and facilities that can be applied to the estimated budgets. They also have a line item in the annual budget for these kinds of programs. These sources can be used, firstly, to cover increased recurrent costs of an expanded GOB staff capacity for water and sanitation activities and, secondly, to contribute cash to annual programs.

UNICEF, having an established water and sanitation program, is currently seeking financing directly from UN organizations, from bilateral arrangements with its members, or from one of the multilateral agencies. It can supply partial funding in amounts that might attract matching portions from other donors and, finally, it can implement via one of the external assistance organizations whose contribution to administration and operation might help reduce the overall program costs.

Recent financial trends in the WS&S sector, especially for rural areas, are cause for concern. UNICEF concluded its Toledo project, although it is considering new initiatives in the WS&S sector. With the completion of the WS&S component of IPTBH, the GOB will have very limited resources for these programs.

Besides the rudimentary water supply system's fee service to cover maintenance and operation, there are few mechanisms for cost recovery for other water supply facilities in rural areas. Granted, it is very difficult to do this around handpump systems. However, more attention should be given to cost recovery, and to increased community cash and in-kind contributions that reduce investment costs as ways of reducing government burden to this sector.

### 3. Audit/Accounting Review

a. Accounting reviews of the participating implementing agencies will be conducted by USAID as a part of the analysis of financial capabilities.

b. Audit coverage will be provided by USAID's Office of the Regional Inspector General and the GOB's Auditor General. However, because of the size and duration of this project, it has been determined that additional audit coverage may be needed. Accordingly, funds have been provided for audit reviews. It is anticipated that such reviews will cover the financial and compliance aspects of the project.

### 4. Gray Amendment Clause

Contingent to A.I.D. policy, every effort will be made to enhance the Gray Amendment under this project, particularly with regard to the acquisition of technical services and commodities.

## C. Social Soundness Analysis

### 1. Overview

The sociocultural profile of Belize described in the original Project Paper remains essentially valid. However, the population is beginning to grow rapidly, due to both the young age structure and higher fertility rate, and to a large influx of refugees and immigrants from neighboring Central American countries.

The health picture of Belize's population is complex. The epidemiological profile reflects diseases of both developed and underdeveloped countries, and includes a mix of infectious and communicable diseases, nutritional and vector-borne diseases as well as chronic diseases. Chronic diseases such as diabetes, hypertension and cancer are listed among the major causes of death. In addition, Belize's many ethnic groups have varying traditions and beliefs with regard to health, disease and curing which must be taken into account in health education and promotion of community participation.

Educationally, the situation is more complex than official statistics indicate. While the official literacy rate is 90%, evidence from educators indicates that the functional literacy rate is lower (estimated at 70%). While 78% of children within the compulsory primary education age group (5-14) are enrolled in school, the dropout rate is high (22%) and only about half of those finishing primary school go on to secondary education.

Few children entering primary school speak standard English and the school system lacks adequate expertise in teaching English as a second language. While there is little difference between male and female enrollment at the primary and secondary level, female enrollment drops sharply at the post-secondary level. Post-secondary education is limited in Belize. Professional or vocational training is available in business studies, agriculture, some technical areas, nursing and teaching, mostly at the Sixth Form level (junior college), with limited programs available at the University College. Career fields tend to be highly sex-stereotyped. Educational levels and opportunities have a clear impact on the availability of trained personnel for the WS&S program and on the level and presentation of health education. Consideration should therefore be given to developing materials for outreach to those with a low level of literacy.

Over 85% of working-age men and 43% of working-age women were economically active in 1986. A large proportion of employed women are in government service (29% in 1984), mainly as teachers, nurses and clerical workers, with the remainder mainly in "community service" work and in the commercial sector. Men work in a much wider range of occupations with a large proportion in agriculture and production-related jobs.

The unemployment rate is high (15% in 1986) and will increase as the population under the age of 15 (which now comprises 45%

of the total population) enters the workforce. Unemployment is much higher for women than for men, affecting one-fourth of the female labor force in 1986 compared to about 10% for men. Further, while total unemployment doubled from 1960 to 1986, the rate for women tripled during the same period. Women are further disadvantaged by a high fertility rate (5.2-6.3 live births per woman) and high teenage pregnancy rate (21% of live births in 1983). The proportion of female-headed households in 1983 was over 27% and anecdotal evidence suggests that the number is growing.

It is likely that the growing refugee/immigrant population will negatively affect these conditions and will have a growing impact on Belize's cultural, linguistic, socio-economic and political fabric. There are already indications of serious pressure on the basic services which maintain Belize's quality of life and help preserve its political stability.

## 2. Project Beneficiaries

The Project will continue to target the same group of beneficiaries described in the original Project Paper.

## 3. Cultural Feasibility and Acceptability

The discussion of socio-cultural issues related to community acceptance of and support for WS&S and vector control technologies presented in the original Project Paper remains pertinent. Acceptance of spraying continues to be low among the Mennonites, Europeans, North Americans, and the Maya Indians in the South, and there is a growing misinformation among the general population about the potential health hazard of DDT. Health education in this area needs to be intensified, coupled with the promotion of alternative means of control such as screening and use of bednets, as well as source eradication where feasible. Operational research on other alternative means also needs to be carried out. There is also evidence that both Mennonite women and men sometimes object to male outreach workers visiting their homes when their women are at home alone. These objections could be countered by employing some female field staff in these communities and making the fact known through the volunteer network and local authorities.

*Aedes aegypti* control has not been well understood, in part because dengue fever is much less of a public health problem and is often not distinguished as a specific, preventable illness. However, according to AACP personnel, acceptance is

growing, though more emphasis is needed on education and individual and group action in removing or screening containers.

#### 4. Community Organization and Participation

Historically, the government has provided most services to the population based on government priorities and influenced by political pressure. Because communities perceive that national government provides for them, community participation and self-help efforts have been limited. Local institutions and councils have been more oriented towards petitioning government officials than acting and organizing themselves to address community needs. This is changing gradually due to an increasing emphasis by the government, as well as donor agencies, on community participation. Indeed, in recent years, the central government has begun to encourage more community participation in the development of community services. The existing village structure for community participation is the Village Council whose members are elected by the community.

Belize is politically organized on three levels - national, district and community. Communities elect a council (town or village) and also participate in national elections to elect representatives to represent their interests directly to the national government. At the district level, each Ministry is represented by professional staff responsible for services to the district.

Within the RWSSP, targeted communities which have expressed interest in improved WS&S facilities have been asked, through their VCs, to form VHCs (where they did not previously exist). These committees have been formed in all villages in which the project has functioned. They have been instrumental in mobilizing community participation in the construction phase of project activity. Beyond that, the strengths of these groups and their degree of activity varies, as does the support they receive from RWSSP staff. It is too early to judge their potential for long-term management of water systems and initiation of community development activities.

Given active and consistent support for their responsibility for management of water and sanitation improvements in their communities, and for initiating other activities responding to community priorities, most communities will be able to strengthen their organization and thus their ability to undertake community development activities on their own behalf.

Community participation efforts ultimately rely on continued support from the central government. At present, the MOH has taken the lead in these efforts and has the most experience. The PHC strategy, in the early planning stages at the time the original Project Paper was written, is now being implemented to varying degrees in all six districts and is coordinated through DHTs. The number of VHCs has grown, although they have been organized by a number of different organizations and are not yet fully integrated into the PHC system. The number of CHWs trained has likewise grown. The CHW curriculum and the structure for CHW supervision are being increasingly standardized and brought under the control of the MOH/PHC Division. A major obstacle to the sustainability of the CHW component of PHC concerns incentives for CHWs to continue over time in their volunteer roles.

Problems of political divisiveness continue to impact on these efforts. Care must be taken to try to avoid politicization of health volunteers if they are to be effective in promoting greater community involvement. Furthermore, not all communities may be committed to supporting this strategy. VHCs should be formed, and CHWs selected and trained, on the basis of felt community need and commitment to this strategy as a means of strengthening the community's ability to assume an active role in the improvement of community health and development.

##### 5. Impact on Women

Although the roles of women vary among cultural groups in Belize, they are usually at a disadvantage relative to men. All women, including those in the paid labor force, share the burden of unpaid domestic work and often unpaid agricultural labor as well in rural areas, with little recognition, male collaboration, or support services such as day care. Male dominance is prevalent in the rural areas and is strongest among the Maya. Urban women frequently face the problem of sexual harassment in the workplace and in daily life. Wife and child abuse are also common. All these phenomena indicate the relatively inferior status of women and the need for measures to help bring about change.

This project provides direct benefits to women by helping them avoid vector-borne and water-related illness and by providing curative treatment for malaria. It will also benefit women in their domestic role, since they traditionally care for the sick, by reducing the incidence and severity of disease in their families and hence the demands on their time and energy.

The project also benefits women substantially by encouraging their recruitment as VCs and CHWs and promoting their participation in VHCs. Training women in recognized and appreciated skills as a VC or CHW enhance their status in the community, their own self-esteem and their willingness to get involved in other activities. Incentives in the form of certificates or plaques are valued highly and a chance to attend training workshops also addresses issues of gender equality in the promotion of community participation.

The involvement of the women's groups organized by WID officers in WS&S and other health activities is also a way of enhancing women's participation in community affairs and, hence, their status. One WID officer reported notable success in gaining entry into Mayan communities (known for their male dominance) to work with the women once the men had seen the advantages of what she was teaching them. It has also been suggested that officers could help get Mayan men to agree to let women from their communities be trained as CHWs since they do not want outsiders to visit their homes. Leadership training for women provided by WID officers also complements the efforts of this project to increase women's involvement in development activities.

A potentially negative impact of using women as VCs or CHWs could be an excessive demand on their time without any compensation, particularly if they are recruited under the assumption that "they aren't doing anything anyway and have lots of free time" - a mistaken assumption often made about women classified as housewives. Care must be taken not to overburden women, or men, with voluntary activities. Another negative impact would be the direct cost incurred by volunteers in providing services, a potentially harder burden on women because they usually have less money than men. It is important to try to prevent volunteers from incurring costs beyond the time they give, by ensuring that they receive adequate supplies and logistical support in the performance of their functions and that all costs for attending training workshops are covered.

One way to lessen the burden of volunteer service is reportedly now under consideration, allowing CHWs to charge a fee for service. It is not known whether this will be approved or whether it will also be extended to VCs. If this were done, it would eliminate this potentially negative impact, but it would have implications for CHWs and VCs involved in educational and promotional activities, for which

they cannot charge. This is an issue which should be examined carefully.

D. TECHNICAL ANALYSIS

1. Technical Feasibility

a. Malaria and Aedes aegypti control

The extension of USAID support to the AACP and the NMCP will include the same control methodologies described in the original Project Paper to maintain the operational efficiency and increase the impact of these programs. The computerized data management system installed in 1988 will be expanded so that it can handle all of the malaria epidemiological and operational data as well as the information generated by the Aedes aegypti control operations. The malaria program operations will continue to rely, albeit to a greater degree, on the stratification or prioritization of control areas, based on epidemiological, climatological, and other data, and the application of appropriate anti-malarial measures such as house spraying and drug treatment, as indicated by the stratification and available resources. The AACP will continue to concentrate its control efforts in urban areas where importation of the dengue virus is most likely to occur in the future. The methodologies to be applied include premise and household inspections and treatment, source reduction, and the application of space sprays (ULV) during rainy season periods of high vector density.

b. Water and Sanitation

Belize drillers have relied on cable-tool drilling methods for some years and only in recent years have switched to air-rotary drill rigs that have been provided via external assistance. These have the great advantage of speed over the cable-tool rigs but are far more complicated to operate and maintain. The two principal problems encountered with drilling in Belize have been the correct maintenance and operation of the rigs and limited field access during the rainy season. In addition, air-rotary boreholes occasionally collapse in loose soils and must be completed by cable-tool methods. Adding the additional capacity of hydraulic-rotary onto one or both rigs could help alleviate this problem.

As alternative methodologies will be tried within the context of this Amendment, MNR will need to explore various water storage tank technologies and decide which ones to use.

The project includes demonstration of various technological options. These options might include cyclopiian concrete, corrugated metal with lining, ferrocement and reinforced concrete. This Ammendment suggests the examination of alternative options and calls on MNR to make the decision as to what is best, keeping in mind their affordability to the communities and the ability of MNR to train its staff in the implementation of such technologies.

## 2. Analysis of Technologies Selected

### a. Vector Control

#### o Intradomiciliary Spraying

The indoor application of DDT in houses, at two grams per square meter twice a year, has proved to be a feasible and effective method of malaria control in Belize. Past experience has indicated that, when properly applied, house spraying can greatly reduce the incidence of the disease. DDT remains the insecticide of choice, being relatively inexpensive when compared with other insecticides and having a prolonged residual activity. Spray personnel of the malaria program have been trained in safe handling practices of insecticides and their use of DDT is carefully supervised. There are no epidemiological or biological findings to indicate that the principal vector, *Anopheles albimanus*, has developed resistance to this compound. It is important, however, to continue to monitor the susceptibility status of the vector through bio-assay testing. It is also desirable to decrease dependence on imported insecticides. This will be achieved through application of insecticides only to persistent high incidence localities. The number of localities to be sprayed is expected to decrease as better control is achieved over the course of this project. The efficacy of alternative control methodologies, such as village-based vector management projects and self protection with bednets, screens, and impregnated curtains will also be explored. These technologies can be assessed through operational research.

#### o Larviciding

Although larviciding with petroleum oils or insecticides such as Abate may be an appropriate technique to use for anopheline control, it has not been routinely used in Belize, mainly because urban malaria is not considered to be a problem. However, the technique has been extensively used in *Aedes*

aegypti control through the inspection of premises and treatment of positive containers with Abate. This organophosphorous insecticide has a low toxicity to man and on-target organisms, but remains highly effective in the control of Aedes aegypti larvae. Positive containers that cannot be eliminated by the householder, such as drums and large rainwater storage tanks, are treated with appropriate dosages of Abate sand granules by the inspector on his regular round of house-to-house inspections. There is a need to continuously monitor the susceptibility of Aedes aegypti by appropriate larval susceptibility tests.

o Space Spraying

This method, which employs aerosols of malathion at very low application rates, has been used worldwide for many years in the control of adult mosquitoes. It is used in Belize under certain conditions and at specified times for the control of Aedes aegypti in urban areas. During the rainy season ULV sprays are applied to those blocks where the house indices are high and where it is necessary to quickly lower the density of adult mosquito before dispersion to clean blocks can take place.

Any dengue epidemic emergency plan calls for the availability of ULV machines, insecticides and trained operators. At present the AACP has these resources. In the event of a dengue outbreak, adult vectors potentially infected could be quickly brought under control by ULV spraying.

o Case Finding and Chemotherapy

The malaria surveillance system which has been in place for many years has been passive case detection carried out by a network of volunteer collaborators trained and supplied by malaria evaluators. The general health services have not participated in any significant way in the diagnosis or treatment of malaria, and the NMCP has for the most part remained a vertical and semi-autonomous service. Recently, steps have been taken to integrate these activities into the general health services and this integration will be accelerated during the project extension. The goal is to have all MOH health facilities participating in taking blood slides from fever cases and all MOH hospital laboratories capable of slide diagnosis. Active case detection will be done by the NMCP only in special circumstances, such as during epidemiological investigations and surveys.

In chemotherapy, chloroquine and primaquine are the drugs used. Volunteer collaborators, CHWs and health centers administer a presumptive dose of chloroquine after taking a slide from the suspected case. After slide confirmation, the person is given a radical cure - additional chloroquine in the case of Falciparum malaria and a course of chloroquine and primaquine in the case of vivax malaria. The general belief is that chloroquine continues to be completely effective in curing Falciparum malaria, although no formal drug sensitivity testing has been done. It is recommended that chloroquine sensitivity testing be carried out if sufficient falciparum cases are available.

o Source Reduction

Source reduction has played a very minor part in the malaria program activities in the past, mainly because the NMCP has not had equipment or funding to carry out drainage or other permanent works. A possible source reduction effort, not yet exploited, will be to involve villagers in small-scale engineering works which would eliminate vector breeding places in and around their own villages. This would require surveys by the NMCP to identify breeding places that could be eliminated by community effort and training villagers in how this might be accomplished. Resources in manpower and transportation from other institutions, such as the Ministry of Public Works, will be solicited in order to make community cleanup campaigns effective.

o Training

The NMCP and AACP has been providing periodic in-service training for their employees. Spraymen and squad leaders are re-trained at the completion of each cycle in the techniques of spraying as well as in the safe handling of insecticides. Six malaria and Aedes aegypti officials have completed the comprehensive water and sanitation course offered by the University of South Carolina at "The Wedge" and two additional officials will be sent to this course during the extension period. One senior staff member has completed a MPH degree program in public health and epidemiology and is currently serving as the Director of the Vector Control and AIDS program.

Particular attention will be given to in-country training of voluntary VCs and CHWs to enable them to participate more effectively in case finding and treatment.

o Health Education

A systematic effort will be continued during the program to influence the attitudes and practices of villagers through education of village volunteers and community leaders.

o Operations Research

Due to other priorities, it has not been possible to carry out operational research under the AACP and NMCP programs. MOH vector staff recognize that these types of investigations must be carried out during the project extension to provide solutions to identified operational constraints. An example of this is the need to carry out an epidemiological study of malaria in refugees. The results of a well-conducted study in this group would provide information on how best to treat these groups and to prevent the reintroduction of cases into Belizean localities where malaria is under control.

Other research topics could include vector susceptibility to insecticides, efficacy of ULV sprays in the control of *Aedes aegypti*, feeding and resting habits of *Anopheles albimanus*, reduced dosage and cycle, field trial of DDT biological control of *Aedes aegypti* in water storage tanks, epidemiological profile of malaria in migrant workers, small-scale community-based engineering works for malaria control, and alternative malaria control measures such as impregnated curtains and bednets. Additional details on operational research and selected projects are presented in Annex D.

b. Water Supply and Sanitation

This section will examine primarily the "software" technologies, that is, issues relating to the non-construction aspects of the water supply and sanitation program. This aspect of the analysis is included in this section because funding is primarily from the water supply and sanitation components. However, it is also applicable to the vector control component.

o Legal and Policy Framework

Experience has shown that it is not sufficient to make community participation a central point for sustainability. Nor does community participation mean the divestiture of central government from its responsibility for people living in the periphery. The GOB seems to support the philosophy of

community participation. However, that philosophy will need to be translated into the policy and legal framework of the GOB. It would not be possible for field extension agents to develop a participatory process as long as communities perceive the improved facilities as a gift from the government to them.

Under this amendment, two policy dialogue workshops are envisaged. The first one will focus on the inter-institutional support required at the level of the ministers, permanent secretaries, and their deputies (program directors) to implement community-based WS&S and vector control programs. The second policy dialogue workshop, held a year after the first one, will review the achievements, constraints and lessons learned. It is hoped that following the second policy dialogue meeting other donors will see the usefulness of such meetings and will continue these discussions on an annual basis. A local Belizean institution (to be determined jointly by USAID and the GOB) will take a lead in facilitating these discussions, thus establishing in-country institutional memory for continuation of such dialogue.

o Capacities of Communities to Undertake Sustainable Investment

In general, participation is understood to be the acceptance or compliance of communities with program needs and objectives. Under this amendment, the concept of participation is being applied to the issue of sustainability. It refers to the ability of communities to take responsibility for the management of improved facilities, meaning that communities understand the value of improved facilities and are willing to take the necessary steps to realize them.

Practices in the GOB tend to be driven more by political obligations than by the willingness and ability of communities to pay and devote time in training and in management of improved facilities. The latter approach is what is generally meant by effective demand. The processes and procedures required to determine a community's willingness and ability to pay will need to be established. It is important that communities be provided with a level of infrastructure that is both within their means to support and, over the longer term, within their means to replace.

The division of responsibility for O&M between the communities and the government is a complex issue. Communities cannot do everything; nor can the GOB. Thus, the need for a clear division of responsibility as to who can do what needs to be worked out. Because most of the systems are at present new, this seems like an opportune time to set O&M management in place. When all the tasks are done by the implementing agency, the approach will tend to be one of crisis management, hurrying from one repair to the next, never really getting ahead of the problems. The result is frequent outages, high repair and rehabilitation costs, and a suboptimal level of water service.

Establishing a maintenance management system means putting in place a series of techniques for the planning, organizing, directing, controlling, monitoring, evaluating, and reporting on maintenance activities to ensure maximum program effectiveness at minimum cost. It is not a set of new technical procedures for performing maintenance tasks in a better way, but a means of getting organized so that the correct activities are scheduled and performed at the right time in an efficient and cost effective manner. It is a way of making maximum use of personnel and materials to provide the best possible level of service at the lowest possible cost.

Discussions with MNR staff suggest that communities can undertake more functions in operations and maintenance than is currently being done. A relevant aspect to O&M is the feasibility of technologies in use. One clear addition here will be experimentation with different technologies for rainwater catchments. This component of the program will need to analyze the costs and benefits associated with different technologies and related approaches for O&M. The second need is to develop a model that will help define the different responsibilities of the various participants in the operation and maintenance of technologies ranging from RWSs to rainwater catchments. It will be necessary to determine the degree of maintenance that VHCS can realistically undertake. In addition, it is unclear whether and how much subsidy will continue to be required from the government. All these are important issues that will impact on the sustainability of the systems.

#### o Financial Management and Accountability

The two most critical ingredients of sustainability are that users (a) decide on the most appropriate level of service and (b) identify the sources of payment necessary to sustain

those technologies. This latter aspect implies that communities must learn how to manage their finances because they have the ultimate responsibility.

In Belize, there seems to be a widespread idea that since MNR is the provider and maintainer of improved facilities, those facilities are the responsibility of the government. On the other hand, it is also accepted knowledge that the government cannot provide improved sources free-of-charge to the entire country. There is therefore a critical need for managerial and financial improvements to meet the budgetary constraints and to optimize the utilization of the improved facilities. Ways to contain costs and to diversify the types of systems and levels of cost recovery is going to play a major role in this project extension.

The evaluation of 1989 and the UNICEF/CARE assessment of the water supply sector have noted that WASA is in a better financial condition than MNR. This is not unusual for institutions responsible for rural water supply (in this case MNR) where cost recovery methods are not usually seriously considered.

#### o Training

Training in the areas critical to the implementation of sustainable, community-based facilities will be carried out as an important component of this amendment. Training of Trainers (TOT) workshops for district- and - central-level staff will be carried out to enhance skills in community participation, hygiene education, management, appropriate technologies, operations and maintenance and financial management. A capability will be developed within the relevant DHTs to conduct training on a regular basis for community-based committees (VHC or others) specific to the management of water supply and sanitation facilities.

A study tour in the Latin American and Caribbean (LAC) region will take place for decision-makers and managers. The tour will be to countries where water supply and sanitation programs are being managed successfully by communities. The study tour will examine the institutional and organizational support that such a strategy requires to achieve long-term sustainability.

### 3. Long-Term Sustainability and Impact

#### a. Vector Control

Integration of the formerly vertically organized malaria and *Aedes aegypti* control programs into the framework of the general health services, one of the primary objectives in this project extension, will be a major contribution toward long-term sustainability of interventions in vector control. Formerly heavily dependent on imported insecticides and equipment and committed to country-wide preventive spraying, the vector control program is now organized in a way that permits reduction of operational areas through epidemiological stratification.

Major achievements of the reorganized NMCP have been the control of the country-wide epidemic in 1984 and the steady reduction of malaria rates to their present level. *Aedes aegypti* has been adequately controlled and dengue epidemics have not occurred in the past five years.

During the past four years, approximately 15 members of the NMCP and AACP staff received training in other countries in the region or the U.S. to upgrade their technical and supervisory skills. In-country training and workshops have reached many more individuals. A computerized data management system and a system for prioritizing localities to be sprayed are now in place and the malaria surveillance system has been reinforced. Slide diagnosis is beginning to be decentralized. While most diagnosis is still done at a central malaria laboratory, one regional laboratory is now operational. Microscopists have been trained for other districts and are about to receive microscopes so that slides can be read there and delays in treatment reduced. Strategies for the control of *Aedes aegypti* have been realigned to make them more pertinent to dengue control.

In addition, logistical support has been improved through the construction and equipping of a vehicle maintenance and repair facility and the training of mechanics to staff it. This facility now provides preventive maintenance as well as quality repairs and has had great positive impact on the entire MOH vehicle fleet.

These achievements and improvements have made the NMCP and AACP more efficient and created the conditions on which effective program management can continue to build.

With this extension of USAID assistance, malaria rates should be reduced even further, community participation improved, and the probability increased that water and sanitation activities can be carried out successfully within the framework and resources of the general health services. The MOH will have available a corps of well-trained health education, vector control and sanitation specialists who can quickly deal with any future preventive health problems due to outbreaks of vector-borne diseases.

Behavioral change that results in health benefits does not occur by itself, nor does sustainability result from "targeted messages", particularly where hygiene education is concerned. Changes in attitude about malaria and its causes and about the use of unsafe water and unsanitary disposal of human waste will require a reassessment and understanding of community ideology and community values before any hygiene education program is developed.

The sustainability of both vector control and water supply and sanitation will require community-based institutions that can sustain changes in behavior and foster preventive health measures. The long-term impact of this Amendment, relevant to both health and economic improvement, also means that community women will need to be recognized as an important segment of community-based institutions.

#### E. ENVIRONMENTAL ANALYSIS

##### 1. Vector Control

The Pesticides Control Board is responsible for overseeing the importation and monitoring the use of pesticides in Belize. The use of DDT is highly restricted in Belize and the MOH is the only institution permitted to use DDT for malaria control.

The insecticides used so far in the Belize malaria and *Aedes aegypti* control program are those chlorinated hydrocarbons and organophosphorous insecticides (DDT, Abate, malathion) commonly used in similar vector control programs around the world. Numerous environmental studies and assessments have already been undertaken for these compounds and all have concluded that these compounds, if properly applied, have a favorable risk-benefit impact on the environment. In view of these studies and the fact that Belize has not experienced to date any health problems in its spray operations because of the safeguards built into the program (such as refresher

training, proper storage and destruction practices), USAID concluded that no further environmental analysis was required and recommended a negative determination.

The insecticides and control techniques to be used in the extension of the NMCP and AACP are exactly the same as those used in the original program from 1985-1989.

## 2. Water Supply and Sanitation

Water is an abundant resource in Belize and one that can meet the growing needs for domestic, agricultural, and industrial uses. However, the GOB should continue efforts to protect water resources from the continued threat of environmental pollution. The most significant threats come from improper sewage disposal, sugar processing effluents, solid waste disposal, and industrial and agricultural chemical pollution. The GOB has taken protective measures in the past, including the connection of Belize City and Belmopan to modern sewage treatment plants. Within the scope of this analysis, three further activities merit attention. The first is to increase the still low-coverage in adequate rural sanitary facilities. The second is to extend comprehensive periodic water quality testing and information collection to all rural water sources. Finally, the various agencies should pursue initiatives already started to create a national coordinating body for water resource development and sanitation.

## F. PROJECT ISSUES ANALYSIS

### 1. Common Issues

The overriding issue dealt with in developing this Amendment is that of the long-term sustainability of the water and sanitation and vector control programs, which must be addressed both by reducing or controlling costs, developing more effective organizational structures, and greater planning and management capacity. This issue comprises the following sub-issues.

o The need for a greater degree of integration and coordination to make the best use of all the resources available to combat vector-borne diseases: This will be addressed through the use of coordinating mechanisms at all levels to promote increased integration of the WS&S and vector control programs with the general health services to help ensure that the entire health system collaborates in vector

control, malaria diagnosis, and treatment and sanitation activities.

o The need to strengthen community participation to promote prevention of water infestation and disease, thereby improving health while reducing spraying costs: The Amendment proposes to address this by strengthening health education capabilities and training persons throughout the health system to promote greater participation and by integrating and strengthening the volunteer network at the community level.

o The need to decrease heavy dependence on expensive imported pesticides to reduce vector control costs while maintaining effectiveness: This will be addressed through support for operational research on alternative control methodologies as well as by increased community participation. Biological control will be emphasized.

o The need to improve management to increase effectiveness while reducing costs: This will be addressed through technical assistance and training in management at all levels of the system.

## 2. Vector Control

### a. Institution Building

For the GOB to effectively diagnose and treat malaria, as well as control the vectors of malaria and dengue, it is essential that the planning, implementation, and evaluation of these efforts be well coordinated at central, district, and community levels. The rigidity and autonomy of the various Ministries and their functional divisions have severely undermined their ability, if not willingness, to cooperate in this effort. Contrary to the envisioned plan, the lack of coordination that exists at ministerial and community levels is not offset by district-level committees which appear diffuse in their concerns and generally unempowered because of lack of authority and funds. Malaria and dengue control are commonly regarded as the sole domain of the vector control program.

This attitude has resulted in health care workers in clinics and hospitals frequently refusing to provide care for malaria patients. This problem is especially acute for the refugees along the border who are frequently forced to seek treatment in Guatemala. A focused program of workshops and training sessions needs to be developed and targeted at the central,

district, and community levels to bring together all sectors relevant to the control and treatment of malaria and dengue control.

b. Community Participation

A program of community participation is likely to be constrained by centralized decision-making. A general constraint to diversification and eventual decentralization of the VCP is its conservative orientation, probably an inheritance from older malaria eradication programs. The staff are highly trained in technical aspects of vector control but have only had limited exposure to other community-focused approaches. The approach rests solidly on a "cure" rather than a prevention perspective. This situation has made it difficult for the VCP to commit itself to a strategy of community participation. VCP policy makers, supervisors, and implementors need to be specifically targeted for training sessions in health education and community participation.

c. Management

A further constraint to effective institution building and community participation is a lack of job definition. Lines of responsibility need to be clearly identified at all levels and, where appropriate, institutionalized. Similarly, mechanisms for communication between different sectors, public and private, and between the central, district and community levels need to be developed.

3. Water Supply and Sanitation

Evaluations of all the WS&S projects in Belize have made some very important recommendations to improve service coverage and long-term follow up within the sector by the GOB. Substantive comments from all the evaluations seem to fall under the following common themes.

a. Strengthening Institutional Capabilities of GOB

Efforts must be made to develop a capacity within appropriate government Ministries to continue the planning of field, administrative, and professional technical services that are now provided by external agencies either as substitutes or in weak affiliation with existing institutions.

MNR, as the principal agency responsible for rural water supply, is primarily supported by external assistance (UNICEF and USAID). The agency receives some government allocations and has the technical capacity to drill, install pumps, construct latrines, and carry out a health education component. It does not, however, possess the financial resources of WASA, the agency responsible for urban water supply. WASA has been shown to be run and operated with a budget surplus. It has been suggested by various evaluations that MNR should develop a more business-like orientation in supplying services.

Management information systems need to be developed to track progress, inventory control, financial management, and hydrogeological information and water quality. This will contribute to more efficient planning, implementation, and evaluation of rural WS&S activities.

b. Increased Emphasis on Health Education Activities

Statistics and experience suggest that the real value of improved water and sanitation services is derived from a thorough health education component in conjunction with construction activities and a community's receptivity to health education. Eventually, improvements in the demand and utilization of improved water supply and sanitation facilities occur.

The MOH division of PHC/HECOPAB will need to be strengthened and provided with central government support to conduct health education programs that will enhance the value of improved facilities. When communities understand the value of infrastructure, then MNR with MOH/HECOPAB can assess the proper level of technology based on ability and willingness of communities to support it. This creation of "effective demand" for improved facilities will ensure their long-term sustainability in communities that see the value of and are able to maintain the infrastructure.

As the Ministry of Education (MOE) integrates hygiene education into the primary school curriculum, MNR and MOH District Health Teams should serve as resource persons to teachers in specified areas.

District-level teams for water and sanitation will need to develop close working relationships with DHTs in strengthening support to VHCs and CHWs. This collaboration will facilitate a broader focus on health related problems of concern to

communities. It will also help in developing water supply and sanitation facilities that are responsive to health needs rather than the fulfillment of political obligations to communities.

c. Improving Community Participation

All the evaluations conducted strongly recommended that greater impact and long-term sustainability would result from increasing community participation in three areas:

(1) improving its capacity to become involved in development programs, (2) the planning, selection, construction, and operation of various technologies, and (3) more direct and longer-term involvement in health education programs.

Although some processes for community participation have been developed over the past five years in implementing the construction component of the project, these experiences need to be synthesized and operational lessons drawn from them for application in future projects and technologies.

The issue of sustainability in large part hinges on community participation, which in turn must include the operation and maintenance of the improved facilities. There is every reason to believe that Belizean communities can undertake more O&M responsibilities than they presently do. This will need to be substantiated and training needs identified to ensure a continued process for retraining.

An important aspect of community participation is that communities participate in the selection of technologies by understanding the real costs and implications for each type. Their choice, in terms of their preference of water "potability", needs to be discussed before any construction takes place. In that context, various improvements in rainwater catchments need to be explored. The mix of different sources to meet different needs will have to become part of a continuing process of hygiene education.

d. Interagency Coordination

The continued implementation of water and sanitation activities will require a better defined GOB long-term strategy for its agencies and a mechanism for coordinating these agencies with external organizations.

Coordination with international nongovernmental organizations will be an important part of this amendment. CARE, for example, is operating an important WS&S project in the two

northern districts of the country. This agency has adopted a district approach to implementation by hiring its own staff and then establishing coordinating links with the GOB. Although such an approach admittedly has not done much in terms of developing the GOB's institutional capability, there are nonetheless some lessons and experiences that have emerged in the process which need to be considered.

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## PART IV PROJECT IMPLEMENTATION

### A. A.I.D. Arrangements

#### 1. Project Monitoring

The allocation of project monitoring responsibilities within USAID, as described in the original Project Paper, have been modified as follows.

Project management responsibility will continue to rest with the General Development Officer (GDO). However, the GDO will be assisted by a Health Project Manager (on a personal services contract). The Health Project Manager will serve as the principal liaison officer between USAID and the host government counterpart agencies and will be responsible for the day-to-day management of the project. He/she will coordinate with other donors engaged in vector control and WS&S and will work closely with the GDO to ensure consistency in approaches and interventions between the project and other USAID-funded projects. The GDO will provide general oversight as well as technical guidance at the policy level. The USAID Controller and Executive Officer will provide advice and support in financial and administrative areas as required.

#### 2. Disbursement Procedures

Most of the A.I.D.-provided grant funds have been used for the procurement of goods and services requiring dollar payment. This has been undertaken through the procurement procedures and facilities of USAID/Belize, the Regional Contract Office in Guatemala and AID/Washington. A small portion of A.I.D. funds has also been disbursed by USAID to finance local currency expenditures resulting from contracts with local entities, in-country training, operational research activities and in-country transportation. The same procedures will be followed during the extension period.

#### 3. Procurement Procedures

##### a. Technical Assistance

This project extension provides for up to 29 person months of short-term technical assistance (12 person months for vector control and 17 person months for water supply and sanitation). Technical assistance will be provided through direct buy-ins to centrally-funded vector control and WS&S projects and direct USAID contracts with local contractors, if necessary.

b. Commodities

The commodities remaining to be procured under the project are outlined in Part IIB4.

The commodity procurement methods envisaged in the original Project Paper have been revised to include host country procurement (by MNR) of materials and equipment required to implement the WS&S component of the project. However, in light of problems which have been experienced during the past three years, MNR's procurement capability will be reassessed in the second quarter of FY 1991 and a determination made whether to continue use of the HCC method or to use A.I.D. direct procurement procedures. The commodities required to support the operations of the vector control and water quality program within the MOH will continue to be procured directly by USAID/Belize.

The procurement of motorcycles and bicycles will be financed through a revolving fund which will be established initially with USAID funding and subsequently replenished through monthly repayments by vector control and EHS staff. They will ultimately own these bicycles/motorcycles (upon complete reimbursement of their costs) and be responsible for their maintenance. The employees will, however, receive from the MOH a monthly stipend for fuel.

c. Construction

Since no problems have so far been encountered with construction, construction activities will continue to be carried out under host country fixed amount reimbursement contracts. USAID/Belize has contracted a local civil engineer to review the design and cost estimates of all proposed construction and advise USAID of their technical adequacy and appropriateness. The contract engineer is also responsible for monitoring the actual construction and certifying that construction has been completed in a satisfactory manner and in accordance with agreed upon norms and requirements.

Construction activities to be completed during the Project extension include the construction of a small vector control storage unit in one district, 20 wells equipped with handpumps and 2 rudimentary water systems.

4. Methods of Implementation and Financing

USAID/Belize proposes to use the following methods of payment during the project extension in accordance with the Payment Verification Policy Statement.

<u>Type of Assistance</u>	<u>Method of Implementation</u>	<u>Method of Payment</u>	<u>Estimated Cost *(\$000) FY1991-1993</u>
Short-term TA	Direct A.I.D. contract (Buy-ins)	Direct Payment	350
IEC	Host country contract	Direct Payment (L/COM)	45
Training (long-term & short-term)	Direct A.I.D. placement	Direct Payment	235
Operations Research	Direct A.I.D. contract	Direct Payment	40
Construction	Host country contract	Direct (Fixed-amount) Reimbursement	190
Audit reviews	Direct A.I.D. contract	Direct Payment	50
Commodities (MNR/WS&S)	HCC	Direct Payment	250
Commodities (MOH)	Direct A.I.D. contract	Direct Payment (L/Com)	84
Evaluation	Direct A.I.D. contract	Direct Payment	16
Project Management	Direct A.I.D. contract	Direct Payment	60

\*Includes remaining FY 91 obligation (\$420,000) as well as balance of currently obligated and unearmarked funds.

Because of the magnitude and duration of this project, funds have been budgeted for audit reviews to supplement audit coverage which will be provided by A.I.D.'s Office of the Inspector General and the GOB Auditor General, and to evaluate the financial and compliance aspects of the project.

#### B. Implementation Plan

Technical assistance training and operations research will provide the essential support for the institutional development activities envisaged during the project extension. Requirements and tentative schedules for the

proposed TA, training, operational research and commodity procurement for both program components are presented in Annexes C, D, E and J.

Specific training objectives and schedules for the various target groups will be developed jointly by USAID and the GOB during the third quarter of FY 1991, taking into account the findings of the institutional analysis.

### C. Evaluation Plan

A final evaluation is scheduled during the last year of the project, in the third quarter of CY 1993.

In general this evaluation will assess the project's success in reducing the incidence of malaria and *Aedes aegypti* infestation and the GOB's capability for sustaining a natural vector control program. It will also assess the project's impact in improving and ensuring the sustainability of water and sanitation systems in rural areas and the communities' ability to operate water systems and maintain sanitation facilities.

ANNEX A

LIST OF ABBREVIATIONS

AACP	Aedes Aegypti Control Program
ACD	Active Case Detection
CHW	Community Health Worker
DHT	District Health Team
DDT	Dichlorodiphenyl Trichloroethane (insecticide)
EHS	Environmental Health Service
EOPS	End of Project Status
EPA	Environmental Protection Agency
GOB	Government of Belize
HE/CP	Health Education/Community Participation
HECOPAB	Health Education and Community Participation Bureau
IEC	Information, Education, and Communication
LOP	Life of Project
MLSS	Ministry of Labor and Social Services
MNR	Ministry of Natural Resources
MOH	Ministry of Health and Urban Development
MPH	Master's Degree in Public Health
MACH	Maternal and Child Health
NMCP	National Malaria Control Program
O&M	Operations and Maintenance
PAHO	Pan American Health Organization
PCD	Passive Case Detection
PHC	Primary Health Care
RWS	Rudimentary Water System
RWSSP	Rural Water Supply and Sanitation Program
TA	Technical Assistance
ULV	Ultra Low Volume
VC	Volunteer Collaborator
VHC	Village Health Committee
WASA	Water and Sewerage Authority
WHO	World Health Organization
WS&S	Water Supply and Sanitation
WID	Women in Development

## ANNEX B

## REVISED LOGFRAME

ANNEX B

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<u>GOAL</u>			
To improve the health and productivity of the Belizean population.	<ul style="list-style-type: none"> <li>a. Measurable reductions in morbidity and mortality from endemic diseases which are directly attributable to specific health interventions.</li> <li>b. Development of economic sectors such as agriculture will not be adversely affected by losses in worker productivity caused by outbreaks of malaria, dengue fever, and gastro-intestinal diseases.</li> <li>c. The tourism industry will not be adversely affected by reports of outbreaks of the targeted diseases.</li> </ul>	Reports from MOH, MNR, the Central Statistics Office, PAHO and other international health organizations. Reports from other affected Ministries.	The improvement in environmental health and vector control services will not be offset by other factors such as declining economic conditions, social unrest, etc.
<u>PURPOSE</u>			
<p>COMPONENT I</p> <p>Control the incidence of malaria and dengue fever</p>	<ul style="list-style-type: none"> <li>a. To reduce malaria incidence to a parasite incidence of 12 cases/1,000 population or less by EOP.</li> <li>b. To reduce <u>P. falciparum</u> malaria to a point where it represents no more than 5% of the total yearly caseload of malaria by EOP.</li> </ul>	NMCP and AACP surveillance records, case records of public and private hospitals and health centers; Validated by annual assessments, A.I.D. mid-term and EOP evaluations, and continuous monitoring by short-term advisors and consultants.	Continuing GOB priority given to anti-malaria and <u>Aedes aegypti</u> activities.  Adequate GOB budgetary support.

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Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
	<p>c. To reduce the total number of reported <del>Anopheles</del> <u>Anopheles aegypti</u> positive localities to less than 5% of the total localities in the country by EOP.</p>	<p>Same as above</p>	<p>Research within Belize and world-wide will define appropriate alternative methodologies to provide viable operational methods for control of malaria.</p>

PURPOSE

COMPONENT II

To expand safe water supply and sanitation in rural communities in three districts through sustainable program activities.

<p>a. At least 80% of the rural population in the three project districts have access to safe water.</p> <p>b. At least 70% of the rural population in the three project districts have access to and are using improved sanitation facilities.</p> <p>c. 90% of all handpumps are maintained by the communities and in working status in the the three districts, including those previously installed.</p> <p>d. Annual reports issued on quality of drinking water in rural areas.</p>	<p>EHS surveillance of rural water supply and sanitation systems. System coverage and usage verification by annual assessments, EOP evaluation, and continuous monitoring by short-term consultants.</p>	<p>Continuous GOB priority given to rural water supply and sanitation.</p>
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Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<b>SUB-PURPOSE</b>			
<b>COMPONENT I</b>			
<p>To strengthen the institutional, educational and technical capabilities of the GOB to determine effective demand for vector control and institutionalize effective surveillance.</p>	<ul style="list-style-type: none"> <li>a. NMCP and AACP fully &amp; properly staffed &amp; effectively operating to maintain continuing malaria and <u>Aedes aegypti</u> surveillance and control.</li> <li>b. Increased integration of the NMCP and AACP with other MOH services and other GOB agencies.</li> <li>c. Management, educational and technical activities in vector control are functionally integrated within the MOH and coordinated with other agencies.</li> </ul>	<p>Same as above, plus NMCP/AACP annual reports and personnel records.</p>	<p>Major malaria or dengue fever epidemic does not occur. Integration of water control within the overall health system remains a priority.</p> <p>Current methodologies for vector control and treatment of malaria remain viable.</p>
<b>SUB-PURPOSE</b>			
<b>COMPONENT II</b>			
<p>To improve the effectiveness of the Environmental Health Service by strengthening its institutional capacity and establishing a national rural water quality monitoring system.</p>	<ul style="list-style-type: none"> <li>a. The Environmental Health Service (EHS) is fully staffed with trained personnel to ensure that water supply and sanitation systems are maintained and provide safe water.</li> <li>b. The EHS is able to sample and analyze rural water supplies.</li> </ul>	<p>Same as above, plus monthly reports from the EHS.</p>	<p>Continuing GOB priority given to water and sanitation.</p> <p>Adequate GOB budgetary support.</p>

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Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>To strengthen the institutional, educational and technical capabilities of the GOB to determine effective demand for water and sanitation.</p>	<p>Management, educational and technical activities in WS&amp;S are functionally integrated within the MNR and MOH and coordinated between the two Ministries and with other agencies.</p>	<p>Review of organizational charts, annual assessment, EOP evaluation and continuous monitoring by consultants.</p> <p>Reports from MOH &amp; MNR, and other relevant agencies, validated by consultants' reports and EOP evaluation.</p>	<p>Same as above</p> <p>Continuing GOB support to Community Development and District Health Teams.</p>
<p><b>PROJECT OUTPUT</b></p>			
<p><b>COMPONENT I: Vector Control</b></p>			
<p>1. A targeted and stratified vector control strategy is adopted to provide coverage where and when needed so that total insecticide spraying is reduced.</p>	<p>Reduction in the number of houses to be sprayed in subsequent cycles.</p>	<ul style="list-style-type: none"> <li>a. NMCP and AACP annual reports.</li> <li>b. Annual multi-donor assessment of operations.</li> <li>c. Mid-term and EOP AID evaluations.</li> <li>d. On-going monitoring by short-term consultants.</li> </ul>	<ul style="list-style-type: none"> <li>a. Continued availability of residual &amp; ULV insecticides effective against the vectors.</li> <li>b. Implementation capacities exist for alternative control methodologies.</li> <li>c. Household acceptance of insecticide spraying will improve through health education and community involvement</li> </ul>

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Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>2. Functioning, effective and continuous epidemiological, parasitological and entomological surveillance system.</p>	<ul style="list-style-type: none"> <li>a. Blood slides from all sources within the health system are examined and reported to the District Evaluator within 10 days.</li> <li>c. Insecticide resistance tests on <u>A. albimanus</u> and <u>A. aegypti</u> adults completed each year in 4 or more NMCP Districts.</li> <li>d. Minimum of 1 intensive field investigation for parasite resistance.</li> <li>e. 2 operations research studies carried out to improve current and/or evaluate new methods of vector control.</li> </ul>	<p>Same as above plus quarterly progress reports by MOH or minutes of quarterly review meetings.</p> <p>Same as above</p>	<ul style="list-style-type: none"> <li>a. Available trained staff.</li> <li>b. Malaria education improved in public and private sectors.</li> <li>c. MOH actively participates.</li> </ul> <p>Suitable methodology available which can be adapted to Belizean conditions.</p>
<p>3. Active vector control program in place in pilot areas to replace or supplement house and ULV spraying.</p>	<ul style="list-style-type: none"> <li>a. Operational implementation of a project to test feasibility of replacement of total house spraying with alternative control methods in representative areas by EOP.</li> <li>b. A research project to test various methods of vector control under Belize's ecological conditions completed by EOP.</li> </ul>	<p>Same as above</p>	<p>Antimalaria drugs are available which continue to be effective against existing parasites.</p>
<p>4. Chemotherapy of malaria is in place and responsive to surveillance data.</p>	<ul style="list-style-type: none"> <li>a. Maintain an ABER (Annual Blood Examination Rate) at 10% or more each year of the project.</li> <li>b. Radical treatment initiated within maximum of 14 days after blood sampling.</li> </ul>		

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Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p>5. MOH staff and personnel of collaborating agencies at the central and district levels, VHCs, CHWs and VCs are adequately trained in management, health education and technical aspect of vector control.</p>	<ul style="list-style-type: none"> <li>a. Annual in-country seminars and district level workshops covering relevant aspects of malaria and <u>Aedes aegypti</u> control completed by EOP.</li> <li>b. Included in annual seminars and/or some of the short-term training courses is a component on community development and social, cultural and behavioral skills necessary to induce changes in behavior.</li> <li>c. Regional short-term training of one AACP and one NMCP employee in vector control as applied to malaria control and <u>Aedes aegypti</u> control; two by EOP.</li> <li>d. Regional observation training of mid-level personnel - 12 by EOP.</li> <li>e. One U.S. MSc/MPH/PhD course completed by MOH official by EOP.</li> <li>f. Short-term training in the U.S. or region in comprehensive vector control 12 by EOP.</li> </ul>	<p>Same as above</p>	<ul style="list-style-type: none"> <li>a. Appropriate candidates can be identified and released to attend courses in a timely manner.</li> <li>b. Suitable courses on malaria control and <u>Aedes aegypti</u> control will be available in the LAC Region.</li> </ul>

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<u>Narrative Summary</u>	<u>Objectively Verifiable Indicators</u>			<u>Means of Verification</u>	<u>Important Assumptions</u>
<u>USAID INPUTS</u>	<u>USAID</u>			<u>USAID</u>	<u>USAID</u>
	<u>FX</u>	<u>LC</u>	<u>TOTAL</u>		
1. Technical Assistance	1. 3,660	100	3,660	a. Consultations occur as scheduled.	Availability of funds.
2. Operations Research	2. 77	72	149	b. OR project documents.	
3. Training	3. 357	202	559	c. Trained MOH & MNR staff and community members.	
4. Construction	4. -	355	355	d. Functional lab exists.	
5. Commodities	5. 1,617	100	1,717	e. USAID and GOB reports.	
6. Evaluation	6. 116	18	134	f. Evaluation reports.	
7. IEC	7. 50	30	80		
8. Audit	8. 50		50		
SUBTOTAL	5,927	877	6,804		
9. Inflation (5% p.a.)	9. 296	44	340		
10. Contingencies	10. 141	-	141		
TOTAL	6,364	921	7,285		

PROJECT OUTPUTS

COMPONENT II WS&S

1. Safe water supply and sanitation facilities are installed and functioning in the three project districts.

- a. 110 tubewells equipped with handpumps installed in approximately 40 localities.
- b. 8 rudimentary water systems installed in 8 rural communities.
- c. 1,250 pit latrines installed in rural localities and communities.

Reports from MNR, MOH and other concerned Ministries and agencies; Mid-term and EOP evaluations and continuous monitoring by consultants.

EHS reorganization and dedication of one full-time environmental health assistant per district. Local participation in the operations and maintenance of the water supply systems and in the use of pit latrines.

2. Establishment of a functioning national water quality control program.

All rural water supplies sampled & analyzed at least once a year.

EHS water monitoring reports validated by annual project reviewers and EOP evaluation.



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Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
4. Alternative, community based and managed technologies for water supply are developed and introduced.	1. Assessments conducted in selected communities which have indicated preference for alternative options for potable water supplies and sanitation facilities. 2. Alternative technologies tested and implemented in at least two communities according to mutually agreed upon criteria.	Visits, consultants' reports and GOB reports.	Receptivity of the GOB to the alternative, cost effective and sustainable technologies for vector control and WS&S; expressed preference by the communities for alternative options.

PROJECT OUTPUTS

Common to Vector Control & WS&S

1. Effective program planning, management, and evaluation by GOB.	a. Yearly Plans of Action prepared and approved. b. Annual program reviews completed. c. A.I.D. mid-term and final EOP evaluations completed. d. Indicators for project outputs achieved in a timely and effective manner.	a. Annual Plans of Action and GOB priority for malaria and quarterly reports from GOB. <u>Aedes aegypti</u> control and WS&S. b. Midterm and EOP evaluations. c. Consultants' reports. d. Reports from other international donor agencies.	Key government and private agencies want to collaborate and are willing to make use of a coordinating mechanism.
2. An effective mechanism is established to coordinate vector control and WS&S efforts with overall health and development activities in Belize.	a. Coordinating mechanism involving GOB Ministries, NGOs and private sector institutions identified by MOH and MHR, as well as any other donor contributing to the IPTBH project established at the central level and functioning.	GOB annual and/or quarterly reports to USAID, minutes of quarterly review meetings; Validated by reports of management consultants and EOP evaluation.	

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Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
3. Active community involvement in vector control interventions and in the planning, construction and maintenance of water systems.	<ul style="list-style-type: none"> <li>b. Coordinating body at the central level is effectively linked with the DHFs (i.e., provides input to and receives input from).</li> <li>a. Viable health communities established in each project community and demonstrating management and technical skills in vector control and WS&amp;S.</li> <li>b. Community labor inputs to each system in accord with their agreement with the VHCs and DHFs.</li> <li>c. Coordination established between community health committees and district health teams.</li> <li>d. Active maintenance fund established for each rural water system.</li> <li>e. Community maintenance person(s) designated for all water systems, maintenance kits distributed.</li> <li>f. At least 50% of the women, youth and other organized groups in the project communities have collaborated with VHCs in prevention activities by EOP.</li> <li>g. CHWs in VCs in communities where the vector control program is very active have been trained in prevention detection and treatment of malaria by EOP.</li> </ul>	Same as above.	Continuing GOB support for community involvement and district health teams. At least 10 new VHCs will be established during the extension period in villages where there is no VHC.

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Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
	<p>h. VHCs, CHWs and VCs receive regular supervision and support for both their preventive and curative activities from vector control staff, RHWs, district health educators and other relevant MOH personnel.</p>	<p><u>GOB</u></p> <p>a. Annual MOH budget.                      b. Staffing lists.                      c. Field visitations.                      d. Provision of support to NMCP and AACP in national planning documents.                      e. Plan of Operations.</p>	<p><u>GOB</u></p> <p>Adequate official and executive support for the malaria and <u>Aedes aegypti</u> control programs.</p>

PROJECT INPUTS

COMPONENT I

<u>Government of Belize</u>	<u>GOB</u>	<u>GOB</u>	<u>GOB</u>
<p>1. Adequate funds for NMCP and AACP operations, including purchase of insecticides, with plans for continuing support after termination of A.I.D. assistance.</p>	<p>a. GOB budget \$2.28 million (equivalent) and funds provided to NMCP and AACP as required.                      b. Approved Plan of Operations exists over LOP.                      c. Coordinating mechanisms at the central and district levels are used to develop yearly Plans of Action for vector control and WS&amp;S and to assess progress in achieving planned objectives through quarterly meetings.                      d. Other departments within the MOH and MNR and other government and private institutions coordinate and collaborate with vector control and WS&amp;S when necessary and feasible.</p>	<p>a. Annual MOH budget.                      b. Staffing lists.                      c. Field visitations. ✓                      d. Provision of support to NMCP and AACP in national planning documents.                      e. Plan of Operations.</p>	<p>Adequate official and executive support for the malaria and <u>Aedes aegypti</u> control programs.</p>

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Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
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2. Adequate personnel staffing for NMCP and AACP.

3. Adequate facilities for NMCP and AACP programs through in-kind support of GOB health institutions.

PROJECT INPUTS

GOB

GOB

COMPONENT II

Government of Belize

GOB

1. Adequate funds for the Vector Control and Rural Water Supply and Sanitation programs, and EHS water quality laboratory (including fuel costs).

- a. GOB annual budget allocations as specified in Action Plans.
- b. An approved Plan of Operations exists over LOP for vector control and WSSP.
- c. MOH reorganized.

- a. Annual MOH budget and funds availability.
- b. Staffing lists.
- c. Field visitations.
- d. Provisions of support for EHS.

Adequate political and executive support for the vector control and rural water supply and sanitation programs.

2. Adequate personnel staffing and reorganization to facilitate project implementation.

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TABLE 1. Short-term Technical Assistance Requirements in WS&S  
(January 1991-March 1993)

1. CENTRAL LEVEL

ACTIVITY	TIMING*	EFFORT	CONSULTANT	TARGET
Inst't Analysis	2nd Quarter 1991	3 weeks	o HRD o Soc. Sci.	MOH/MNR
Policy Dialogue	3rd Quarter 1991	2 weeks	Facilitator**	Ministers P.S. Directors
Policy Dialogue Continued	4th Quarter 1991	2 weeks	Facilitator**	Ministers P.S. Directors

\* Year refers to calendar year.

\*\* Need for outside technical assistance to facilitate the process will be dependent upon the findings from the institutional analysis.

NOTE: The timing of different consultancies planned for WS&S may have to be adjusted depending on the availability of technical assistance and GOB personnel.

Table 1 (continued)

2. DISTRICT/VILLAGE LEVEL

ACTIVITY	TIMING*	EFFORT	CONSULTANT	TARGET
Community Analysis	2nd Quarter 1991	3 weeks	Social Scientist	D/V/(C)
Training Management Super.	3rd Quarter 1991	4 weeks	Trainees/ Management	D
O&M Management	3rd Quarter 1991	5 weeks	O/MN Spec. Soc. Sci.	D
TOT Community Participation	3rd Quarter 1991 2X	3 weeks (ea.)	VC Spec./ WSS Spec. Trainer CP Spec.	D/V/(C)
TOT Environ. Sanitation	4th Quarter 1991 2X	3 weeks (ea.)	VC Spec./ WSS Spec. Trainer HE Spec.	D/V/(C)
TOT Super	4th Quarter 1991	3 weeks	Trainer/ Management	D/(C)
TOT Materials Develop.	4th Quarter 1991	3 weeks	Trainer Mater. Dev. Soc. Sci. (VC/WSS)	D/V/(C)
TOT Appro. Tech.	1st Quarter 1992 2X	2 weeks (ea.)	VC Spec./ WSS Spec. O&M Trainer	D/V/(C)
Financial Management	1st Quarter 1992	2 weeks	CPA Trainer Soc. Sci.	D/V/(C)
TOT CP Refresher	2nd Quarter 1992	3 weeks (ea.)	VC Spec./ WSS Spec. Trainer HE Spec.	D, V/(C)
TOT Envir. Sanitation Refresher	3rd Quarter 1992	3 weeks (ea.)	VC Spec./ WSS Spec. Trainer HE Spec.	D/V/(C)
TOT Appro. Tech.	4th Quarter 1992 2X	2 weeks (ea.)	VC Spec./ WSS Spec. O&M Trainer	D/V/(C)
Evaluation	1st Quarter 1993	3 weeks	HRD Spec. VC Spec./ WSS Spec.	C/D/V

\*Refers to calendar year

C = Central  
D = District  
V = Village

**TABLE 2: Summary of Vector Control Field Activities  
(January 1991-March 1993)**

ACTIVITY	TIME	LENGTH	NO OF CONSULTANTS	SKILLS
Operational Research-Bednets	2nd Quarter 1991	4 weeks	2	Social Scientist Epidemiologist
Information System	2nd Quarter 1991	3 weeks	1	Information Specialist
Integration VCP/AACP	2nd Quarter 1991	2 weeks	2	ID/HRD Epidemiologist
O.R. Bednets	3rd Quarter 1991	2 weeks	2	Social Scientist Epidemiologist
O.R. Source Reduction	4th Quarter 1991	4 weeks		
O.R. Bednets	3rd Quarter 1991			Social Scientist Epidemiologist
O.R. Malaria Among Refugees	4th Quarter 1991	4 weeks	1	Epidemiologist
O.R. Bednets	4th Quarter 1991			Social Scientist Epidemiologist
Integration VCP/AACP	1st Quarter 1992	2 weeks	2	ID/HRD Epidemiologist
Information System	1st Quarter 1992	2 weeks	1	Information Specialist
Source Reduction Evaluation	2nd Quarter 1992	2 weeks	1	Epidemiologist
O.R. Bednets	1st Quarter 1992	2 weeks	2	Social Scientist Epidemiologist

## Operational Research and Special Projects

### 1. Vector Susceptibility to Insecticides

New resistance detection methods have been developed which allow detection of resistance and its mechanisms in single mosquitos in the field. These methods are simple and straightforward, allowing characterization of resistance with much smaller samples and in less time than bioassays. The microassay technology provides a much easier way to do country-wide monitoring for resistance trends. If a program is using insecticides, then they should be encouraged to monitor for resistance to the insecticide being used, as well as determine if cross resistance could be occurring.

### 2. Behavior of Anopheles albimanus, in Relation to Feeding, House Resting and Vector Status

A lot is known about the behavior of Anopheles albimanus in other countries, but few observations have been done in Belize. Studies of biting and resting behavior could lead to modifications in spraying tactics which would reduce insecticide requirements. Secondary vectors have not been identified to date. With the advent of ELIZA microassay, programs now have an opportunity to help establish whether a suspected mosquito is a vector by finding a circumsporozoite protein of the sporozoite in the mosquitos in question. In addition, the ELIZA will also determine the malaria species in the vector. In areas where vector mosquitos, such as Anopheles albimanus, are known to have extremely low sporozoite rates, the ELIZA test permits analyzing up to 20 mosquitos as one unit. This test is also a tool that could be used to assess whether the control measures being employed are actually eliminating the more dangerous elements of the vector population. In order to carry out the tests, Anopheles mosquitos must be collected and identified. This collection may be accomplished by human landing collections, house collections of resting mosquitos, and by light traps.

### 3. Alternative Control Measures

Impregnated bednets and curtains may be valuable control tools, especially where migrants are present. A small-scale village trial would yield a lot of information. Baseline information will be required, such as malaria rates, type of housing, and vector as well as human behavior. Where malaria rates are low it will be difficult to measure changes in transmission of the disease, but bednets or curtains may be more useful in low transmission areas than in high transmission areas. Success may be evaluated through entomological changes.

ANNEX E

A.I.D.-Financed Commodities and Equipment\* (FY 1991-1993) in US \$'000

	FY 91		FY 92		FY 93		FY 91-93	
	<u>FX</u>	<u>LC</u>	<u>FX</u>	<u>LC</u>	<u>FX</u>	<u>LC</u>	<u>FX</u>	<u>LC</u>
A. <u>Vector Control</u> (MOH)								
1. Motorcycles (7)	10						10	
2. Bicycles (6)			2				2	
3. Malaria tablets			8		10		18	
4. Laboratory supplies			10				10	
5. Educational & other supplies		5	5	5	5		10	10
B. <u>EHS/Water Quality Program</u> (MOH)								
1. Vehicle (1)	20						20	
2. Motorcycles (6)	5						5	
3. Laboratory & other supplies		5	10		6		16	5
C. <u>WS &amp; S</u> (MNR)								
1. Drilling equipment spare parts, well casings, screens and related supplies	35						35	
2. Pumps, motors, generators	35						35	
3. Handpumps (20) and parts	30						30	
4. Pipes, fittings & related supplies		65		85				150
5. Educational & other materials	5	5	5	5		5	10	15
<b>TOTAL</b>	<b>140</b>	<b>80</b>	<b>40</b>	<b>95</b>	<b>21</b>	<b>5</b>	<b>201</b>	<b>180</b>

\*The commodities listed here are not in excess of the total requirements projected in the original Project Paper, but represent those that remain to be procured under the project.

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ANNEX F

TABLE 1:  
GOB (MOH) Recurrent Cost Estimates for the Vector  
Control Program FY 1990/91 - FY 1992/93 (US \$000)

	<u>FY 1990/91</u>	<u>FY 1991/92</u>	<u>FY 1992/93</u>	<u>Total</u>
Total VCP Salaries	285	294	303	882
Travel & Subsistence	214	233	254	701
Materials & Supplies	89	101	121	311
Vehicle Oper. & Mtnc	114	124	136	374
Other	21	23	25	69
Subtotal	723	775	839	2337
Inflation 4%	29	31	33	93
TOTAL	752	806	872	2430

TABLE 2:

MNR BUDGET FOR WS&S PROGRAM  
FY 1990/91 - FY 1992/93 (US \$000)

	<u>FY 1990/91</u>	<u>FY 1991/92</u>	<u>FY 1992/93</u>	<u>TOTAL</u>
Wages, Overtime & Subsistence	250	289	338	877
Vehicle O & M	122	144	170	436
Materials & Supplies & Other Office Expenses	10	12	14	36
Construction Materials, Equipment & Vehicles (Capital Budget)	90	69	53	212
Subtotal	472	514	575	1,561
Inflation 4%	19	21	23	63
TOTAL	491	535	598	1,624

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## ANNEX F

TABLE 3: Summary GOB Recurrent Cost Budget  
FY 1990/91-1992/93 (US \$000)

	FY 90/91*		FY 91/92*		FY 92/93		Total	
	FX	LC	FX	LC	FX	LC	FX	LC
<u>1. Salaries</u>								
a. Vector Control (MOH)		285		294		303		882
b. EHS/Water Quality Program(MOH)		73		76		81		230
c. WS&S (MNR)		175**		211		255		641**
<u>2. Travel &amp; Subsistence</u>								
a. Vector Control		214		233		254		701
b. EHS/Water Quality Program		2		2		2		6
c. WS&S								
<u>3. Materials &amp; Supplies</u>								
a. Vector Control		89		101		121		34
b. EHS/Water Quality								
c. WS&S		10		12		14		36
<u>4. Vehicle Operations and Maintenance</u>								
a. Vector Control		114		124		136		374
b. EHS/Water Quality								
c. WS&S		122		144		170		436
<u>5. Other</u>								
a. Vector Control		21		23		25		69
b. EHS/Water Quality								
c. WS&S		90		69		53		212
<u>6. Subtotal</u>		1,195		1,289		1,414		3,898
<u>7. Inflation (4% of 6)</u>		49		52		56		157
<b>TOTAL</b>		<b>1,244</b>		<b>1,341</b>		<b>1,470</b>		<b>4,055</b>

\* GOB FY 90-91 runs from April 1, 1990 to March 31, 1991

FY 91-92 runs from April 1, 1991 to March 31, 1992

\*\*Including Travel & Subsistence

ANNEX F

TABLE 4: Summary of Planned Counterpart Contributions (In US\$000)

	FY 1990/91		FY 1991/92		FY 1992/93		Total	
	<u>GOB</u>	<u>Comnty</u>	<u>GOB</u>	<u>Comnity</u>	<u>GOB</u>	<u>Comnity</u>	<u>GOB</u>	<u>Comnity</u>
Vector Control	723	105	775	120	839	139	2,337	364
WS&S	397	45	436	50	492	56	1,325	151
EHS/Water Quality	<u>75</u>	<u>      </u>	<u>78</u>	<u>      </u>	<u>83</u>	<u>      </u>	<u>236</u>	<u>      </u>
Subtotal	1,195	150	1,289	170	1,414	195	3,898	515
Inflation (4%)	49	N/A	52	N/A	56	N/A	157	N/A
<b>TOTAL</b>	<b>1,244</b>	<b>150</b>	<b>1,341</b>	<b>170</b>	<b>1,470</b>	<b>195</b>	<b>4,055</b>	<b>515</b>

## Distribution of VHCs, CHWs and VCs

<u>District</u>	<u>VHCs</u>	<u>CHWs (in place)</u>	<u>CHWs (in training)</u>	<u>VCs</u>
Corozal	10	45 *	36 *	56
Orange Walk	10	-	-	43
Cayo	5	10	40	60
Belize Rural	7	4 **	-	45
Stann Creek	8	10	-	21
Toledo	<u>22</u>	<u>22</u>	<u>10</u>	<u>35</u>
TOTALS	62	91	86	260

\* For both Corozal and Orange Walk

\*\*Only 4 reported active out of 30 trained

ANNEX H

Table 1: Projection of A.I.D. Expenditures FY 91 - 93\* (US \$'000)

	FY 91		FY 92		FY 93		FY 91-93	
	<u>FX</u>	<u>LC</u>	<u>FX</u>	<u>LC</u>	<u>FX</u>	<u>LC</u>	<u>FX</u>	<u>LC</u>
1. <u>Technical Assistance</u>								
a. Vector Control	40		80		40		160	
b. EHS/Water Quality	10						10	
c. WS&S	50		90		40		180	
2. <u>Operational &amp; Other Research</u>								
a. Vector Control	10	4	10	4	10	2	30	10
b. EHS/Water Quality								
c. WS&S								
3. <u>Training</u>								
a. Vector Control	15	15	10	25	10	20	35	60
b. EHS/Water Quality			30		10		40	
c. WS&S	25		30	15	15	15	70	30
4. <u>Construction</u>								
a. Vector Control		15						15
b. EHS/Water Quality								
c. WS&S		60		115				175
5. <u>Commodities/Equipment</u>								
a. Vector Control	10		20		10		40	
b. EHS/Water Quality	25	5	10		6		41	5
c. WS&S	100	15	100		35		235	15
6. <u>Info/Educ./Comm. (IEC)</u>								
a. Vector Control		5	5	5	5		10	10
b. WS&S	5	5	5	5		5	10	15
7. <u>Evaluation</u>								
a. Vector Control			6				6	
b. Water Quality Control			4				4	
c. WS&S			6				6	
8. <u>Audit Reviews</u>			25		25		50	
9. <u>Project Management Support</u>		30		30				60
10. Sub Total	290	154	431	199	206	42	927	395
11. Inflation (5% p.a.)	14	8	22	10	10	2	46	20
<b>TOTAL</b>	<b>305</b>	<b>162</b>	<b>453</b>	<b>209</b>	<b>216</b>	<b>44</b>	<b>973</b>	<b>415</b>

AS

Reported Cases of Malaria  
Belize 1975-1988

<u>Years</u>	<u>Total Cases</u>	<u>P. vivax</u>	<u>P. falciparum</u>	<u>P. malariae</u>
1975	90	90	-	-
1976	204	204	-	-
1977	878	-	-	-
1978	1,200	1,998	2	-
1979	1,430	1,417	13	-
1980	1608	1,574	34	-
1981	2,048	2,005	43	-
1982	3,868	3,677	191	-
1983	4,595	3,963	632	-
1984	3,707	3,096	610	-
1985	2,830	2,715	103	-
1986	2,779	2,643	136	-
1987	3,353	3,107	246	-
1988	2,725	2,612	113	-
1989	3,285	3,208	70	-

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## Summary of Planned Training Activities

ACTIVITY	TIMING*			TARGET
	CY 91	CY 92	CY 93	
<u>A. Vector Control</u>				
1. Long-term				N/A
2. Short-term training				
- Aedes aegypti urban mosquito control	X	-	-	AACP field personnel
- Entomological research	X	-	-	Supervisory technical personnel
- Management work-shops		X	X	Central level and District supervisors
- Health education/com. participation		X	X	District and Central level personnel
- Volunteer Workshop		X	X	CHWs, VCs and other relevant field personnel
- Quarterly Review/Coordination Meetings	X	X	X	District level supervisors and central level managers
	X	X	X	
<u>B. Water Supply &amp; Sanitation</u>				
1. Long-term				
- MPH training in H.E.	X	-	-	Chief Health Educator, RWSSP
2. Short-term (in-country)				
- Management training	X			District coordinators and health educators
- O&M		X	X	O&M personnel (RWSSP) at central and district levels
- Community participation (TOT)	X	X		To be determined
- Environ. Sanitation (TOT)		X	X	MOH vector control and EHS personnel Health educators at central and district levels
- Financial Management		X		To be determined (at district & community levels)
- Appropriate Technology (TOT)		X		To be determined
- H.E. Materials development (TOT)	X	X		HECOPAB and MNR health education personnel
- Supervision (TOT)	X	X	X	District and central level supervisors and program managers
- Drilling technology	X	X		Well drillers (MNR)