





# **VBC PROJECT**

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*Tropical Disease Control for Development*

## **Trip Report:**

**Development of Final Draft of Environmental  
Health Program USAID/Belize,  
Ministry of Health, Ministry  
of Natural Resources**

**August 17 - 27, 1993**

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**VBC Report No. 82141B**

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## **Acknowledgments**

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## 1. Introduction

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Since March 1992, an intensive program of workshops and technical assistance in the areas of water and sanitation and vector (malaria) control have been conducted in Belize. The overall objective of this strenuous effort is to assist the authorities of the Ministry of Health (MOH) and Ministry of Natural Resources (MNR) develop guidelines and policies "so that community-based organizations can effectively play their rightful role in environmental health" (Belize Position Paper, August 1993). The position paper that evolved from these workshops was developed by the Belizian health and water-sanitation officials to be presented to their superiors for support and implementation.

The author and Dr. May Yacoob of the WASH Project assisted the Belizian officials in preparing the first draft of the Position Paper in May 1993. The present consultancy, on which this report is based, was to assist in the preparation of the final draft presented to the Senior Intersectoral Executive Committee (SIEC) in Belmopan on August 24, 1993.

USAID support for this effort will terminate at the end of the September 1993. At the presentation of the Position Paper, the representative of UNICEF in Belize expressed interest in continuation of the effort initiated by USAID. In a subsequent meeting (August 25), initial plans were made by MOH, MNH and UNICEF officials to draft the necessary documentation to secure UNICEF funding for subsequent activities for training and institutional development in environmental health.

## **2. Activities**

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### **1. Preparation of Position Paper**

Following initial briefings with USAID on August 17 and 18, the team met with the central management team (Drs. Polanco and Figueroa, Ms. Bottaro and Mr. Nicasio). Work done by the team between May and August was reviewed. A major section left incomplete in the text on proposed policies for vector control was drafted and modifications were made in Annex 2, "Technical Activities in Vector Control," which summarizes the consultancy activities carried out by VBC. Dr. Polanco and the author drafted these sections. The sections were limited to broad recommendations and the major activities required in 1993 - 94 to conform to the length and detail of the other sections of the document. The overall document was reviewed on August 20, duplicated and collated on August 21.

The format of the Position Paper did not permit listing all the recommendations made during the VBC technical consultancies (voluntary collaborators, identification and behavior of vectors, and operations and management of the spray operations). The recommendations of Dr. Tonn (spray operations) and Dr. Harbach (identification and behavior of vectors) are appended to this report as Annex 6. Annex 2 of the Position Paper is included in this report as Annex 4.

The Position Paper does not deal in any detail with activities regarding control of dengue, the other principal concern of Vector Control authorities in Belize. There was no specific consultancy on dengue, and the major interest of the Belizian authorities remains with malaria control. Information relating to dengue control was presented in the consultancies dealing with vector identification and behavior and spray operations, but the central management team did not feel that this information warranted separate sections in the final draft of the Position Paper.

## **2. Presentation of the Position Paper (Belmopan, August 24, 1993)**

This presentation was organized by the central management team and the District Environmental Health subcommittees (Belize, Corozal, Orange Walk, Toledo, Stann Creek and Cayo) with most reports being given by District officials of MOH and/or MNR (Annex 2). Senior officials included the Permanent Secretaries of MOH and MNR; Dr. Vanzey, Director of Health Services (MOH), and Mr. Winston Michael, CEO of WASA (MNR); representatives of USAID and UNICEF, and 24 participants from central and district offices of the two ministries who participated in the workshops and technical training. Vector control was represented by Dr. Polanco and Mr. Westby.

The presentations were well done and the overheads and charts informative. The group had met on Monday, August 23 to rehearse and critique the presentations, a foresight that materially improved the presentations during the formal session. The malaria section was presented under the item Action Plan 1993 - 1994. Although the main emphasis of the overall presentation was the accomplishments in developing coordination of MOH and MNH staff in the environmental health area, malaria control received equal time to the other technical areas (drinking water technology and water quality monitoring - Annexes 1 and 3 of the Position Paper).

The Plenary session was designed to receive the opinions of the senior ministry officials to the plan developed during the past year. There were several reactions, but most comments were guarded because both ministries are in the process of reorganization following the recent elections. Many of the staff, including Dr. Vanzey and Dr. Polanco, are not certain whether they will be transferred to new positions. Budgets for the next fiscal year (starting in February 1994) are still under consideration. Mr. Fred Smith, who has been Permanent Secretary for Health, retires this week and the new Permanent Secretary (Mr. Tillett) was unable to attend the presentation.

The comments of the senior officials included concern about the possible duplication of elements of the new program with existing activities (e.g. in PHC, information systems and committees at the district level). These were the main concerns of Dr. Vanzey of the

MOH. Mr. Smith did not appear to agree with the analysis of problems in the malaria control effort. Mr. Michael of WASA was very impressed with the presentation and offered full support. This was of particular importance as WASA is currently the recipient of UNICEF funding in the training area.

It was agreed that the central management team would prepare a response to the comments of the senior officials to address their concerns and suggestions. To facilitate this effort, sample responses were drafted by the author and given to the central management team the following day (Annex 3). It was not clear at the end of the meeting how the project would be finally evaluated. It is most likely that the Position Paper, budget for 1994 and the central management team's notes on this meeting would be reviewed by the Senior Intersectoral Executive Committee and submitted to the Ministers for Cabinet approval. Interim funding (October 1993 - February 1994) will most likely be provided by UNICEF from existing funds allocated to WASA.

### **3. Meetings with Senior Officials**

- a) A meeting with Mr. Ruben Campos, the new Minister of Health, was held on August 23. Mr. McDuffie, USAID, and the author described the current malaria situation in the country which has the highest rate in the Central Americas. They also described the historical dependence on a strategy 25-30 years old, and the deterioration of equipment, supplies, and manpower training in the Vector Control Service. The Minister acknowledged the problem and said that he hopes to improve on the performance of the previous administration. The Minister agreed that fundamental policy changes were required, not cosmetic ones. He also agreed that the private sector (especially the agricultural sector) should be involved, the Voluntary Collaborator system strengthened, and stratification employed in the spray operations.

Mr. Campos appeared seriously interested in the malaria problem and its potential impact on tourism and development in general. He promised to look into the issue and, on the recommendation of his advisors, to initiate changes as he proceeds to reorganize the Ministry of Health.

- b) Mr. McDuffie arranged a meeting on August 26 for himself, Mr. Robert Dakan, USAID, and the author with Mr. Rene Nuñez, Executive Assistant to the Deputy Prime Minister.

This was a non-technical meeting. Mr. Nuñez was informed of the seriousness of the malaria problem, including the general economic cost and waste incurred in a marginally successful program. The potential economic impact on tourism and other development issues was raised. As did Minister of Health Campos, Mr. Nuñez promised to review the documentation and discuss the malaria issue with the Deputy Prime Minister. It was felt that this was a useful meeting as any substantial changes in malaria policy would probably require cabinet authorization. Mr. Nuñez also said that he would discuss the malaria problem with the Minister of Health. Because the malaria control staff have received considerable technical assistance over the years, they should, if given the chance, develop an alternate plan to present to the Minister and Cabinet for consideration.

#### **4. Meeting with UNICEF**

At the presentation of the Position Paper, Ms. Dorothy Rozga, UNICEF representative in Belize, expressed interest in the program as it relates to UNICEF priorities. A meeting was arranged at UNICEF for the following day (August 25). Present were Ms. Rozga and staff, Ms. Bottaro (MOH), Mr. Nicasio (MNH), Ms. Cadle (USAID) and Drs. Yacoob and Arata. The WASH and VBC consultants arrived early to brief Ms. Rozga on the history of USAID's involvement in the program.

UNICEF authorized US\$200,000 in 1992 for training and capacity building in environmental health through the Ministry of Natural Resources. They intended this money to be used in a broad fashion, but this has not occurred. Consequently, only US\$50,000 has been released

through CARE. Ms. Rozga felt that the last year's USAID-sponsored training of trainers program training at district and village levels (and malaria Voluntary Collaborators), collection of qualitative behavioral data on health habits, and the technical manuals were well planned and successfully conducted. They match UNICEF's objectives. She stated that she a) would be willing to provide UNICEF funding for the interim (October 1993 - February 1994) budget proposed in the Position Paper (Bz \$4126); and b) looked forward to receiving a proposal and work plan from both ministries, starting in 1994 to use the remaining US\$150,000. She also indicated that if the program continues to move forward, other funds might be provided by UNICEF's donors as training in environmental health is a high priority. Ms. Rozga inquired about the number of documents available (especially the training manuals) that resulted from the USAID-funded work in 1993-93. She felt that several (e.g. monitoring water quality) should be available in large numbers (several thousand), not hundreds. Following detailed review of the documents, UNICEF may provide funds to make the desired number of copies.

Ms. Bottaro and Mr. Nicasio plan to have a preliminary draft of the required plan completed for Dr. Yacoob's review prior to her departure from Belize on September 4.

### **3. Outcomes**

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#### **1. Overall Environmental Health Program**

Pending production of the necessary documentation and work plans, the Environmental Health initiative developed by USAID/Belize in 1992-93 should continue under UNICEF auspices. This additional funding should reduce any budgetary qualms on the part of the government, and strengthen the new administration's intention to decentralize all ministries and increase community participation in health. It also will reinforce the multisectoral approach to health which the administration states "is everyone's responsibility."

This will be a big boost to the primary health care system in Belize and the allied Health Education section the Ministry of Health. The Ministry of Natural Resources already has a rather good training program, so the combination of the two should benefit Belize considerably.

#### **2. Malaria (Vector Control Service)**

In meetings with the Minister of Health and reinforced by the technical reports of VBC consultants, it was pointed out that no single change (e.g. selection of a new insecticide) was going to improve the performance of the malaria control program or reduce the intensity of transmission. A new national policy and the resources to implement the actions required for meeting the stated objectives are required. This should include strengthening the Voluntary Collaborator System for prompt diagnosis and treatment throughout the country (vivax malaria is seen in approximately 98% of the cases reported), and improving surveillance and information management so that spraying of insecticides can be targeted at high risk areas in the country rather than attempting total coverage. Equipment must be upgraded, and continuous retraining of personnel in the malaria service is required.

It is unlikely that UNICEF funds will be made available for spraying operations or case management. Improving the Voluntary Collaborator system, however, and upgrading the information system may be included if the malaria staff makes the proper justification. This means that a stratified system for spraying is environmentally sound, and that community participation in case reporting can be conducted by Voluntary Collaborators in conjunction with the PHC system.

Because the government did not purchase insecticides in time, the first spray round was missed in early 1993. More than 3,000 cases of malaria have been reported in the first six months of 1993, higher than the rate in 1992. The technical assistance provided in 1993 has outlined the appropriate steps to be taken. Unless government action is taken at high levels, Belize will probably continue to have the highest malaria transmission rates (per capita) in the Americas.

Unfortunately, PAHO was not invited to attend the presentation of the Position Paper in Belmopan. The Vector Control Service had already sent a written request for technical assistance and supplies to the PAHO Representative in Belize. They should follow up on this, both in the broad areas of insecticide selection and safe use, and malaria coordination with the primary health care system as recommended in this report and specifically in that of Dr. Tonn's (VBC, July 1993).

## Annex 1

### Persons Contacted

#### USAID

Mr. Robert Dakan, Deputy Director  
Mr. Patrick McDuffie, GDO  
Ms. Amelia Cadle, Project Manager  
Mr. Zakir Merchant

#### MOH

Mr. Ruben Compos, Minister of Health  
Mr. Fred Smith, Permanent Secretary for Health  
Dr. Earl Vanzey, Director, Health Services  
Dr. Jorge Polanco, Director, Vector Control Service (VCS)  
Mr. Frank Westby, Chief Operations Officer, VCS  
Dr. Ramon Figueroa, Director, Primary Health Care  
Ms. Kathy Bottaro, Director HECOPAB (Health Education)

#### MNR

Mr. Winston Michael, CEO, WASA  
Mr. Anthony Nicasio, Chief, Health Education and Community Participation

#### GOB

Mr. Rene Nuñez, Executive Assistant to Deputy Prime Minister

#### UNICEF

Ms. Dorothy Rozga, Representative to Belize  
Ms. Lorraine Thompson

Pride/Belize

Dr. Dennis Hoy, Director

Approximately 24 participants (District Level) from MOH and MNH attended the meeting in Belmopan to present the Position Paper to senior ministry officials.

## Annex 2

### Position Paper Presentation

Community Based Environmental Health Project  
Ministry of Health/Ministry of Natural Resources  
August 24, 1993  
Belmopan

#### Agenda

8:30 am	Registration - Hecopab
8:50 am	Welcome - Mrs. Cathy Bottaro
9:00 am	Purpose/Introduction - Stann Creek - Ms. Regina Neal
9:15 am	Mission Statement/Rationale - Cayo/Belize - Mrs. Lourdes Hales
9:35 am	Accomplishments/Concern - Toledo - Mr. Kent Arzu
10:05 am	Action Plan 1993 - 1994 - Orange Walk/Corozal Team
10:35 am	Budget - Management Team - Dr. Figueroa
<b>10:55 am</b>	<b>BREAK</b>
11:10 am	Plenary
<b>12:00 noon</b>	<b>LUNCH</b>

## Annex 3

Some critical points raised at the Position Paper Presentation that should be addressed by the central management team.

Dr. Vanzey Is this a separate structure? How does this differ from PHC? Aren't there committees already in place that this duplicates?

Response. The proposed plan of action is not a separate structure; rather it is a mechanism to provide training and capacity building skills efficiently and economically to persons in both ministries (and possibly others) whose actions influence the health status of the population. Similarly, this mechanism (through village and district committees) enhances the PHC system. Within the MOH, PHC is the unit that will benefit most by development of the Environmental Health Program.

Dr. Vanzey There is no need for a separate information system. It should be part of the existing health information system.

Response. Any additional information collected will augment not duplicate information in existing health system. Current indicators are largely of quantitative outputs (numbers of pumps, numbers of latrines, numbers of houses sprayed, etc.). The proposed data collection will largely be qualitative, to monitor behavioral change in response to health education, and to guide future work.

If, as Dr. Vanzey says, WHO/PAHO is to sponsor a new pilot MIS in Toledo district, this would be an ideal test to evaluate the utility of data to be collected in the proposed project.

Dr. Vanzey

The new administration plans to reorganize MOH, and one central issue will be decentralization.

Response. The main objective of this project is to set up mechanisms to strengthen district and village actions and decision making capacity. Therefore, it will strengthen any efforts towards decentralization.

Mr. Smith

Malaria is increasing in all of Latin America. Central American immigrants are largely responsible for the increase in Belize.

Response. Regardless of the reasons for the increase, every consultant who has visited Belize in recent years has reported on the poor status (training, equipment, strategy) of the malaria program. The malaria component of this project (Voluntary Collaborators and link to the PHC) is only one part of what is needed to improve malaria control. The other elements, especially improved vector control, will have to be handled separately by the MOH.

Mr. Michael

Four points. a) Training (and capacity building) is fundamental because health is everyone's business. b) A good model has been presented. c) There should be a pilot District. d) The project has my full support.

Response. Agreed - The project needs a strong supporter at senior level and Mr. Michael seems the likely candidate. Is there anything lacking in the present Position Paper that would be needed to gain his further support?

How can the central management team convince him to be their active supporter?

## Annex 4

### Technical Activities Specific To Vector Control

During the planning for technical assistance in vector control in the 1992-93 project amendment period, emphasis was placed on malaria. Because of the need to review and strengthen the whole program, major critical areas were identified: the voluntary collaborator system, identification and behavior of vectors; and the organization and management of spray operations, including consideration of a replacement insecticide for DDT which has recently been banned in Belize.

#### 1. Development of Norms for Voluntary Collaborator (VC)

##### a) Observations:

- The current status of the Belize VC program was reviewed.
- A study tour by senior Belize malaria officials to El Salvador was arranged to review the successful program in that country.
- Better training of the VCs was indicated, along with improved performance of the malaria evaluators.

##### b) Recommendations:

- The VC system should be "revitalized."
- VCs should coordinate activities at village level with the village health committees (VHC).
- Case reporting should be reviewed on a weekly basis at central and district levels and passed to the VHC and VC as soon as possible.
- The role of and resources for malaria evaluators should be strengthened.

- Training programs for VCs should be developed.

Manuals for the VCs and evaluators were developed, including the norms for selection and the responsibilities of VCs and to guide malaria evaluators in supervising the VCs.

## 2. Vector Identification and Behavior

### a) Observations:

- Vector control personnel were deficient in the ability to identify species of malaria vectors.
- *An. albimanus* is not the only vector species in Belize.
- Geographic variation in topography and vegetation will influence possible control measures in different areas.
- Vector Control staff need better knowledge of the biology of vectors in order to educate the public and properly target vector control operations.

### b) Recommendations:

- The vector control program should develop closer relationship with the USUHS laboratory in Belize for continued training in biology and identification of vectors.
- All staff, especially new personnel, should receive continued training in these subjects.
- Work should be coordinated with USUHS and PAHO to study possibilities for focal insecticide usage, and larval control (i.e. reduction of breeding sites) required in some areas of the country.

- Better understanding of vector behavior will improve the efficiency of insecticide use.

Vector control staff were given guidelines for collecting vectors and keys for their identification.

### 3. Organization and Management of Spray Operations

#### a) Observations:

- Current policies for spraying are inadequate, based on lack of knowledge of which insecticide will be used in the future, historical problems of management and supervision, and the seeming lack of commitment on the part of senior MOH officials.
- The staff suffers from rapid turnover, and training is inadequate.
- Equipment is poorly maintained with no spare parts.
- Should a more toxic insecticide be selected to replace DDT, adequate storage facilities will be required.
- Community compliance with spaying is poor, contributing to inadequate coverage.
- Transport is insufficient to move personnel and equipment.

#### b) Recommendations:

- A new insecticide will have to be selected to replace DDT, based on efficacy, price and safety. Trials on efficacy and monitoring the possible development of resistance should be conducted with the assistance of PAHO.

- Depending on the insecticide selected, protective equipment and safety training should be provided annually for all spraymen.
- Current resources (manpower and financial) will not permit complete spraying coverage of all areas of the country. Therefore, a new national policy based on a stratification system and identification of high risk areas should be developed and put into practice.

A new manual for spraying operations was produced for the vector control service. Like other manuals, however, this document will only be of value when the new insecticides and equipment are available.

## **Conclusion**

Major aspects of the malaria control program have received technical assistance during the period of this project extension. General recommendations for improvement are presented in this document and in more detail in the specialized reports of the consultants. There are numerous deficiencies that can be ascribed to a continued adherence to a dated strategy developed for malaria eradication, lack of support at senior levels in the MOH, and a gradual deterioration of equipment and manpower skills. Given the current status of the program and the present rate of malaria transmission, it is unlikely that any single change (e.g. a new insecticide) is likely to bring about a major improvement. The critical need is for a national review, culminating in a new policy and strategy for malaria control. The strategy should include improvements in the voluntary collaborator system, closer ties to primary health care for prompt diagnosis and treatment, and improved data reporting and analysis.

Insecticide application should be prioritized for high risk areas and to contain local outbreaks. More attention should be paid to changing human ecology including housing, water use and population movements. There is a great need for education to gain greater community support for malaria control efforts.

## Annex 5

### Technical Activities Specific to Vector Control

#### Recommendations:

- 1) The Ministry of Health and Ministry of National Resources should take a holistic view of vector control activities.
- 2) The Malaria and Dengue Voluntary Collaborator Systems should be integrated.
- 3) The new information system must be compatible with the existing malaria system at both district and central levels. The computer at Central Headquarters should be reprogrammed to permit analyses and print outs of weekly slide production at each voluntary collaborator post.
- 4) The process from data collection through analysis to decision making should be accelerated. Key players need to be identified at each level.
- 5) How and with whom the malaria data will be shared needs to be determined.
- 6) Entomological data should be collected to identify specific vector species, including the geographical distribution of the highly efficient vector *Anopheles darlingi*. Regular vector monitoring should be institutionalized.
- 7) The implications for different vector control methods (source reduction, insecticide spraying, housing improvements, bed nets) should be determined.
- 8) With assistance from PAHO, a new insecticide to replace DDT should be identified.

- 9) WHO's international malaria treatment schedule for vector control should be followed.
- 10) Malaria control services and general health services should work more closely together in reporting and treating malaria.
- 11) Field supervision should be strengthened.
- 12) Funding should be allocated for repairing and maintaining spraying equipment and vehicles.
- 13) Spraymen should receive training in vector biology, ecology and control.
- 14) Once a new insecticide is identified, spraymen should receive protective equipment and be trained in safety aspects of the insecticide.

## Annex 6

### Recommendations of Ralph E. Harbach

The dissection microscopes currently used by the Vector Control Program are inadequate for observing certain details needed to make precise mosquito identifications. The available compound microscope is adequate for identifying specimens mounted on microscope slides.

The MOH lacks the required space, equipment, and personnel to conduct meaningful entomological work in malaria control.

#### Recommendations:

Conduct preliminary surveys in each district (were appropriate) to: (1) determine the anopheline species which attack humans, (2) determine or confirm the vector species, (3) assess the behavior and habits of the vector species, and (4) locate and characterize the larval habitats of the vector species.

Recommend that a team of two or three consultants work with national staff for approximately one week in each district to simultaneously train and collect basic entomological data on which to base a rational malaria vector control program. This work would include the parasitological incrimination of vector species. Indications are that one or two species other than *Anopheles albimanus* may be involved in transmission in the southern districts (Cayo, Stann Creek, Toledo).

Implement vector control strategies based on entomological observations of the vector species.

Routinely monitor vector populations to evaluate the effectiveness of control practices.

Develop an entomological laboratory. This will require space, equipment, and supplies. The laboratory should include a good quality dissection microscope with good lighting and an ocular micrometer, a mosquito reference collection, and a collection of appropriate scientific

literature and mosquito identification guides and keys. Assistance and training will be needed in the development and maintenance of a mosquito reference collection.

A period of several weeks of intense training is usually required for students to become adequately skilled in mosquito identification. This consultancy provided only an introduction to mosquito morphology and identification. The participants learned to identify the common genera and species of mosquitoes in Belize using available adult and larval keys, but considerably more training and experience is needed before this consultant will have confidence in their ability to accurately identify species independently (without professional assistance).

**Result:**

The MOH plans to use the training received by the participants to obtain baseline entomological data (less parasitological incrimination of vector species) in a selected village with high malaria incidence in Cayo District. This is viewed as a pilot project to be conducted in other areas at later dates. Success will depend upon resources.

## Recommendations of Dr. Robert Tonn

1. To insure that any new manual does not suffer the same fate as the 1983 manual, USAID/Belize should explore ways in which adequate copies can be made available. A small pocket size manual would be best.
2. Depending on the pesticide selected, additional and improved protective equipment (hats, uniforms, gloves, visors, respirators) should be made available to the spraymen. The spraymen should have new sprayers, and the vehicles should be equipped with holders to carry them. An improved means of storing sprayers at the district offices should be found. If the alternative pesticide is a moderately to highly toxic organophosphorus compound, cholinesterase monitoring of handlers is recommended for spraymen, squad leaders, and drivers doing ULV spraying (some vehicles lack windows making contamination possible). For some organophosphorus and carbamate pesticides, it might be necessary to reduce the contact time (actual spraying time) per day to about 5 hours. Some pyrethroids will require the use of disposable face masks.
3. The manual should be revised and additional training provided to all staff handling the new pesticide. PAHO should be consulted on the protective clothing and specific equipment needs required for the pesticide selected. When ordering pesticides, the chemical and its formulation should conform to WHO specifications for the method of application. (Note: The label of the DDT received as a gift from Mexico does not have all the information usually required for a pesticide label.)
4. Before spraymen begin a new spraying year, a few days should be devoted to refresher training, especially on safe handling of the pesticide being used and proper spraying technique. In addition to this training, newly recruited spraymen should be assigned to work with senior spraymen until the squad leader is satisfied with their work.

5. Storage and transport facilities required for a more toxic pesticide should be reviewed. Purchasing pesticide packaged as pesticide per pump charge should be considered. If this is not done, consideration must be given to construction of adequate storage and repacking facilities in one centralized location. Although scientific documentation is not available to recommend selection of a new pesticide, a pyrethroid should probably be considered for safety reasons.
6. At least one poison center within Belize should be created, and poison treatment training provided to at least one physician at every hospital. Safety regulations for the use of public health pesticides with the Pesticide Control Board should be coordinated. If possible, program staff should participate with other ministries in developing regulations for the safe handling and use of pesticides and a contingency plan to handle pesticide emergencies. The CDC of the USPHS and PAHO have literature on emergency treatment of pesticides. Copies of this material should be available at all district hospitals and the major health clinics. One physician could be trained at a center such as the one at the University of Miami. He or she could train others locally.
7. Considering the present condition of vehicles and spraying equipment as well as the possible need for additional protective clothing should another pesticide be used, USAID/Belize and the Ministry of Health should do a serious evaluation of the Vector Control Program. A priority point is that little is being done properly because of the poor condition of equipment. An alternative pesticide will probably increase the cost of the program because of the increased cost of the product, treatment cycles, and the need for protective equipment and clothing. Part of the cost might be recovered through stratification of vector control and better utilization of all VCP staff. Some type of vector control activities may be necessary because of tourism, the refugee situation, and public demand. However, all aspects of the program, including management and government commitment, should be examined.

COMMENTS: I have been asked to comment on the present status and future of vector control in Belize. From an epidemiological standpoint there has not been much change in malaria for years. This is in spite of a large migration of refugees and others into the country and the settlement of many isolated areas. On the other hand, considering the cost of the program, this is a poor showing.

Presently the program has deteriorated to a point that it is not functioning effectively or efficiently. Vehicles and application equipment are practically unusable and must be replaced. DDT has been banned and the program is running on a small donation from Mexico and waiting for a six month supply to arrive. The chance that another purchase will be possible is debatable. Consequently the first cycle for 1993 has been missed. Spraymen and squad leaders estimate that even when spraying was on schedule about 25 per cent of the houses went unsprayed because of refusals or they were missed.

All levels of staff morale is poor. The field staff complain about lack of equipment and supplies as well as lack of communication and interest on the part of senior staff. In turn senior staff note discipline and other problems from field staff and lack of real commitment on the part of higher governmental officials.

The program is poorly organized and managed. There is considerable waste. Apparently senior officers lack management skills or have not been given the authority to act effectively.

There is a belief in the program that a number of golden opportunities have been missed to gain further cooperation from the Government of Mexico and the Uniformed Services epidemiological group. They cite lack of interest in the government to request assistance from these sources.

Eventually DDT will have to be replaced, but little consideration has been given to the selection of a new pesticide. There are a number of technical steps, including limited field trials, which should be taken. Furthermore, an in depth examination of the total cost and implications of changing the pesticide is lacking. In all probability, donor support will be required. This frequently limits the selection of pesticides and may saddle the program with a pesticide too toxic to safely handle under the conditions in the country.

It is evident that the program should not continue in its present state. There are options that the MOH can study to redirect the program. The Aedes and Malaria Sections should be combined and staff retrained to be able to work in either field. The quality of recruits must be upgraded and training of these recruits improved. At present there is not a single junior supervisory staff that have the education or training to step into a senior position. Career opportunities are nil.

At the same time that the program is deteriorating, the community health worker and voluntary collaborator systems are improving. More rural health centers are being established and there are greater opportunities to transfer some of malaria control to effective treatment of human cases.

It is suggested that the MOH review the program and make it more compatible to the financial situation and the needs of the country. Perhaps an economist familiar with malaria control and a technical consultant from USAID could assist a MOH task force review the program and develop a plan of action.

## Annex 7

### Ministry of Health Vector Control Budget for FY 1992

#### 02: TRAVEL AND SUBSISTENCE ALLOWANCE

##### 02-1 Transport Allowance

Motorcycle Allowance - 12 Evaluators x \$75.00/mth x 12 =	10,800.00
Motorcycle Allowance - 6 Supernumery x \$75.00/mth x 12 =	5,400.00
Motorcycle Allowance - 5 Aedes Inspectors x 75.00/mth x 12 =	4,500.00
Bicycle Allowance - 1 Messenger x 25.00/mth x 12 =	<u>300.00</u>
	\$21,000.00

##### 02-2 Mileage Allowance

12 Evaluators @ 800 mls/mth x 50¢ per mile x 12 =	57,600.00
6 Supernumery @ 800 mls/mth x 50¢ per mile x 12 =	28,800.00
5 Aedes Inspectors @ 800/mth x 50¢ per mile x 12 =	<u>24,000.00</u>
	\$110,400.00

##### 02-3 Subsistence Allowance

1 Chief of Operations @ \$25.00/day x 10 days/mth x 12 =	3,000.00
1 Administrator @ \$25.00/day x 10 days/mth x 12 =	3,000.00
1 Microscopist Gr.1 @ \$19.00/day x 1 day/mth x 12 =	228.00
3 District Supervisors @ \$25.00/day x 15 days/mth x 12 =	13,500.00
27 Spraymen @ \$19.00/day x 20 days/mth x 12 =	123,120.00
3 Squad Leaders @ \$19.00/day x 20 days/mth x 12 =	13,680.00
3 U.L.V. Drivers @ \$19.00/day x 20 days/mth x 12 =	13,680.00
8 Aedes Inspectors @ \$19.00/day x 20 days/mth x 12 =	36,480.00
12 Evaluators @ \$25.00/day x 20 days/mth x 12 =	73,000.00
3 Sprayteam Drivers @ \$19.00/day x 20 days/mth x 12 =	13,680.00
1 Director @ \$25.00/day x 6 days/mth x 12 =	<u>1,800.00</u>
	295,168.00

##### 02-4 Other Travel Expenses

1 Director @ \$25.00/night x 6 nights/mth x 12 =	1,800.00
1 Chief of Operations @ \$25.00/night x 10 night/mth x 12 =	3,000.00
1 Administrator @ \$25.00/night x 10 night/mth x 12 =	3,000.00
3 District Supervisors @ \$25.00/night x 8 nights/mth x 12 =	7,200.00
6 Evaluators @ \$25.00/night x 10 nights/mth x 12 =	18,000.00
3 U.L.V. Drivers @ \$25.00/night x 15 nights/mth x 12 =	<u>13,500.00</u>
	46,500.00

03: MATERIALS AND SUPPLIES

03-1 Office Supplies

Office Stationeries (eg. Typing Paper, Liquid Paper,  
Pens, Pencils, Staples etc.) = 4,000.00  
House Cards - 24,000 @ \$5.00/100 = 1,200.00  
Notification Books - 2,000 @ \$5.00 each = 10,000.00  
Field Operation Forms - 15,000 @ \$50.00/1000 = 750.00  
15,960.00

03-2 Medical Supplies

500 rolls Cotton @ \$9.50 ea. for V.Cs & Evaluators = 4,750.00  
54 Gals. Alcohol @ \$42.00/gal. for V.Cs & Evaluators = 2,268.00  
300,000 Chloroquine - 250 mg. tabs. @ \$40.00 - Treatment = 12,000.00  
700,000 Primaquine - 15 mg. & 5 mg. @ \$35.00 - Treatment = 24,500.00  
24 Bots. Giemsa Stain @ \$48.00 ea. - Slide Examination = 1,152.00  
5 Gals. Methyl Alcohol @ \$100.00/gal.-Slide Examination = 500.00  
48,170.00

03-4 Uniforms

24 Laboratory Coats @ \$70.00 ea. for 8 Lab Technicians = 1,680.00  
300 Shirts @ \$25.00 ea. for Evaluators & Aedes Insp. = 7,500.00  
300 pairs Trousers @ \$35.00 ea. for Evaluators & Aedes = 10,500.00  
105 pairs Shoes @ \$40.00 ea. for Spraymen & Evaluators = 4,200.00  
75 Knapsacks @ \$40.00 ea. for Spraymen & Evaluators = 3,000.00  
120 pairs Coveralls @ \$60.00 ea. for Spraymen = 7,200.00  
30 pairs Shoes @ \$40.00 ea. for Aedes Inspectors = 1,200.00  
35,280.00

03-5 Household Sundries

Soap, Toilet Papers, Disinfectant, Clorox, Paper Towels  
Soap Powder etc. = 5,500.00  
5,500.00

03-7 Spraying Supplies

Kerosene for DDT - 100% - 25 lbs. x 54 Gals.:-  
480 Drums x \$145.00/Drum. = 69,600.00  
Malathion @ 2 Drums/mth x 3 x \$1,800./Drum = 129,600.00  
Abate @ \$150.00/barrel x 25 Barrel = 3,750.00  
12 Gals. Oil Paint @ \$48.00/gal. = 576.00  
35,000 kgs of 75% DDT @ 31773000  
17,000 kgs of 100% DDT @ 114,240.00  
635,496.00

04: OTHER OPERATING AND MAINTENANCE SERVICES

04-3	<u>Repairs to Furniture and Equipment</u>	=	<u>5,500.00</u>
			5,500.00
04-4	<u>Repairs to Vehicles</u>		
14	Vehicles attached to Vector Control -		
4	Tyres per Vehicle/year @ \$185.00 each	=	10,360.00
7	Batteries - 11 Plate x \$140.00 each	=	980.00
	Other Repairs & Maintenance @ \$3,000.00 each	=	<u>42,000.00</u>
			53,340.00
04-5	<u>Fuel</u>		
200	Gals. Super Gas/mth per Vehicle x 14 vehicles		
	x 12 mths/year = 33,600 gals/year x \$2.90 gal.	=	<u>97,440.00</u>
			97,440.00
04-9	<u>Miscellaneous</u>	=	<u>5,000.00</u>
			5,000.00

07: PUBLIC UTILITIES

07-1	Electricity		
07-2	Gas		
07-3	Telephones		
07-4	Water	=	<u>23,000.00</u>
			23,000.00

09: RENT

09-3	Building at Customs Warehouse		
	@ \$200.00/mth x 12 mths.	=	2,400.00

Total 1,397,000  
includes donque