

Proj. No. 9310563-②
PD-AAC-822-81

Jan. 9-9, 1972

PROJECT STATEMENT

Date November 20, 1972

A. PROJECT SUMMARY

Rac
KPA 13-563

1. Statistical

Project Title: Lower Cost Methods of Water and Waste Treatment in LDC's

New or Extension: New

Contractor and Address: University of Oklahoma, Norman, Oklahoma

Principal Investigator: George W. Reid, Director, Bureau of Water and Environmental Resources

Duration: January 1, 1973 through December 31, 1975

Total Estimated Cost: \$269,000

Funding by Fiscal Years:	Current Year	\$115,000
	FY 1974	\$ 0
	FY 1975	\$154,000

Project Manager: A. Dale Swisher, P.E.

Project Specialist: Albert P. Talboys, Dr. Eng.

2. Narrative

To devise, test, and evaluate simplified, lower-cost approaches to the design and construction of both water and waste treatment facilities for small as well as larger communities in developing countries is the purpose of this project. The goals are to reduce the cost of providing urgently needed safe water supplies for the rapidly increasing populations in LDC's, and to combat the spread of debilitating water-borne diseases such as cholera, schistosomiasis, and the dysenteries by the adoption of effective but cheaper methods of sewage disposal.

The use of sophisticated, conventional methods of treatment, developed in and for industrialized nations, is so costly that sufficient funds are simply not available to meet the burgeoning needs of the LDC's. In addition, the methods are often too intricate and automated, resulting in excessive operational and maintenance difficulties and in extreme cases abandonment of the facilities. Recognizing this, coordinated practical research studies are planned, involving selected sites in Asia, Africa, and Latin America, to determine what new, neglected, and untried techniques and systems can and should be developed for or adapted to the conditions existings in LDC's.

This work will involve close contact and development of working relationships with international health organizations (WHO and PAHO), regional economic commissions (OECD, ECAFE), international lending agencies (IDB, IBRD), and universities and centers here and abroad. Full advantage will be taken of work by previous and current investigators and recent literature searches, with emphasis in the first phase of this project on condensation and evaluation of data, information, and findings.

Several symposia conducted by PAHO over the past year and a half on new approaches to water plant design have served to stimulate widespread interest and to "break the ground" for more substantive follow-up. Systematizing of information on the wide variety of possible techniques of water and waste treatment is now needed, and the University of Oklahoma's Bureau of Water and Environmental Resources has considerable experience along this line to offer.

In the second and main phase of the project, the prime contractor will supervise and coordinate the development, testing, and evaluation of promising methods and approaches in the field under various conditions of climate, terrain, and state of development of an area over a two to two-and-a-half year period. These studies overseas, based on the first phase findings, will be planned and conducted in conjunction with WHO or PAHO and local agencies or institutes. Three centers of operation have been selected initially: (1) CEPIS, the PAHO Sanitary Engineering Center in Lima, Peru; (2) AIT, the Asian Institute of Technology in Bangkok which has been receiving AID support; and (3) the University of Nairobi, in Kenya, which is receiving WHO assistance and where the new UN Secretariat for the Environment is to be headquartered. Additional field test sites will be selected by the end of the first phase of the project. The practical studies will be supported by means of sub-contracting, with local counterpart in the way of physical facility, labor, and analytical assistance to be sought.

In the final phase, the results obtained and conclusions drawn with regard to both water and waste treatment will be summarized, put into report, book, and/or manual form by the prime contractor, made available and distributed to those who could benefit from the findings, and arrangements made in conjunction with the various international agencies for conducting regional seminars and training courses so that the widest possible application of the results will be realized.

A proposal outlining the general procedures to be followed has been submitted by the University of Oklahoma, and an addendum to the proposal indicates more specifically the techniques to be looked at, the types of equipment to be developed for carrying out tests, and particular sites that should be suitable for field studies.

B. EXPANDED NARRATIVE STATEMENT

1. Project Description and Background

The purpose of this project is to devise, test, and evaluate simplified, innovative, lower-cost approaches to (1) the design, construction, and operation of water treatment plants and (2) methods of safely handling and disposing of sewage applicable to the less developed areas of the world.

As a result of greatly increased population pressures and the universal trend toward urbanization in the LDC's, there is urgent need for expansion of existing water treatment facilities and for construction of additional plants. To meet this need by using traditional methods and approaches, almost exclusively developed in and for the advanced industrialized countries, would require vast sums of money in competition with many other pressing and perhaps more politically attractive development projects. Therefore, in order to make feasible the provision of sufficient water to fast growing communities, with their industrial and commercial as well as human demands, it is proposed to conduct a comprehensive investigation of simpler, more efficient techniques, particularly with regard to their suitability under conditions existing in LDC's and concentrating on maximum reduction of initial cost, maintenance, and operational difficulties.

Additionally, widespread contamination of watercourses and water supplies in the LDC's by pathogenic organisms, which produce such debilitating intestinal diseases as cholera, typhoid, dysenteries, and helminthic

infections, hampers seriously the overall development of a country or region. The usual source of these organisms, untreated human wastes, must be disposed of in a more sanitary manner to interrupt this disease cycle, but the use of complex, highly automated waste treatment plants is generally out of the question because of financing, operational, and maintenance problems. Innovative use of known techniques as well as devising new technology to arrive at the simplest, cheapest treatment methods possible and which actually take advantage of local conditions is the approach needed. This project aims at the determination of such methods.

In September 1972, at a Regional Conference of the Economic Commission for Asia and the Far East (ECAFE) in Manila, it was stated that "Little research has been carried out in developing countries of the region, and there is a great need to build up a store of information on which to base important decisions affecting the national budget. Exchange of operating information on conventional processes is necessary among countries of the region so that design criteria appropriate to the region can be developed. Controlling authorities must be prepared to accept unconventional systems and design criteria rather than insist on designs proved suitable in Western countries."

2. Significance to A.I.D. Objectives

Recognition and resolution of environmental health problems in the LDC's would facilitate progress toward the attainment of A.I.D. objectives.

With regard to agricultural development, health and food production are so closely interrelated as to be interdependent. Protein loss suffered by the millions of inhabitants of countries where intestinal parasitism is rampant adds up to a problem of global significance. Environmental health measures that reduce the incidence of endemic disease and prevent disease transmission would contribute to improved nutrition, higher productivity, and general well-being of the peoples involved.

In the area of family planning, the continuing high burden of disease and death in infants and children inhibits rapid acceptance of family planning services.

Health and education are also closely related. In 1971, the A.I.D. Task Force on Cholera reported among its conclusions that: "Cholera vibrios are transmitted from person to person principally by fecal contamination of drinking water and food; therefore, the major preventive effort must be directed toward improvement of water supplies and excreta disposal supported by health education which emphasizes personal hygiene." Impaired receptivity of individuals due to malnutrition and debilitating infections impose significant obstacles in improving education, qualitatively and quantitatively, and education has been a primary focus of A.I.D. programming for many years.

In industrial and urban development, unprecedented population growth and the technological revolution have brought about large scale migration from rural to urban areas in many LDC's. This rapid urbanization has almost overwhelmed water supply and already inadequate sewerage systems,

with consequent demands for additional funds to support expansion and improvement of sanitary services usually in excess of the supply of money available.

In A.I.D.'s Congressional Presentation for FY 73, it was stated that: "Without good health, the individual and society cannot get full benefit from more food and material goods, schools and other services, or new technology. Nor can they make development gains if energy is sapped by debilitating illness." It was further stated that disease control efforts would continue as well as programs to establish and operate safe water and sewerage systems, and that "The relationship of environmental pollution to health problems will also receive increasing attention--efforts will be made, in cooperation with various international organizations, to improve awareness of the extent of the problem and what can be done about it."

The work contemplated under this project would entail studies of methods applicable to both urban and rural communities, from sprawling cities down to small villages requiring the most minimal of systems. The absolutely rural situation with regard to water supply is currently being taken care of by the A.I.D. Hand Pump Project, contracted out to the Battelle Institute and with studies now underway overseas.

3. Relation to Existing Knowledge

A good deal of knowledge and experience has already been gained on the use of newer approaches to water and waste treatment, but it is

scattered and often unavailable to investigators, designers, and planners in LDC's, who are most in need of the information. For example, there are now several water plants in the United States that have been built using one or more of these newer methods, but little is known of their performance outside of the United States. Some research and pilot studies have been initiated in Peru, Brazil, and Thailand on certain innovative aspects of water treatment. In the waste treatment field, a number of countries such as India and Kenya have experimented with and operated very elementary-type sewage treatment facilities. However, testing under different climatic conditions, suitability of locally available materials, and combinations of newer methods to achieve maximum economy need to be studied systematically if true global application of promising developments is to be realized.

A.I.D. has a unique and timely opportunity to try to bring together these piecemeal efforts into a cohesive and coordinated approach to the serious water supply and water pollution problems now facing practically every developing area in the world. The desirability of such an effort has been repeatedly voiced by the World Health Organization (WHO), the World Bank, the Inter-American Development Bank (IDB), and others, but implementation of a specific project to attain the goals has been lacking. The savings in construction and expansion costs, maintenance, treatment chemicals which often have to be imported, and in overall health benefits likely to result would be infinitely greater than the modest cost of this project.

Some examples of pioneering efforts which could be further studied for application elsewhere are:

(1) In Brazil, at the Guandu water treatment plant serving Rio de Janeiro, a 20% reduction in chemical coagulant cost was realized by conducting experiments to determine the optimum point for introduction of the coagulant in the system. Additional studies are aimed at increasing output of the present plant by 100%, obviating the necessity of building a whole new plant, at much greater cost, to meet rising water demands.

(2) A study of the operation of the Taipei Water Works in Taiwan recently revealed that the filter rate controllers, expensive contrivances that rarely work in developing countries, were inoperative. Elimination of the controllers and substitution of a new variable declining rate system of control greatly reduced maintenance costs and improved the quality of the treated water at the same time.

(3) In Cucuta, Colombia, pilot plant and full-scale test work has indicated that a switch from single medium (sand) to dual media (sand and anthracite) filtration could more than double the output of the plant without structural changes in the physical plant. The cost involved would be about one-third of that required to duplicate and thus double the capacity of the present conventional design treatment plant.

(4) Operating sewage lagoons in Panama, Peru, Kenya and other places are giving promising results in the treatment of sewage at reasonable cost. Retention and the use of the final effluent in the arid countries for crop irrigation need study, however.

4. Relation to Other Research

Bringing together the results of past and current research and experience around the world, and filling in gaps in knowledge, are principal concerns of this project. Close cooperation and coordination would be sought with a number of active groups. Some of these are indicated below.

In the United States, work on elimination of filter rate controllers has been conducted by Iowa State University, studies on multiple media filtration by the Taft Sanitary Engineering Center in Cincinnati, determination of scientific bases for the design and operation of sewage lagoons by the University of California. A water plant in Las Vegas, Nevada has introduced into practice a new concept, contact flocculation, which under the right set of circumstances makes the construction of large, settling basins unnecessary.

The Pan American Health Organization (PAHO) through its new Engineering Center (CEPIS) in Lima, Peru, is now conducting pilot scale tests on dual media filtration at the Lima water plant, and has designed a three-valve, hydraulically regulated plant for use in smaller communities which should be evaluated. In Chile a simple wooden tower for dissolving and feeding lower grade, locally obtainable chemicals for water treatment has been devised, to get away from imported and often troublesome dry feeders. In Brazil, some limited tests have been made with a tube settler, a very efficient device, and in Ecuador plant-scale studies can now be made on a plate settler. Argentina has installed several dynamic filters in rural

areas, a Russian-originated design, which should be evaluated for possible application elsewhere.

At the Asian Institute of Technology (A.I.T.) in Bangkok, Thailand, which has been receiving A.I.D. support, research is underway on use of locally produced charcoal from coconut husks for water filtration. Also being studied is a relatively new waste treatment device, adapted for use in tropical countries because of its low capital cost and ease of operation, called a biological disc filter. More experimentation could be conducted in some Asian countries on the use of human excreta for fertilization of fish ponds for improved algal growth, through the use of primary lagoons for treatment purposes and secondary ponds for fish culture. Safe ways of utilizing effluents for waste lagoons for irrigation of crops, especially in arid and semi-arid areas or during dry seasons, should also be the subject of practical, on-the-spot investigations. India and Israel could be sources of useful information on these subjects, and further field testing could be carried out on the lagoons in Kenya.

Obtaining data and information from such diverse sources around the world, seeking out, encouraging and supporting study of promising developments and then evaluating and making known the results and conclusions would aid immeasurably in developing suitable design criteria for LDC situations. Wherever basic literature searches and state-of-the-art surveys have been carried out on some facets of the problems use should be made of them. For instance, the Organization for Economic Cooperation and Development, in Paris, has recently sponsored a survey of the international rural water supply situation. While this will concentrate on the truly

rural picture, it undoubtedly will get into small community works, and advantage will be taken of whatever material and information is brought together under this one-year survey. The PAHO Center in Lima, with the aid of the Taft Sanitary Engineering Center information gathering facilities in Cincinnati, has gotten together a remarkably complete and up-to-date collection of papers on water coagulation, sedimentation, and filtration, and steps will be taken to gain access to this assemblage in order to avoid any duplication of effort. In other words, effort in this project will not be expended on re-doing what others have spent considerable time doing, but will cull out unimportant detail and use the materials of most value as a base for the field studies to be conducted under this project.

5. Proposed Work Plan

(a) Scope of Work

To rigorously attack the problem of providing water supply and safe disposal of sewage at minimum cost the following steps are considered necessary:

1. A comprehensive search of the world's literature, not only published articles but unpublished reports, theses, and the like, has to be undertaken, and steps taken to critically select and later make available in compact, readable form the truly pertinent materials.

2. Newer techniques, such as dual media filtration, hydraulically regulated filtration rates, contact flocculation, tube and plate settling, effective viral disinfection, sewage stabilization, disc filtration, reuse of treated waste waters, etc., must be tested under ambient conditions in LDC's since existing climatic, water and waste characteristics are very difficult to simulate elsewhere.

3. Where test programs have already been conducted the results may well require further evaluation, verification and the effects of modifications determined.

4. Full scale plant performance wherever new approaches have been tried should receive careful scrutiny and new tests run under controlled conditions as necessary, so that data obtained are truly comparable.

Information collected as outlined above must be studied, screened, condensed, reported on, then distributed to and through international organizations (USAID Missions, WHO, PAHO), lending agencies (World Bank, IDB, Africa Bank), and regional institutions (CEPIS, A.I.T., ECAFE). Close coordination with these entities will be essential at all stages of the project; in collecting data, arranging for the conduct of experiments and tests, in dissemination of literature, and later in planning and conducting seminars to present findings and explain new methods and the benefits that can be derived therefrom.

This is admittedly a large order. Only the fact that considerable basic investigation already has been or is being carried out on a number of the most important facets of the work makes it possible to conceive of such a project being carried out in a three-year time span. If it turns out that gaps in knowledge are greater than anticipated, and unforeseen difficulties are met with in the field studies, time slippage will be inevitable. However, on the basis of first-hand experience with the kinds of tasks outlined here and the current state-of-the-art, it is confidently

expected that very worthwhile achievements can be realized in three years. Emphasis then, in this project, obviously has to be on obtaining a grasp of the total picture, putting the pieces together in a practical, usable way, and conducting field research as needed of a highly applied nature.

(b) Program of Work

The first six months of the project would be devoted to the literature work and to making contacts and initiating arrangements with the various agencies, missions, and institutions.

The next two years would be largely taken up with planning, conducting, and coordinating laboratory, pilot, and field testing and experimentation at different sites.

The last half year of the third calendar year should see the culmination of the fact-finding and data-gathering aspects of the project, ending with the compilation of information and preparation of reports. Toward the end of the project, agreements should be reached with the cooperating international and regional agencies to hold conferences, seminars, training sessions, etc., for promulgation of the ideas and arriving at procedures for implementing the new approaches.

In accordance with this program, the project is broken down into work phases below, and a diagram illustrates the planned scheduling:

Phase I: Literature search - at Contractor's base and at WHO/Geneva;
PAHO/Washington; Environmental Protection Agency (EPA),

Washington and Cincinnati; OECD, Paris; WHO International Reference Centers, at Zurich, Switzerland and Delft, Netherlands; CIPHERI, Nagpur, India.

Contacts and exploratory arrangements for studies - WHO/ Geneva; PAHO/Washington; World Bank and IDB, Washington; American Water Works Association, New York; A.I.T., Bangkok; selected USAID Missions and WHO Regional and Country Offices.

Selection of most promising areas of work, both as to subject matter and geographic locations; completion of arrangements, planning; devising and suggesting new methods, possibilities.

Phase II: Initiation or continuation of research, testing programs; sub-contracting for field studies; purchase of needed equipment, supplies; evaluation of progress, verification of results, determination of new avenues of approach needed and follow-up; accumulation of performance data, findings.

Phase III: Completion of field studies; compilation, condensation of data, information obtained; evaluation of results; preparation and editing of reports, manuals, annotated bibliographies; printing up and distribution of pertinent materials; arrangements with international, regional, and lending agencies for further dissemination of knowledge through seminars, training conferences, translation, etc.

Calendar Year

	1973			1974				1975		
Phase I	XXXXXX	XXXXXX	XXXX							
Phase II			XX							
Phase III								XXXXXXXXXXXXXXXXXXXX		

6. Research Methodology

Considering the broad scope and global nature of this project, it can undoubtedly best be carried out by a single A.I.D. Contractor, acting as the focal point for all information gathering; as coordinator or supervisor, as the case may be, of the multifarious research activities; and in summing up and evaluating the results. Considerable travel would be required to initiate and then follow-up on agreed-upon studies, decide on equipment needs, observe procedures followed in studies, and secure desired data and reports, AID/W would closely monitor the project, assisting the Contractor initially with contacts and protocol, with sub-contracting, and ultimately with distribution and arranging for utilization of the results.

For development of realistic design criteria for water and waste treatment facilities in LDC's, the experimental work should be carried out to the maximum extent possible in the developing countries themselves, subject to constraints of time, budget, and local availability of

competent and interested personnel. Individual studies and field investigations would be encouraged, supported, and guided to the extent necessary under sub-contractual arrangements by the primary Contractor. However, heretofore untried techniques and portable test and pilot plant kits could be developed and tested initially at the Contractor's own research facility. More specific research methodology is covered in the proposal submitted by the tentative Contractor.

Three principal areas of the world would be involved: Latin America, Asia, and Africa. Specifically, three centers of operation have been selected: (1) The PAHO Sanitary Engineering Center in Lima, Peru, known as CEPIS, where particularly able investigators in the water treatment field are located; (2) The Asian Institute of Technology in Bangkok, Thailand, where AID has been a dominant factor in the development of the school and its research program; and (3) the University of Nairobi in Kenya, where early work on the development of sewage stabilization ponds has taken place. Little difficulty is expected in obtaining the necessary interest, cooperation, and sharing of tasks and information at these places by working with and through WHO, PAHO, regional institutes, and the banks.

Other field sites will be selected following on-the-spot determinations of suitability as to human and physical resources and general applicability of results of studies to be conducted. Some possibilities are Cuenea, Ecuador; for plate settling evaluation; Taipei, Taiwan, for slow sand filtration; San Jose, Costa Rica, for simplified upflow water filtration; etc. Certainly some work will be conducted at a West African site, possibly in Nigeria.

7. Researcher Competence

The Contractor should have (1) broad international experience in the environmental engineering and science field, particularly with regard to activities in LDC's and in association with international agencies, and (2) demonstrated competence in applied research, technical publications, and contractual arrangements. Full advantage has to be taken of on-going research work abroad as well as library and bibliographic services of various institutions. The success of the project will depend upon the degree to which the Contractor is able to obtain and blend together inputs from a number of sources, sift out the usable and reliable, and systematize and summarize the data and important findings for use in the LDC's.

An eminently suitable Contractor would be the University of Oklahoma, specifically through its Bureau of Water and Environmental Resources Research, in Norman, Oklahoma. Qualifications of the University especially appropriate to this project include the following:

(1) The Director of the Research Bureau, George W. Reid, Regents Professor, would serve as the Principal Investigator and Project Director. Professor Reid is the author of numerous publications on water and waste treatment practice and research based on studies conducted for municipalities, government agencies, and industry, and has developed novel systems approaches to the solution of complex environmental problems.

(2) The University's School of Civil Engineering and Environmental Science is well staffed and equipped to assist in this type of work, and has been in the forefront of schools cooperating with AID and WHO over the

years in providing graduate training to foreign participants in environmental health, sanitation, and engineering.

(3) International environmental health projects of the School include training of Peace Corps volunteers in water supply and sanitation for service in Central and South America, development and presentation overseas of a number of seminars and training courses for PAHO on systems analysis and river basin development, and has just entered into a contractual relationship with the United States Army to operate for research purposes their sewage stabilization ponds in the Panama Canal Zone.

8. Contribution to Institution Building

Involvement in this project by agencies and personnel in LDC's should certainly encourage them to take a more positive attitude toward research and innovation instead of blind acceptance of often unsuitable methods transplanted from developed lands. It should build an awareness of their own capabilities and the need for greater exchange of ideas and information among themselves. Publications developed by this project should be of value in regional institutes, local WHO and AID missions, universities, and government offices in providing specific leads to the solutions of problems, as well as indicating sources of additional information. In some instances, much needed supplies and test instruments not otherwise available for conducting research and pilot-scale studies will have been acquired by local and regional institutes. By direct participation in data gathering, plant studies, and the like, local personnel will not only increase their own knowledge and understanding of problems, techniques, and solutions, but be better able to further convey

their experiences to superiors, to colleagues, and to students, and be better prepared to propose and defend needs of their countries in the water and sewerage field to international lending agencies and other sources of support.

9. Utilization Plans

Outputs from this project from the Contractor would include:

(1) Comprehensive, selective, annotated bibliographies, covering various aspects of the overall study and resulting from the literature search. These should be very valuable to those in LDC's lacking access to sophisticated information services.

(2) Research reports and summaries evaluating the newer methods and comparing them to conventional systems with regard to costs, operational requirements, efficiencies, and recommendations regarding application and design.

In order to ensure adequate diffusion of this information, assistance would be requested from USAID Missions, WHO, and PAHO offices in distribution. In addition, joint efforts with WHO, PAHQ, and the lending institutions would be sought in producing manuals explaining procedures to be used for assessing plant performance, explaining how expansion of water plants might be realized without excessive capital requests and expenditures, and on how waste treatment needs can be evaluated and met. Especially with regard to seminars, training courses and pilot demonstration projects, a great deal of dependence would have to be placed on the international agencies, banks, and regional institutions for sponsoring and funding such activities. Such cooperation can be antici-

pated, since acceptance and implementation of appropriate means to augment pure water supplies and reduce raw waste discharge is a goal being striven for by all of the above entities. For instance, the World Bank is now financially supporting an extensive program in pre-feasibility studies of water supply projects being conducted by WHO.

It should also be noted that some of the information obtained in a project of this kind could well be of value in our country as well as in LDC's.

10. Budget Analysis

To carry out the research program described in Section 5b, a total of \$269,000 will be required to cover a full three-year period of work. The sum is intended to cover salaries, fringe benefits, overhead, travel expense, equipment, supplies and publication costs of the Contractor. In addition, and most importantly, funds are included for sub-contracting of research and testing in the field at selected overseas sites. It is intended that as much as possible of the work be carried out overseas under local conditions. It should also be realized that the sum of \$269,000 is a bare minimum to carry out this broad scope project, and only if much of the actual research and testing is done in developing areas will it be possible to conduct the desired amount of work within the requested amount.

For most efficient operation of the project, time-wise, the bulk of the funds actually should be made available during FY 1974. However, because of overall budget constraints of the Agency, it has been indicated that less

than half of the total amount, or \$115,000, would be available to cover both FY 1973 and FY 1974. Therefore, based on the assumption that \$115,000 would be available starting in January 1973, and that the remainder of \$154,000 would become available around October 1974, the budget breakdown is as follows:

	<u>FY 73-74</u>	<u>FY 75</u>	<u>TOTAL</u>
Salaries			
Principal Investigator 20% time (\$2500/mo.)	10,000 (4 man-months)	7,500 (3 man-months)	17,500
Research Engineer *	32,000 (20 man-months)	24,000 (15 man-months)	56,000
100% time (\$1600/mo.)			
Secretarial, Clerical Editorial, Technician Drafting Assistance 25% time (\$1000/mo.)	5,000 (5 man-months)	6,000 (6 man-months)	11,000
Fringe Benefits @ 15% of salaries	7,000	5,600	12,600
Overhead @ 20% of salaries	9,400	7,100	16,500
Travel Expenses	16,000	12,000	28,000
Publication Costs	5,000	13,000	18,000
Sub-Contracted Research Activities (Asian, African, Latin American areas)	21,000	53,400	64,400
Equipment and Supplies (for overseas research and testing activities)	9,600	25,400	35,000
	<u>115,000</u>	<u>154,000</u>	<u>269,000</u>

The above figures are A.I.D. estimates only. Some adjustments among the various items will be necessary to suit specific requirements or

*This position could be divided up so that different capabilities could be brought to bear on different aspects of the investigations.

recommendations of the Contractor. Costs of seminars, training courses, demonstrations, etc., are not included in this budget, since this goes beyond the research scope of the project. Additional funds may have to be made available later for this type of follow-up activity; however, active support from cooperating agencies will be sought to help carry out this dissemination work as results of the research are brought together in final form. WHO and PAHO have long been in the forefront of this type of work and collaborative arrangements with these organizations and the international and regional banks and agencies would be the most effective and ideal way of reaching the governmental, university, and practicing consulting engineer groups who would best utilize the information obtained from this research project.

11. Internal and External Reviews

This proposal has been reviewed by several organizations and individuals outside of AID. The World Health Organization in Geneva, through its Chief of Community Water Supply and Sanitation, has indicated active interest and has suggested a joint planning session as soon as AID approval of the project is obtained. PAHO similarly looks forward to its implementation, and suggests disinfection, design periods, maintenance, and standardization aspects receive attention, points which certainly would be given through consideration. The Inter-American Development Bank has given its support to this proposal and states that the provision of funds for water and now sewer systems rates first priority in the Bank. Two consulting engineers with previous long-term experience with AID projects, Mr. James Caldwell and Mr. Leonard Board, agree with the value of this undertaking.

In the RIGC review within AID, in which unanimous approval was given to this proposal, it was stipulated that the \$100,000 budgeted for subcontracting of research studies overseas and purchase of equipment and supplies in support of these studies be expensed only with prior approval from RIGC. Thus, individual overseas projects as they are developed by the prime contractor would be written up and presented to RIGC. The AID monitors on this project would work closely with the contractor on this, and this should pose no serious problems in carrying out this project.

12. Ethical Considerations

None of the studies called for in this project involve experiments with human beings. No problems of an ethical nature are anticipated.

13. Environmental Impact

Environmental improvement is an inherent goal of this project. The determination of ways and means of providing safe water and adequate waste disposal at lower cost should aid significantly in improving environmental health and sanitation and in reducing current pollution levels. Funds that would have to be spent on unnecessarily complex treatment plants could then be used to build more of the needed plants of a simpler type, for improvement and extension of water distribution systems and sewer networks, or for other needed developmental projects.

14. Proposing Office General Evaluation

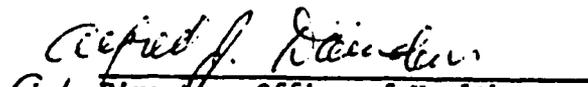
This project is regarded as highly important by the Office of Health as a positive, needed approach to the solution of environmental health

problems in the developing countries. No agency, organization, or country has yet comprehensively and systematically attacked the problem of weeding out costly, inappropriate methods and developing newer, better, and less expensive techniques for treating water and wastes. Any progress in cutting down on the ravages of intestinal disease in LDC's would be invaluable in assisting them in their overall development.

The project is particularly timely as a follow-up to the UN Conference on the Human Environment held in Stockholm in June 1972. The United States with its thorough and diligent pre-Conference planning and with the announcement of a substantial contribution to the UN Environment Fund has assumed world leadership in striving for improvement of the environment. This project would enable A.I.D. to play a lead role in this new global effort.



Monitor



Asst. Director, Office of Health

KPA 13-563
RAC Meeting
Dec. 3-4, 1973

- 21 -

Project Review

Health

Lower-Cost-Methods of Waste Treatment in LDC's -
University of Oklahoma

The project's subcommittee make-up was its chairman, Dr. D. Peterson. He reviewed the project's history and the RAC decision that recommended approval of the project but which requested the privilege to review the specific plans for Phase II of the project prior to its being implemented in the field. The current project report is that part of Phase II which pertains to activities to be conducted in Latin America. It is to be carried-out under a \$25,000 set of subcontracts under CEPIS (Peru) plus six other institutions. Dr. Peterson commented that the plan was well conceived. Currently, the African piece of this project is being designed and may be worked-out with the UNEP. The project appears to be well on track, however, the periods of funding leave a potential budgetary gap which may result in a spreading out of the project's activities. A.I.D. may wish to advance funding in order to accelerate activities toward project completion in 1975.

Mr. Swisher thanked Dr. D. Peterson for his constructive criticisms and, in general, very favorable comments. He stated that the approach taken by the Oklahoma group is one that may permit the simple transfer of this type of technology. He added that the UNEP was very interested in achieving a joint effort in this project.

Motion: That: (1) the report regarding Latin America be approved; (2) the contractor be permitted to develop plans for Phase II in Africa and Asia without the necessity of RAC review; and (3) a program report concerning this project be submitted to RAC one year hence.

(Moved by Dr. D. Peterson; seconded by Dr. M. Peterson)

Motion carried: unanimous

RESEARCH ADVISORY COMMITTEE MEETING
December 3-4, 1974
Attendance

RAC Members Present

Ralph R. Smuckler, Chairman
David A. Adams
C. Arnold Anderson
James P. Carter
Elizabeth B. Connell
Charles R. Frank, Jr.
Earl O. Heady
Forrest E. Linder
Varnum D. Ludington

Malcolm H. Merrill
D. F. Peterson
Maurice L. Peterson
Vernon W. Ruttan
B. S. Schweigert
Raymond Tanter
Robert S. Whitney
Samuel M. Wishik

AID Staff Present

AA/TA, Joel Bernstein
AA/TA, Curtis Farrar
AA/TA, W. E. Popp
AA/TA, Curtis Barker
TA/RIG, J. K. McDermott
TA/RIG, Miloslav Rechcigl
TA/RIG, Samuel Kahn
TA/RIG, Delbert T. Myren
TA/RIG, Willis Schaefer
TA/RIG, Stefan Krashevski
TA/RIG, John Ryan
TA/RIG, Charles Dove
TA/AGR, Omer J. Kelley
TA/AGR, C. E. Shuart
TA/AGR, F. H. Madden
TA/AGR, C. F. Sierk
TA/AGR, Guy B. Baird
TA/AGR, George K. Parman
TA/AGR, Andrew R. Downie
TA/AGR, R. L. Holmes
TA/AGR, John Malcolm
TA/AGR, R. Desrosiers
TA/AGR, S. C. Litzenberger
TA/AGR, T. S. Gill
TA/AGR, J. B. Cordaro
TA/AGR, Ronald D. Harvey
TA/AGR, A. Alvin Bishop

AA/TA, Theodore Brown
RED/Bangkok, David Steinberg
O/LAB, Burnie Merson
ASIA/TECH, James M. Blume
ASIA/DP, Nelson C. Denlinger
PFC/PDA, Robert Muscat
PFC/PDA, James Brown
PFC/DPRE, Arthur M. Handly
PFC/PDA, James R. Hoath
PFC/PDA, Barbara K. Herz
GC/TFHA, A. R. Richstein
SA/RD, Robert Meehan
SA/TD/RD, D. R. Yeaman
AFR/DS, John L. Cooper
LA/DR/RD, C. A. Breitenbach
LA/DR/RD, J. E. Hawes
ENG, J. Cooperman
CM/COD, R. J. O'Brien
PHA/POP, J. J. Speidel
COD/PHA, Gerald Gold
PHA/POP, Steven Sinding
TA/H, J. Stockard
TA/H, Dale Swisher
TA/H, A. P. Talboys
TA/OST, Bill Long
TA/N, Harold Rice
TA/STS, David Harbinson