PD-AAN-345/53

ISN-31891

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COLLEGE OF MARINE STUDIES
ROBINSON HALL

Mr. Harold LeSieur
Office of Engineering (ST-ENGR)
USAID
Building SA18, Room 208 D
Washington, D.C.

Dear Hal,

Please find attached an interim progress report on the DELBUOY project. *

I trust your trip to Africa was successful and rewarding. I hope that you will be able to visit with us in the near future.

Sincerely,

C. M. Pleass

CMP/rl
Attachments
Progress Report
USAID Proposal

* Office of Science Advisor

PROGRESS REPORT
On the Research and Development Supporting the Introduction
of the DELBUOY Wave Powered Seawater Desalting System
to Caribbean Countries
AID reference No. AID/SCI/172/82
December 1982

Grant monies were finally received by the College of Marine Studies effective August 31, 1982. All dates and periods mentioned in the proposal should therefore be referred to this starting point. The progress report will be given in context with the milestone chart in the original proposal, a copy of which is attached.

Milestone 1

In late October and early November, 1982, I visited the University of West Indies in Trinidad, and discussed details of the DELBUOY program and plans for cooperative work with the Dr. Satcunanathan, the head of the Department of Engineering. He introduced me to a colleague, Dr. Thuraisingam Vinayagalingam. With their approval, I propose to refer to them as Dr. Sat and Dr. Vin throughout this and future reports. Much of Dr. Sat's time is consumed with administrative duties. However, he was enthusiastic about the prospects for DELBUOY and our collaborative work. Dr. Sat is too heavily involved in administrative work to become personally involved in the project, but he is most enthusiastic, and has encouraged us to work directly with Dr. Vin. While I was at UWI I nterviewed two technicians who were candidates for the project. Well ualified for the work, with the exception of scuba diving skill, Dr. Sat arranged to have both attend a scuba diving course prior to their t field trip. During discussions with Dr. Sat and Dr. Vin we came to onclusion that it was inappropriate to install DELBUOYs in Aruba

using USAID money. Anguilla appeared a much more appropriate location. Therefore, from this point onward please read Anguilla for Aruba throughout the proposal.

I subsequently visited with Dr. Jeff Dellimore in Barbados, at the Caribbean Development Bank. Jeff is responsible for the energy technology unit, and he has been interested in DELBUOY for several years. He also recommended that we work in Anguilla. One of his staff, Jerome Singh was due to visit Anguilla in the following week, and Jeff provided Jerome with a letter which introduced the project and prepared the water engineer, Peter Williams, for telephone contact.

Using the Eastern Airlines Unlimited Mileage Ticket I then flew to Aruba to check out the potential for the use of DELBUOYs at this site and pass on our decision not to introduce them using USAID monies. I was hosted by the Deputy Governor, Mr. Remie Zaandam, and given an opportunity to inspect the water plant, talk to the water engineers, and to examine the wave fields along the north coast. We agreed that DELBUOYs at this site will be a most appropriate supplement to their present distillation plant. I addressed the Cabinet for a few minutes, and found them warmly receptive to the idea of an experimental DELBUOY system. I believe that they will contact the University shortly to request a proposal.

The final seven days of this trip was spent in Magueyes Island in Puerto Rico preparing for the installation of the first USAID DELBUOY. Usual, the University of Puerto Rico were most cooperative. The old site at Media Luna was approximately 1000 feet from the reef, and I chose to search for a new site closer to the reef face in order to cut down on length of transmission line to the metering and monitoring equipment.

Such a site was identified off the reef known as Turromote. It is in 50 feet of water, 450 feet from the reef face. There is a little mangrove on the reef which will provide shade and minimal protection for a box containing the metering instruments, and a large coral head offers an excellent opportunity for experimental work with a new type of anchoring system. Around the coral head is quite deep sand. Two well points were jetted into the sand bottom and connected to a low pressure feed line. An anchor was designed to lock into a cavern in the foot of the coral head, and was placed in position. Sea wells were pumped, giving clean water smelling mildly of hydrogen sulfide. The well points are approximately six feet below the sand surface, and it is to be expected that the region would be anoxic, and would have dissolved hydrogen sulfide. This is not a problem; indeed, it may be beneficial, since the number of microbiota that can survive in this environment are small.

I returned to the USA on November 12 to get together the equipment for the next visit to Puerto Rico, scheduled for early December, during which we propose to place a DELBUOY at this site, and thereby bring the project to approximately Milestone 5. When referring to previous Milestones 1 to 4, note the following points.

1. Milestone 2 has been fulfilled. The terminal failure occurred at approximately twice the working load, when the copper nickel piston rod necked down due to annular pressure. It may prove necessary to change the alloy used in the piston rod, although alternate solutions such as internal reinforcement with resin will be tried first. There is [illegible]mediate problem affecting the sea trials.

2. To date, only one unit has been built for the Puerto Rico trial. Orders for the component parts for five more are being placed on local workshops and pumps should be quite readily available by early Spring, 1983.

3. Only one pump has been shipped to Magueyes Island. No pumps have yet been shipped to Anguilla. However, the first visit to Anguilla is not scheduled until early January, 1983.

4. It is unlikely that the technician from UWI will complete his scuba diving course in time to join us for the first installation in Anguilla. The course is a necessary prerequisite.

Notes added on December 17, 1982

A complete system has been installed off Turromote, including a 3/4" diameter high pressure transmission line to the reef. Although it was possible to test the system to 800 psi, unusual northerly winds left the site relatively calm during the start-up period: a striking tribute to the law of cussedness. Despite postponing our return for four days, the maximum average wave height through December 13-16, 1982, was recorded to be 1'. System efficiencies in these conditions were of the order of 15%, in excellent agreement with laboratory and small scale sea trial data. I plan to return to Magueyes on my way home from Anguilla, approximately January 1983, and if the unusual period of calm has ended and the stem has held together (it was left pumping at a conservative 400 psi ce it will be unattended through the Christmas holidays) it should be ible to begin desalting at once.