

FDAB 683

931-17-521-454

AID 1020-25 (10-70)

REPORT U-446

PROJECT APPRAISAL REPORT (PAR)

67889

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|                       |  |                         |                        |
|-----------------------|--|-------------------------|------------------------|
| 1. PROJECT NO.<br>454 | 2. PAR FOR PERIOD:<br>Feb. 1972 to 6/30/73 | 3. COUNTRY<br>Worldwide | 4. PAR SERIAL NO.<br>2 |
|-----------------------|--|-------------------------|------------------------|

5. PROJECT TITLE  
Field Research and Testing of a Water Hand Pump for use in Developing Countries

|   |                                  |                            |                                    |
|---|----------------------------------|----------------------------|------------------------------------|
| 6. PROJECT DURATION: Began FY 71 Ends FY 74 | 7. DATE LATEST PROP<br>4/15/1971 | 8. DATE LATEST PIP<br>N.A. | 9. DATE PRIOR PAR<br>Feb. 24, 1972 |
|---|----------------------------------|----------------------------|------------------------------------|

|                  |   |                                      |  |
|------------------|---|--------------------------------------|--|
| 10. U.S. FUNDING | a. Cumulative Obligation Thru Prior FY: \$ 49,422 | b. Current FY Estimated Budget: \$ 0 | c. Estimated Budget to completion After Current FY: \$ 0 |
|------------------|---|--------------------------------------|--|

11. KEY ACTION AGENTS (Contractor, Participating Agency or Voluntary Agency)

| a. NAME                                     | b. CONTRACT, PASA OR VOL. AG. NO. |
|---|-----------------------------------|
| Battelle Memorial Institute, Columbus, Ohio | AID/csd-3305                      |

I. NEW ACTIONS PROPOSED AND REQUESTED AS A RESULT OF THIS EVALUATION

| A. ACTION (X) |       |     | B. LIST OF ACTIONS  | C. PROPOSED ACTION COMPLETION DATE |
|---------------|-------|-----|---|------------------------------------|
| USAID         | AID/W | HEB |   |                                    |
|               |       |     | A.A.  |                                    |
|               |       | x   | 1) Finalize agreement with UNICEF to produce in Bangladesh and conduct a field test with periodic reporting of maintenance requirements of not less than 20 pumps.  | 1 November 1973                    |
|               |       | x   | 2) Respond to inquiries received and prepare a plan for dissemination of information.   | 1 December 1973                    |
|               |       | x   | 3) Investigate possible contributions of funds or assistance to publicizing availability of pump design, to local manufacture and/or field testing thereof.   | 1 December 1973                    |
|               |       | x   | 4) Determine what is patentable in present design and proceed to seek patents where feasible.   | 1 March 1974                       |
|               |       | x   | 5) Provide AID with estimates of time and costs to:<br>(a) Complete a not less than eighteen month field test.<br>(b) Adequately reply to all inquires currently on hand, plus those anticipated.                   | 1 November 1973                    |
|               | TA/H  |     | 6) Project Monitor investigate:<br>(a) Alternative or additional approaches to completing adequate field testing.<br>(b) Use of LDC industrial research institutes to stimulate utilization of present pump design. | 1 December 1973                    |
|               | TA/H  |     | 7) Amend Battelle contract or proceed with new contract (subject to findings under Action No. 6).   | 1 January 1974                     |

|   |                         |
|---|-------------------------|
| D. RE PLANNING REQUIRED?  | E. DATE OF REVIEW       |
| <input type="checkbox"/> NEW<br><input checked="" type="checkbox"/> ? PROP <input type="checkbox"/> PIP <input type="checkbox"/> PRO AG <input checked="" type="checkbox"/> PRO/T <input type="checkbox"/> PIP/C <input type="checkbox"/> PIP | Office<br>July 23, 1973 |

PROJECT MANAGER: TYPED NAME, SIGNED INITIALS AND DATE  
 PROJECT DIRECTOR: TYPED NAME, SIGNED INITIALS AND DATE  
 Office  
 Lee M. Howard, M.D., Dir., TA/H

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Second Annual Report of Review and Appraisal  
AID Research Contract AID/csd-3305  
"Field Research and Testing of a Water  
Hand Pump for Use in Developing Countries"

The following evaluation group was invited to meet on July 23, 1973 to conduct the Second Annual Review of the AID funded research project carried out by Battelle Memorial Institute to design and test a hand-operated water pump for use in developing countries:

TA/H - Mr. A. Dale Swisher, F.E. (Chairman)  
TA/H - Mr. Amos D. Worthington  
TA/RIG - Mr. H. C. Ladenheim  
SA/PPB (RIGC) - Mr. James Cudney  
SA/TCD - Mr. Ed Schiffman  
ENGR/SP - Mr. John Neave  
AID Consultant - Mr. Alfred J. Davidson  
AID Consultant - Dr. Albert Talboys  
TA/PM - Mr. David Mathiasen  
TA/OST - Mr. Henry Arnold  
AFR/DS - Mr. John Blumgart

The first eight individuals participated in the meeting. Mr. Robert Fannon, technician in charge of the project for the Battelle Memorial Institute, was also present to respond to technical questions of the group.

Mr. Swisher reviewed the history of the three contracts leading to the present status of the project. He stated that the first contract (AID/csd-1434) signed in January 1966 called for the design and fabrication of a model hand pump followed by in-house bench tests. This phase was successfully completed in September 1967. A second contract (AID/csd-2174) for further development and field testing was signed in June 1968. This contract expired in August 1970 without a proper field test due to the failure of a third party to supply the pumps. The present contract (AID/csd-3305) was signed in June 1971 and provided among other features

for the preparation of pumps to be demonstrated in not less than three test areas and to persuade local manufacturers to produce the pumps and to procure, install and report on the tests. The contractor is required to supply material not available locally to permit manufacture of NLT 20 pumps and to coordinate a 24 month test program.

The previous review held February 24, 1972 resulted in recommendations that (1) Battelle could reduce the test sites from three to two if it could be demonstrated that the pump met overseas requirements and could be produced locally, (2) that AID review the advisability of reducing the 24 month field test to 18 months, and (3) Battelle proceed to file a U.S. patent application on the current design.

#### PRESENT SITUATION

A prototype pump has been designed and bench tested with results which indicate an operational life of as much as ten years. Pump has been manufactured in Thailand in a small way (less than 20 pumps); in Nigeria (about 800 pumps); and preparations are underway for the production of 35,000 to 50,000 pumps in Bangladesh. The Nigerian program is in cooperation with CARE and the Bangladesh operation is part of UNICEF's \$30- million emergency program which in turn is part of the United Nations Relief Operation. These field tests have resulted in changes in Battelle's original design mainly in use of PVC pipe as drop pipe and well casing; lining of pump cylinder with thin wall PVC pipe; fixed, non-rotating bearing pins; use of sliding blocks rather than guide rods for the deep well version; advocacy of extended handles and smaller cylinders when cylinder is set more than 135 feet below the surface, etc.

The pump has attracted considerable attention and Battelle has received requests for information and/or blueprints from approximately 100 sources. Included are inquiries from India, Nepal, Vietnam, Costa Rica, Mozambique, Singapore, Philippines, England, etc. -- from governments, foundations, universities, business firms, farmers. Battelle, in their quarterly report dated May 27, 1973, has estimated that at least \$2,500 is needed to answer pending questions and to provide assembly drawings and reports as required.

THE ISSUES:

1. The contract calls for introducing the pump in three countries. Active programs are underway in two countries (Thailand and Nigeria) with UNICEF agreeing to undertake work in Bangladesh. Should Bangladesh be accepted as the third country to fulfill contract requirements?

2. The contract requires a 24 month test program. The contractor would like to complete his test obligation in less time. The issue is whether the twenty-four month period can be reduced and yet provide sufficient time for adequate evaluation of any changes in design and test procedures.

3. In the original contract, Battelle is required to apply for a public use patent. Although Battelle claims much of the original design was known and used by the public, subsequent changes may be patentable, including changes yet to be made. The issue is whether Battelle should continue to explain and take action on that part of the new developments that are patentable.

4. The issue of dissemination of information on the pump is not contained in the contract. However, it is to the interest of AID to give widespread publicity to the development and use of the pump. The question of making additional funds, if necessary, available for dissemination is

General discussion on these issues was led by Dr. Schiffman with participation of the AID group and Mr. Fannon of Battelle. It came out during the discussion that there has not been sufficient time for evaluation of the experience in Thailand and Nigeria. At least a year in each country is required. Some results are available, e.g., plastic cylinders do better than locally cast and machined brass. It was also brought out that leather cups of local manufacturers are not adequate and that corfam has not so far been obtained.

Discussion also indicated that progress is much slower than planned; that some of the cost-cutting innovations reported during the progress of the initial AID-Battelle contract have been shelved; that arrangements made by Battelle to govern the installation of test pumps and for reporting their maintenance requirements thereafter are either not understood or not being complied with; that the maintenance report form prepared for use in Thailand has, after two years, not been used; that Battelle has not been able to gather production and/or cost figures from any of the three test sites; and that the transmission of such data to AID/W, originally seen as a research input by AID Mission staffs in Thailand and Nigeria, has not taken place. The consensus was that these difficulties are of such magnitude that a continuation of the present Battelle program will not carry this project to an expeditious conclusion, i.e., will not result in the the transfer of production and maintenance functions to competent developing country organizations nor in widespread use of the features incorporated in the Battelle design.

It was also pointed out that funds still available in the contract were not sufficient to complete the tests and evaluation required and

that no funds were now available for dissemination of information.

The evaluation team made the following recommendations:

1. Provided UNICEF agrees to the manufacture and testing of not less than twenty (20) pumps Bangladesh should be accepted as the third test area under the contract requirement.

2. Tests should continue under Battelle supervision in Thailand and Nigeria long enough to complete evaluation of performance and design.

3. Battelle should respond to inquiries received and prepare a plan for dissemination of information. Further investigation should be made of possible interested contributors to cost of information and testing such as CARE, IBRD, UNICEF.

4. Battelle should determine what is patentable in present design changes and proceed to seek patents where feasible.

5. Battelle should present revised estimates of cost and time to complete tests and reply to all inquiries.

6. The Project Monitor should investigate (a) alternative or additional approaches to completing requisite field testing and (b) the use of LDC industrial research institutes to stimulate prompt utilization of the research efforts to date.

Program: Research

FY 1973 Interregional and Program Budget Review  
Project and Budget Analysis Matrix

Revised - PAS 6/11/72

220: +

Major Types of Activities: Field Support-Env. Health  
Project Title: Field Testing Hand Pump  
Obligations Begin FY: 66 End FY: 72  
Work Begin FY: 66 End FY: 74

Major Country/Countries: Worldwide - Thailand, India-Philippine & Brazil

Project Manager: A. Dale Swisher, PE Extension 75044  
Name of Contractor: Battelle Mem. Inst. Contract No. 69-01  
Contract Officer: D. P. Faler Extension 293  
FAR Schedule: Feb. 72

Summary

Objectively Verifiable Indicators

|   |  |  |
|---|--|--|
| <p><b>I. PURPOSES:</b></p> <p>Field test to determine durability, dependability and operating cost of a simple hand pump (design previously sponsored by AID).</p>  | <p><b>A. End of Project Status:</b></p> <p>Local manufacturers produce and distribute a dependable, rugged, simple, moderate cost hand pump (which serves to reduce prevalence of intestinal infections).</p>  | <p><b>B. ASSUMPTIONS:</b></p> <ol style="list-style-type: none"> <li>1. Demand now exists for simple low-cost locally manufactured pumps which require minimum maintenance</li> <li>2. Results of previous contractor bench tests will be confirmed by field test</li> <li>3. Foreign manufacturers will be commercially interested.</li> <li>4. Anticipate commercial production, sales and distribution will meet demand.</li> </ol> |
| <p><b>II. OBJECTIVES:</b></p> <ol style="list-style-type: none"> <li>1. Current drawings and specifications</li> <li>2. NLI three complete pumps fabricated to current standards.</li> <li>3. Production of contractor-designed pumps by foreign manufacturers</li> <li>4. Two year field test</li> <li>5. Test results</li> <li>6. Recommend any desirable changes in design or production technique.</li> </ol> | <p><b>A. Output Indicators:</b></p> <ol style="list-style-type: none"> <li>1. Delivery of set reproducible drawings and specifications.</li> <li>2. Demonstrate contractor produced pump</li> <li>3. Demonstrate foreign manufactures produced pumps.</li> <li>4. Statistics re wear or breakage of each component due to two year field usage</li> <li>5. Final report with recommendations for changes in design.</li> </ol> | <p><b>B. Progress to Date:</b></p> <p>Contract signed June 30, 1971.</p>   |

**III. EFFORTS:**

AID Contractor: Professional research design engineers and support team; extensive manufacturing and testing facilities; management of contract; patent attorney on-site TA to foreign manufacturers; design and supervision of field test; analyses of test data.

AID: AID/W, funding, contract monitoring, USAID's support officers.

IPCs: Local funds for procurement, manufacturers facilities, personnel and funds for test supervision.

**A. Budget Summary (\$000)**

|                           | Total | Personnel <sup>1/</sup> | Particular <sup>1/</sup> | Comm <sup>2/</sup> | o/c | Expen-<br>Situation | June 30<br>Pipeline | Terminal Funding<br>Period | Year |
|---------------------------|-------|-------------------------|--------------------------|--------------------|-----|---------------------|---------------------|----------------------------|------|
| All Prior<br>Yrs (Actual) | 69    |                         |                          |                    |     |                     |                     |                            |      |
| Actual                    |       |                         |                          |                    |     |                     |                     |                            |      |
| FY 1971                   | 20    | 20                      | (B)(C)                   |                    | 7   | 3                   | 0                   | 30                         | 3    |
| FY 1972                   | 20    | 15                      |                          |                    | 4   | 1                   | 25                  | 25                         | 4    |
| FY 1973                   |       |                         |                          |                    |     |                     | 15                  | 10                         |      |
| All Others                |       |                         |                          |                    |     |                     | 10                  |                            |      |
| TOTAL                     | 118   | 35                      |                          |                    | 11  | 4                   | 50                  |                            |      |

<sup>1/</sup> Indicate Contract - C/, PASA - E/, or Direct A.I.D. - D/ as appropriate.  
<sup>2/</sup> Pipeline as of June 30, 1970 computed on an accrual basis.

\*Indicate GTS, Research or Section 211(d).

\*\*Key Program Area, Externally Determined Program Emphasis, other Field Support or All Other.