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**UNITED STATES
INTERNATIONAL DEVELOPMENT
COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT**

**MANAGEMENT
REPORT**

**PHOTOVOLTAIC
DEVELOPMENT
AND SUPPORT
PROJECT**

AUGUST 1982

07 OCT 1982

LEVELS 2 & 3
FOR OFFICIAL USE ONLY

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION - LEWIS RESEARCH CENTER

**UNITED STATES
INTERNATIONAL DEVELOPMENT
COOPERATION AGENCY
AGENCY FOR INTERNATIONAL DEVELOPMENT**

**MANAGEMENT
REPORT**

**PHOTOVOLTAIC
DEVELOPMENT
AND SUPPORT
PROJECT**

**AID/NASA
INTERAGENCY
AGREEMENT
DSB-5710-2-79**

Accomplishment: William J. Bifano September 29, 1982
Date

Approval: W. J. M. ... September 29, 1982
Date

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION - LEWIS RESEARCH CENTER

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RESPONSIBILITY:

APPROVAL W. MASICA

ACCOMPLISHMENT W. J. BIFANO

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PROJECT: DEVELOPMENT AND
SUPPORT PROJECT

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NARRATIVE ANALYSIS



PROJECT: PHOTOVOLTAIC
DEVELOPMENT AND
SUPPORT PROJECT

STATUS AS OF August 31, 1982
(DATE) (INITIALS)

1.0 INTRODUCTION AND BACKGROUND

The Photovoltaic Development and Support Project is being implemented by the NASA Lewis Research Center (LeRC) for the U.S. Agency for International Development, Bureau for Science and Technology, Office of Energy. The purpose of the project is to facilitate the use of photovoltaics for a variety of applications in support of AID's development assistance activities.

A Participating Agency Services Agreement (PASA No. NASA/DSB 5710-2-79) authorizing this project was signed by AID August 28, 1979, and approved by NASA August 30, 1979. Under this agreement, AID provided an initial funding authority of \$2,000,000. This PASA was amended in August 1980 and August 1981 to provide additional funding authority of \$500,000 and \$921,000, respectively. Total funding authority received to date is \$3,421,000.

2.0 OBJECTIVE

The major objective of this project is to demonstrate the suitability of photovoltaic (PV) power systems for meeting basic electrical requirements in rural areas of developing countries.

The Project Management function at the LeRC is being performed by the Solar Energy Projects Office in the Solar and Electrochemistry Division of the Energy Directorate.

3.0 ACTIVITIES

The activities required to accomplish the Project objectives are:

1. Planning and Studies
2. Field Test Support
3. Applications
4. Training and Information
5. Management

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| <p>4.0 <u>STATUS OF ACTIVITIES</u></p> <p>4.1 Planning and Studies</p> <p>4.1.1 Survey, Analysis and Selection Task</p> <p style="padding-left: 40px;">Activity complete for medical applications</p> <p>4.1.2 System Definition Study</p> <p style="padding-left: 40px;"><u>Contract DEN 3-248: Education/Communication Applications</u></p> <p style="padding-left: 40px;">The final report for this contract is ready for distribution.</p> <p>4.2 Field Test Support</p> <p>4.2.1 Project Definition</p> <p>S. Marsik visited Zimbabwe and Kenya, August 3-20, where he finalized planning arrangements for in-country PV Technology Seminars associated with the PV medical systems. This parallels previous arrangements made in Guyana and Ecuador. Host country personnel will:</p> <p>(a) actively participate in General Sessions of the seminar addressing topics specifically related to their own use of alternate energy sources and those dealing with upgrading of rural health facilities through the use of PV-powered systems.</p> <p>(b) make all in-country logistics arrangements for the conduct of the seminar.</p> <p>The week-long seminars will coincide with the initial evaluation period of the PV systems in each country.</p> | | |

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NARRATIVE ANALYSIS



PROJECT: PHOTOVOLTAIC
DEVELOPMENT AND
SUPPORT PROJECT

STATUS AS OF August 31, 1982
WJBT (INITIALS)

A complete set of architectural drawings for the Pedro Vicente Maldonado Health Subcenter provided by the Ecuadorean National Institute for Sanitary Works (IEDS), along with comments on the draft Operation Plan by the National Energy Institute, were received at LeRC from U.S. AID/Ecuador in August.

4.2.2 Load Identification and Acquisition

No activity during this reporting period.

4.2.3 Load Testing and Evaluation

No activity during this reporting period.

4.3 Applications

4.3.1 Medical Refrigerators

The procurement process for the purchase of ten additional PV-medical refrigerators (second buy) is continuing. Contract award is still scheduled for September 30.

Contract NAS 3-22246: Deployment of PV-Powered Refrigerators

One refrigerator unit was installed at the site in the Dominican Republic by the LeRC/Solar Power Corporation team August 23-28. The initial operation of the system is satisfactory. The same LeRC/SPC team began the installation of a system in Haiti on August 31.

U.S. AID/Guatemala confirmed arrival and customs clearance of a refrigerator unit. LeRC/SPC team is scheduled to depart U.S.A. early in September to install the unit. U.S. AID/Ecuador also confirmed arrival

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| <p>of a unit in Ecuador. Three to four weeks will be required for customs clearances there. The refrigerator unit for Guyana was shipped by Solar Power Corporation on August 30.</p> <p>The overall status of the PV medical refrigerator field-test activity is summarized in Table 1.</p> <p>4.3.2 Medical Applications</p> <p><u>Contract NAS 3-22240: Photovoltaic Development and Support Program for Medical Systems in Developing Countries</u></p> <p>Proof of Design Testing (PODT) of the prototype PV medical system at the Solarex facility continued through August. The difficulties of the prototype system reported in July were corrected; however, new difficulties in the sterilizer and the Automatic Data Acquisition System (ADAS) were identified during the extended operation and "exercising" of the system. The sterilizer problem with the switching/timing mechanism has been corrected. The ADAS problem is currently being analyzed. In addition, analyses of the PV array performance indicate an output approximately 5% lower than the design value which was based on nominal ratings of the PV modules used. Solarex is analyzing these results and may have to select higher output modules to increase the array output. As a result of these developments in the PODT, the shipping date for the Guyana system has been rescheduled for the second half of September. The shipping schedule for the other four systems will be affected less since the corrective measures undertaken in the prototype can be readily applied to the other systems.</p> <p>All design drawings are in final review.</p> | | |

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| <p>4.3.3 Remote Earth Station(s)</p> <p style="padding-left: 40px;">The procurement package for the development and deployment of one or more power systems for remote earth station applications has been finalized. Issuance of the RFP is scheduled for the end of September.</p> <p>4.4 Training and Information</p> <p style="padding-left: 40px;">The draft of the text prepared under the U. of M. grant to be used as lecture material for the technical seminars is being reviewed at LeRC.</p> <p style="padding-left: 40px;">A draft report covering Dr. Roberts (U. of M.) two-week follow-up impact assessment of the Tangaye, U.V. project in mid-July, was submitted to LeRC for</p> | | |

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TABLE 1 - MEDICAL REFRIGERATOR APPLICATION: STATUS

| <u>Mission</u> | <u>Tentative Sites</u> | <u>Status/Remarks</u> | <u>Action Needed</u> |
|----------------|--------------------------------|---|--|
| Zaire | Kionzo | Cable Kinshasa 09204, received on August 18, confirms that the Brooke Amendment restrictions have been lifted subject to Congressional notification expected to be completed August 29. The cable further indicates that the LSGPA can be signed at that time. Shipping address for the refrigerator has been provided. | Mission to inform LeRC when the LSGPA is signed. |
| Zimbabwe | Chiota | Cable Harare 4463 states that the Grant Agreement Amendment covering addition of a refrigerator has been signed by the US AID/ Zimbabwe and by the Secretary for Economic Planning/GOZ. However, the document appears to have been misplaced at the Ministry of Industry and Energy Development where it was sent for countersignature. Attempt is being made to locate the document. Shipping address has been provided. | LeRC to inform mission when shipping schedule set. |
| Liberia | Suehn Village | LSGPA signed by GOL and US AID/L in March. Signed copy of the Agreement received at LeRC. Cable was sent to US AID/ Liberia on August 9 requesting: (a) confirmation that the Suehn clinic construction has been completed (b) shipping and receiving information | LeRC to inform mission when shipping schedule set. |
| Philippines | TBD | Cable dated July 2 received from Manila indicating GOP and AID/Philippines not interested in participating in field test activity. | Offer refrigerators to AID Missions in Thailand and Bangladesh per telecon with Bob Ichord, ASIA/TR. |
| Indonesia | 1) Cingbwibulan 2) Batujaya | Two refrigerators installed in April. Operating satisfactorily. | None |

| <u>Mission</u> | <u>Tentative Sites</u> | <u>Status/Remarks</u> | <u>Action Needed</u> |
|--------------------|------------------------|--|--|
| Morocco | Bouaboute | Copy of the signed LSGPA received at LeRC along with information that the refrigerator system is to be consigned to the Ministry of Public Health. | LeRC to inform mission when shipping schedule set. |
| Upper Volta | Hounde | Cable Ouagadougou 04278 states that the US AID/UV expects a completed and signed agreement by the end of August. | Mission to inform LeRC when the LSGPA is signed. |
| Egypt | TBD | Draft of LSGPA left with AID/Cairo during TDY of the LeRC personnel in February. | None |
| Guyana | Schepmoed | LSGPA signed. A copy of the signed agreement between US AID/G and GOG received at LeRC | LeRC to inform mission when shipping schedule set. |
| Ecuador | Comuna Cobos | Cable Quito 5772 states that Ecuadorean Institute of Sanitary Works (IEOS) is ready to begin Customs Clearance of the medical refrigerator. | Mission to inform LeRC when unit clears customs. |
| Dominican Republic | Las Tablas | Refrigerator was installed at Las Tablas before the end of August. Operation reported as satisfactory. | None |
| Honduras | Aldea Las Selvas | Cable dated July 6 received by LeRC indicating AID/H and GOH/MOH remain interested in activity. LSGPA delivered in final draft for Minister's signature on June 28. Cable Tegucigalpa 07261 provided preliminary site specific information and indicated that additional information on the site is being pouched. | None |
| Guatemala | Tierra Blanca | Refrigerator shipment and customs clearance was confirmed in telecon with US AID/Guatemala on August 19. LeRC/SPC team leaving early in September to install the unit. | None |

| <u>Mission</u> | <u>Tentative Sites</u> | <u>Status/Remarks</u> | <u>Action Needed</u> |
|----------------|------------------------|--|--|
| Haiti | Anse-a-Veau | LeRC/SPC team began installation of the unit before the end of August. | None |
| Tunisia | Es-Smirat | Draft of LSGPA with medical refrigerator information sent on February 3; receipt by AID/T confirmed. Site photographs received by LeRC in March. | None |
| REDSO/WA | Abidjan | Draft of LSGPA sent to REDSO/WA on May 7. Cable Abidjan 7791 questions whether draft LSGPA is a proper format for Ivory Coast in this activity and suggests a simple MOU for NASA's signature. Cable State 175139 advises REDSO/WA that NASA is not a signatory to the agreements in this activity and that the choice of format of the document is left to the Mission. | Abidjan answer needed. |
| St. Vincent | Sandy Bay | Draft of LSGPA left with mission by A. F. Ratajczak during his TDY in March. | AID/Barbados to obtain host government signature on LSGPA & return to LeRC |
| Bangladesh | TBD | NASA cable dated July 19 informed US AID/Dacca that 1 refrigerator unit can be made available for a deployment in Bangladesh per their previously expressed interest. No response received at LeRC in August. | LeRC to provide the draft of an agreement. |
| Thailand | TBD | Cable Bangkok 43579 in response to the offer of 1 refrigerator unit in NASA cable dated July 19, confirms US AID/Thailand and GOT interest in the project. Final decision to be cabled to NASA by August 20. | LeRC to provide the draft of an agreement. |

TABLE 2 - PV MEDICAL SYSTEM APPLICATIONS: STATUS

| <u>Country</u> | <u>Status</u> |
|------------------|---|
| <u>Guyana:</u> | The Implementation Plan has been signed by the Project Managers in Guyana and the signature page returned to LeRC. The Guyana National Energy Authority (GNEA) and the Institute for Applied Science and Technology (IAST) were chosen by the GOG to provide in-country technical support to the MOH. A draft of the Project Implementation Letter (PIL) for the PV medical refrigerator (to be used as an attachment to the existing agreement) was provided by LeRC personnel during the TDY in November and was signed by both US AID/G and GOG. US AID/Guyana has accepted responsibility for receiving the equipment and clearing customs. Tentative outline and schedule for the PV Technology Seminar in Guyana have been jointly prepared by the Guyana Project Committee and LeRC. |
| <u>Ecuador:</u> | The Operation Plan (to be used in lieu of an Implementation Plan) was sent to US AID/E on May 7. A draft of PIL for the PV medical refrigerator was provided during TDY in November and is currently being translated and prepared for signatures by AID/E. Ecuadorean National Institute for Sanitary Works (IFOS) provided complete set of architectural drawings for the Pedro Vicente Maldonado Health Subcenter. Tentative outline for the PV Technology Seminary in Ecuador has been jointly prepared by the National Energy Institute (INE) and LeRC. |
| <u>Kenya:</u> | The Implementation Plan (IP) for the medical systems in Kenya was signed by both the US AID/K and MOH/GOK and the signature page received at LeRC. MOH received from the Kenya Post and Telecommunication Corporation a frequency allocation for the use of two-way radios which will be provided with the medical systems. The operation license will be issued following the payment of the fee by the MOH. Ministry of Energy (MOE) agreed to provide in-country technical support to the MOH. Tentative outline and schedule for the PV Technology Seminar in Kenya have been jointly prepared by the MOE and LeRC. |
| <u>Zimbabwe:</u> | Project Implementation Letter (PIL) for the PV medical system for Chikwakwa was signed by the Ministry of Industry and Energy Development (MIED) and US AID/Zimbabwe. Project Agreement Amendment for the addition of a refrigerator has been signed by US AID/Zimbabwe and by the Secretary for Economic Planning and is awaiting countersignature by the MIED. Tentative outline and schedule for the PV Technology Seminar in Zimbabwe have been jointly prepared by the MIED and LeRC. |

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|--|--|---|

5.0 PROJECT MANAGEMENT

ASEAN Project - Steps were taken to obtain the services of two project planners under a support service contract to prepare an implementation plan for the ASEAN water pumping project. A two to three TDY in the participating countries is planned for late September-October. A kick-off meeting is scheduled for September 2 for this activity.

UNISPACE 82 - Four demonstrations of photovoltaic technology were conducted in Vienna for the 2nd United Nations Conference on the Exploration and Peaceful Uses of Outer Space. Photovoltaic systems were operated to power a water pump, a medical vaccine storage refrigerator/freezer and a grain grinder. Additionally a PV-powered satellite ground station, representative of the AID Rural Satellite Project was displayed. Parelleling the outside display of the ground station and photovoltaic power system was an inside display which demonstrated to conference delegates the types of communications equipment expected to be used in the AID Rural Satellite Program. This equipment included facsimile machines, teleconferencing equipment, slow scan video and computer terminals accessing distance data banks.

As estimated, 1,000 delegates from 100 nations participated in Unispace 82 and additionally an estimated 60,000 persons viewed the outside photovoltaic demonstrations.

Pakistan Project - Bill Masica met with Bob Ichord (ASIA/TR) and Charles Moseley (AID/Pakistan) in preparation for a TDY in Pakistan to assist in preparing a Project Paper on renewable energy. Masica left for Islamabad on August 24 and is currently scheduled to return on September 24.

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MASTER PROGRAM/PROJECT SCHEDULE

2 & 3
LEVEL

PROJECT: PHOTOVOLTAIC
DEVELOPMENT AND
SUPPORT PROGRAM

STATUS AS OF August 31, 1982
(DATE) (INITIALS)

| MILESTONES | ← FY 1981 → | | | ← FY 1982 → | | | | | | | | | | | | ← FY 1983 → | | |
|--------------------------------------|-------------|-----|-----|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------------|-----|-----|
| | JUL | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 4.1 PLANNING AND STUDIES | | | | | | | | | | | | | | | | | | |
| 4.1.1 SURVEY, ANALYSIS AND SELECTION | | | | | | | | | | | | | | | | | | |
| 4.1.2 SYSTEM DEFINITION STUDY | | | | | | | | | | | | | | | | | | |
| 4.2 FIELD TEST SUPPORT | | | | | | | | | | | | | | | | | | |
| 4.2.1 PROJECT DEFINITION | | | | | | | | | | | | | | | | | | |
| 4.2.2 LOAD IDENTIFICATION | | | | | | | | | | | | | | | | | | |
| o CATALOG OF MEDICAL APPLIANCES | | | | | | | | | | | | | | | | | | |

NOTES:

- 1... N = RESCHEDULED MILESTONE
- A AWARD CONTRACT OR GRANT
- B BEGIN
- C ACTIVITY COMPLETE

- K CONTRACT COMPLETE
- R RELEASE RFP OR IFB
- V SITE VISIT
- P PROCUREMENT

- T TESTING
- a ANNUAL REVIEW
- b ANNUAL OPERATING PLAN COMPLETE

- S - Senegal/Mali/UV TDY
- I - Indonesia TDY
- M - Medical Systems TDY
- E - Egypt TDY
- H - Haiti/Barbados TDY

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MASTER PROGRAM/PROJECT SCHEDULE

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PROJECT:

PHOTOVOLTAIC
DEVELOPMENT AND
SUPPORT PROJECT

STATUS AS OF August 31, 1982
(DATE) (INITIALS)

| MILESTONES | ← FY 1981 → | | | ← FY 1982 → | | | | | | | | | | | | ← FY 1983 → | | |
|---|-------------|-----|-----|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------------|-----|-----|
| | JUL | AUG | SEP | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 4.3 APPLICATIONS | | | | | | | | | | | | | | | | | | |
| 4.3.1 MEDICAL REFRIGERATOR | | | | | | | | | | | | | | | | | | |
| o CONTRACT FOR FABRICATION, DEPLOYMENT AND SERVICE | | | | | | | | | | | | | | | | | | |
| 1ST BUY (11 UNITS) | | ▼R | | | | | ▼A* | | | ▼S | | | | | | | | |
| 2ND BUY (9 UNITS) | | | | | | | | | | ▼R | | | | | ▼A | | | |
| 4.3.2 MEDICAL SYSTEMS | | | | | | | | | | | | | | | | | | |
| o CONTRACT FOR DESIGN, DEVELOPMENT AND DEPLOYMENT | | | | | | | ▼A | | | | | | | | | ▼S | | |
| 4.3.3 REMOTE EARTH STATION(S) | | | | | | | | | | | | | | | | | | |
| o CONTRACT FOR DESIGN, DEVELOPMENT AND DEPLOYMENT | | | | | | | | | | | | | | | ▼R | | | |
| 4.4 TRAINING AND INFORMATION. | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | ▼K |
| 5.0 PROJECT MANAGEMENT | | | | | | | | | | | | | | | | | | |
| | | | | | | | ▼a | | | | | | ▼b | | | | | ▼a |

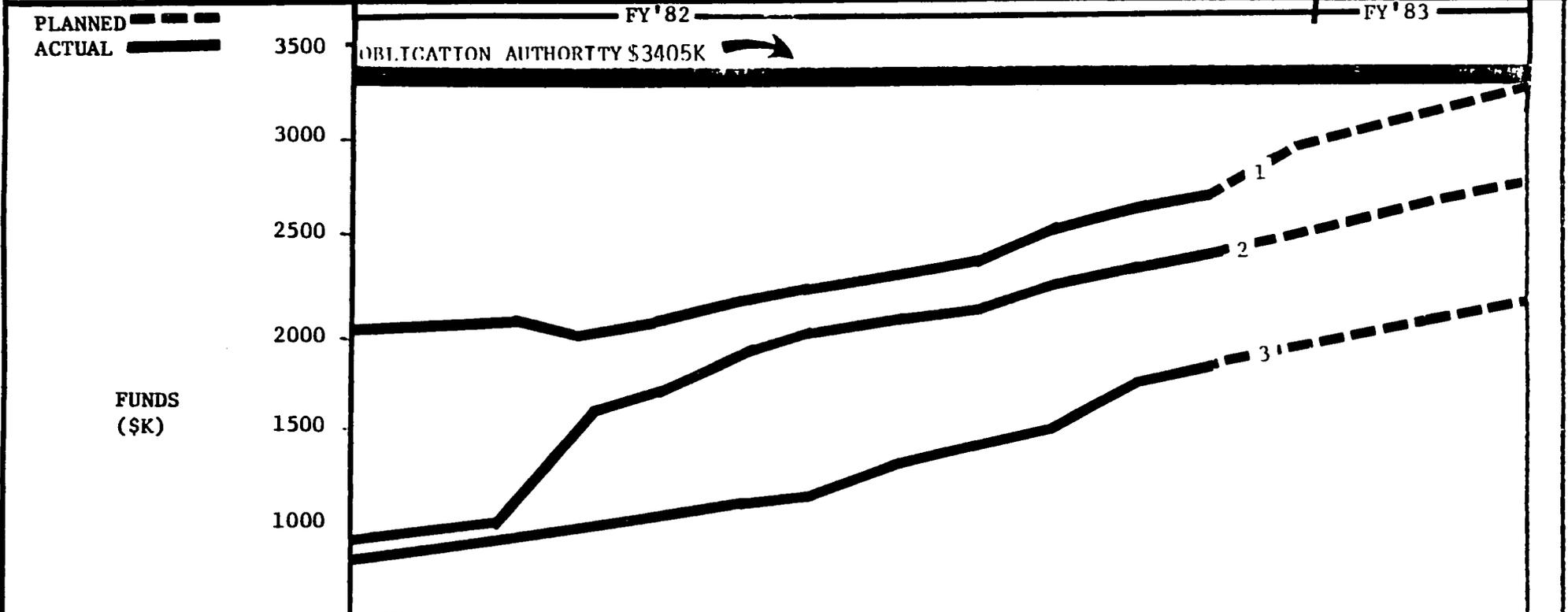
NOTES: *Contract signed by Solar Power Corp.

1... N = RESCHEDULED MILESTONE
A AWARD CONTRACT OR GRANT
B BEGIN
C ACTIVITY COMPLETE

K CONTRACT COMPLETE
R RELEASE RFP OR IFB
V SITE VISIT
P PROCUREMENT

S SYSTEM INSTALLATION
T TESTING
a ANNUAL REVIEW
b ANNUAL OPERATING PLAN COMPLETE

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|---|--|---|



| | Cumulative | | | | | | | | | | | | | | |
|------------------------|------------|------|-------|------|------|------|------|------|------|------|------|------|------|------|------|
| | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| Authority | 3405 | 3405 | 3405 | 3405 | 3405 | 3405 | 3405 | 3405 | 3405 | 3405 | 3405 | 3405 | 3405 | 3405 | 3405 |
| 1 Commitments (Actual) | 2055 | 2075 | *1919 | 1979 | 2170 | 2235 | 2336 | 2366 | 2559 | 2585 | 2677 | | | | |
| 2 Obligations (Actual) | 940 | 963 | 1780 | 1794 | 1996 | 2015 | 2127 | 2187 | 2235 | 2261 | 2328 | | | | |
| 3 Costs (Actual) | 862 | 921 | 971 | 986 | 1027 | 1180 | 1306 | 1429 | 1513 | 1816 | 1895 | | | | |

*Decommitment with respect to PV Medical Systems following contract award.

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IN-HOUSE PERSONNEL

2&3
LEVEL

RESPONSIBILITY:

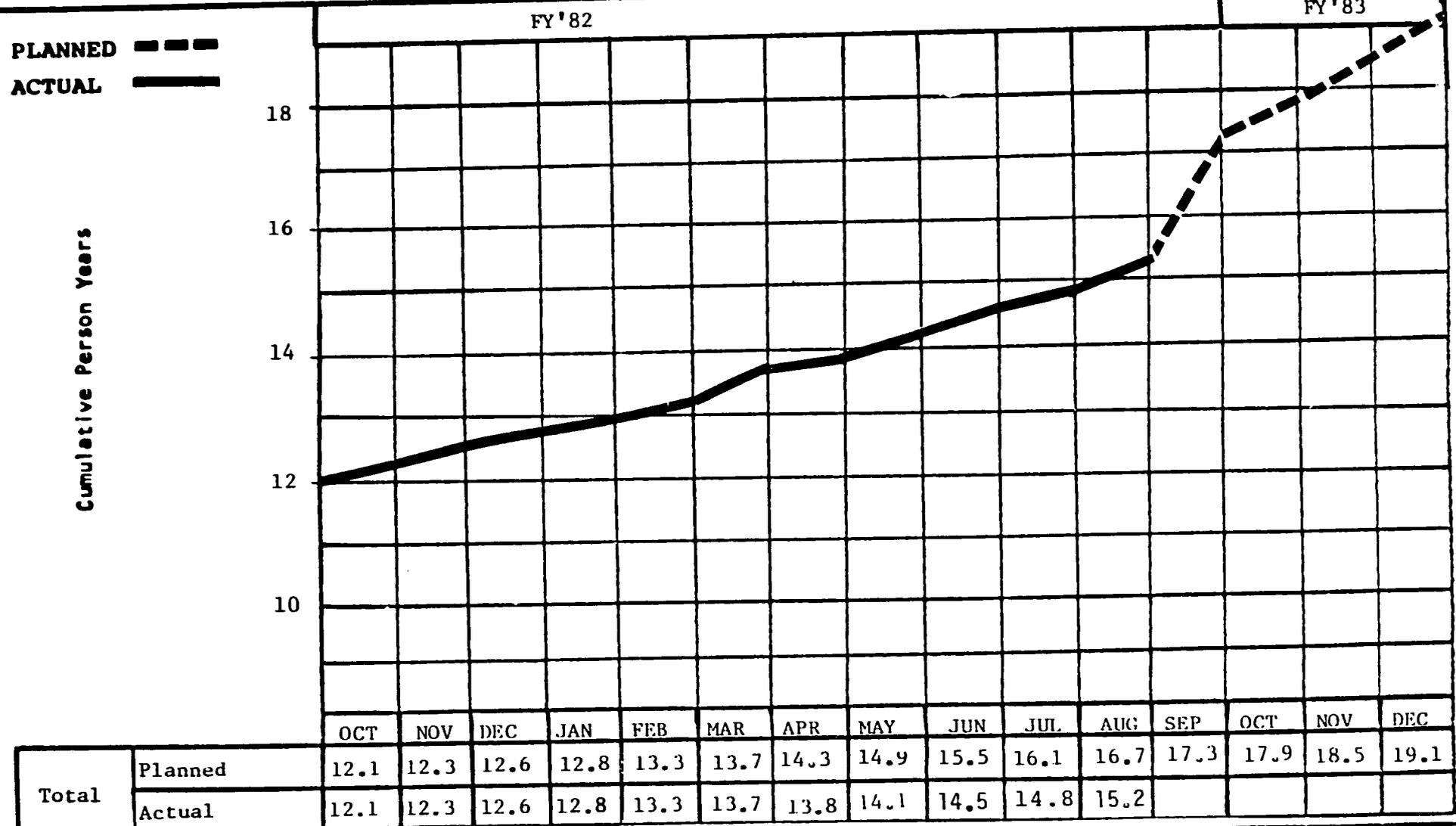
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