

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

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SP-44407

**MANAGEMENT
REPORT**

**PHOTOVOLTAIC
DEVELOPMENT
AND SUPPORT
PROJECT**

JUNE 1982

LEVELS 2 & 3
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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 July 21, 1982
Date

Approval: u. j. m. area July 21, 1982
Date

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RESPONSIBILITY:

APPROVAL W. MASICA

ACCOMPLISHMENT W. J. BIFANO

TABLE OF CONTENTS

2&3
LEVEL

PHOTOVOLTAIC
PROJECT: DEVELOPMENT AND
SUPPORT PROJECT

- 1.0 Introduction and Background
- 2.0 Objective
- 3.0 Activities
- 4.0 Status of Activities
- 5.0 Project Management
- 6.0 Project Schedules
- 7.0 Financial Status
- 8.0 In-house Personnel
- 9.0 Distribution List

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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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4.0 STATUS OF ACTIVITIES

4.1 Planning and Studies

4.1.1 Survey, Analysis and Selection Task

Activity complete for medical applications

4.1.2 System Definition Study

Contract DEN 3-248: Education/Communication Applications

The final report for this contract is in printing.

4.2 Field Test Support

4.2.1 Project Definition

Signed signature page of the Implementation Plan for the PV medical systems project in Kenya was received at LeRC in June.

Host country project personnel (Ing. A. Mejia, INE, Ecuador; Mr. U. Bhimsen, IAST, Guyana; Mr. S. Mullei, MOE, Kenya; Dr. R. Chiviya, MIED, Zimbabwe) visited at the LeRC June 7-8 where they were briefed on the status of the project and given presentations on other renewable energy work at LeRC. All visitors then traveled to the Solarex Corp., Rockville, Maryland where they witnessed operation of the PV medical system prototype and toured the Solarex facilities. While in the Washington, DC area, the visitors also received briefings by Arco Solar personnel at Arco Solar facilities.

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<p>Mr. L. Carberry, Director GNEA, Guyana and member of the Guyana PV project committee, visited the LeRC June 17-18 for briefings and discussions.</p> <p>Arrangements were made by S. Marsik for a TDY in Kenya and Zimbabwe in July/August to finalize planning arrangements for the seminars associated with the PV medical systems. MOH/GOK requested late in June that the planned mid-July trip be postponed until mid-August due to MOH's other commitments. Mr. Mworio, MOH/GOK Project Manager, currently in Los Angeles, California agreed to meetings with Marsik during the period of August 12-20. Order of countries visited during Marsik's TDY will be reversed so that timing of visit to Zimbabwe will not be affected.</p> <p>4.2.2 Load Identification and Acquisition</p> <p>No activity during this reporting period.</p> <p>4.2.3 Load Testing and Evaluation</p> <p>No activity during this reporting period.</p> <p>4.3 Applications</p> <p>4.3.1 Medical Refrigerators</p> <p>LeRC personnel visited Solavolt International (Motorola) on June 8 to discuss the environmental test problems relative to the Western Solar and Polar Products (PROKO) units mentioned in last month's report. The test data submitted initially by Solavolt was inconsistent and incomplete. A final report was received by LeRC on June 28 and is in review.</p>		

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NARRATIVE ANALYSIS

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STATUS AS OF June 30, 1982
(DATE) (INITIALS)

The technical evaluation by LeRC on price analysis relative to the Solavolt International proposal for the second buy of PV refrigerators was completed in June.

A meeting was held on June 3 with Cleveland State University (CSU) personnel regarding analysis of data from the PV refrigerator field tests. This work will be performed by CSU under an existing grant.

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

LeRC personnel visited Solar Power on June 9-11 to finalize the logistics plan relative to the Latin American PV refrigerator installations and to observe the acceptance test on the refrigerator to be displayed at Unispace '82 in Vienna in August. The overall status of the PV medical refrigerator field-test activity is summarized in Table 1.

4.3.2 Medical Applications

Contract NAS 3-22240: Photovoltaic Development and Support Program for Medical Systems in Developing Countries

The Proof of Design Testing (PODT) of the prototype PV medical system at Solarex in Rockville, Maryland began on June 9. Neither a low voltage power supply for the controller nor the Automatic Data Acquisition System (ADAS) were provided by the suppliers on time. Use of substitute low voltage power supply allowed Solarex to demonstrate the system operation for the representatives from each of the participating countries (Ecuador, Guyana, Kenya, Zimbabwe). US AID/Washington and NASA/Headquarters personnel were also present during the demonstrations.

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<p>PODT activity will continue until all system components are satisfactorily tested. The above mentioned delay in delivery of the power supply and ADAS should not adversely affect the shipping of the first system to Guyana.</p> <p>The status of the PV medical application for each participating AID country is summarized in Table 2.</p> <p>4.3.3 Remote Earth Station(s)</p> <p>Based on ongoing discussions with S&T/ED, and their contractors AED and Teleconsult, a procurement package was prepared for the development and deployment of at least one PV power system for a remote earth station application in conjunction with the US AID S&T/ED Rural Satellite Project. This activity was approved based on a memo request by Alan Jacobs S&T/EY and David Sprague S&T/ED to the then Acting Senior Assistant Administrator of S&T, Curt Farrar on August 28, 1981. Farrar approved the request on November 2, 1981.</p> <p>4.4 Training and Information</p> <p>Dr. Roberts of the University of Michigan, left for West Africa in mid-June to support NASA LeRC visits scheduled for June/July in Dakar, Senegal; Bamako, Mali; and Ouagadougou, Upper Volta. Roberts is also scheduled to perform a follow-up impact assessment of the Tangaye, Upper Volta PV Project in July.</p> <p>The Technical Program Chairman of the 16th IEEE Photovoltaic Specialists Conference informed Bill Bifano via letter in June that his proposed paper entitled "Economic Viability of Photovoltaic Power for Development Assistance Applications" was accepted for presentation at the Conference scheduled for San Diego, CA, September 28--October 1, 1982.</p>		

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 4238 dated April 19 cites fact that Brooke amendment precludes any new obligations with GOZ. AID/W has informed LeRC that agreements can still be made with GOZ under certain conditions. Cable Kinshasa 7250 indicates that LSGPA document is ready for execution as soon as authorization is received from AID/W.	Resolution by AID/AFR/legal. AID/W to provide guidance to AID/Zaire
Zimbabwe	Chiota	Cable 2166 dated April 29, 1982 from Salisbury indicates grant agreement amendment covering addition of refrigerator awaiting GOZ signature	None
Liberia	Suehn Village	LSGPA signed by GOL and US AID/L in March. Signed copy of the Agreement received at LeRC.	None
Philippines	TBD	Draft of LSGPA with medical refrigerator information mailed on February 8. Follow-up cable sent by LeRC on April 27 asking mission to confirm interest in participating in field test activity. Cable State 181001, June 30, requested that NASA be advised by "immediate" response whether US AID/Manila and GOP wish to participate in the activity.	Response from AID/Philippines
Indonesia	1) Cingwibulan 2) Batujaya	Two refrigerators installed in April	None
Morocco	Bouaboute	Draft of LSGPA with medical refrigerator information mailed February 3. NASA cable, June 30, requested status of the document and/or probability of its acceptance.	None
Upper Volta	Haounde	Draft of LSGPA with medical refrigerator information mailed on February 3. "No anticipated difficulty" cable received at LeRC March 17.	None

<u>Mission</u>	<u>Tentative Sites</u>	<u>Status/Remarks</u>	<u>Action Needed</u>
Egypt	TBD	Draft of LSGPA left with AID/Cairo during TDY of LeRC personnel in February.	None
Guyana	Schepmoed	LSGPA signed. A copy of the signed agreement between US AID/G and GOG received at LeRC.	None
Ecuador	Comuna Cobos	Site specific information received by AID/E from the project manager for GOE transmitted to LeRC. A draft of the PIL for this activity was provided to AID/E during the TDY in Nov. AID/E translating the draft of PIL into Spanish. "No anticipated problem" letter received from AID/E.	None
Dominican Republic	Las Tablas	Agreement signed on February 24. Signed copy of LSGPA received at LeRC.	None
Honduras	TBD	No reply to request for site specific information (NASA cable - June 21). Draft of LSGPA with medical refrigerator information mailed on February 3. Also new cable sent on February 5 requesting site specific information. NASA cable, June 30, requested that Mission confirm interest in participating in the activity.	None
Guatemala	Tierra Blanca	LSGPA signed by GOG on April 23. Signed copy received at LeRC.	None
Haiti	Anse-a-Veau	LSGPA signed by GOH February 19. Signed copy received at LeRC.	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

<u>Mission</u>	<u>Tentative Sites</u>	<u>Status/Remarks</u>	<u>Action Needed</u>
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.	None
St. Vincent	Sandy Bay	Draft of LSGPA left with mission by A. F. Ratajczak during his TDY in March.	

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.
<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.
<u>Kenya:</u>	Mr. Francis Mworira, senior Hospital secretary, was identified as the new project manager for the GOK. A letter by Mr. Mworira requesting licensing for the two-way radios which will be provided with the medical systems in Ikutha and Kibwezi was sent to the Kenya Post and Telecommunication Corp. 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.
<u>Zimbabwe:</u>	Draft of PIL for medical refrigerator provided during TDY in December. PIL for the PV medical system for Chikwakwa was signed by the Ministry of Industry and Energy Development.

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5.0 PROJECT MANAGEMENT

PV Development and Support Project - The Annual Operating Plan for the period January 1 to December 31, 1982 was submitted to NASA/HQ for approval and forwarding to AID/W.

Background material and status information on the PV D&S Project was prepared and transmitted to S&T/EY for Dr. Jack Vanderryn's testimony delivered on June 21 to the Subcommittee on Oversight and Investigations and Energy Development and Applications.

Additional cables were received from the following AID missions in response to the cable and descriptive material sent to all AID missions in February and March, respectively:

- o AID/Mali: Cable Bamako 3287 dated June 9 was received from AID/Mali requesting TDY by LeRC personnel for short term technical consultancy on photovoltaics. LeRC responded that Bill Bifano and Dick DeLombard of LeRC and Dr. Allen Roberts of the U. of Michigan would visit Bamako in late June--early July as part of a visit to Senegal and Upper Volta.
- o AID/Bangladesh: Cable Dacca 2872 was sent to Bob Ichord ASIA/TR/EFE inquiring as to the possibility of participating in the PV refrigerator field test activity. A decision on this request is pending based on availability of refrigerators.
- o AID/Thailand: Cable Bangkok 30131 was sent to S&T/Health inquiring as to availability of PV refrigerator for field-testing. The decision, again, will be based on the availability of PV refrigerators.
- o AID/Yeman: Cable Sanaa 3507 requested additional copy of the Medical Equipment Catalog as well as information on the Tangaye Grain Mill/Water Pump experiment, PV refrigerators and the Tunisia Renewable Energy Project.

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The material requested was pouched to AID/Yeman in June.

- o Similar information requested via cable by AID/Mozambique and AID/Botswana (see last month's report) was pouched in June.
- o Bob Ichord of ASIA/TR contacted LeRC and followed with a letter regarding the possibility of LeRC managing a three-year cooperative program in Alternative Energy Systems for Water Pumping with the ASEAN countries of Southeast Asia.

A meeting has been scheduled for July 14 at NASA Headquarters to discuss this matter further as well as possible LeRC support of other ASIA Bureau renewable energy projects. Bob Ichord ASIA/TR and Shirley Toth S&T/EY will represent AID.

UNISPACE '82 - Bill Brainard and John Toma attended a Unispace '82 coordination meeting in Washington on June 11 at NASA Headquarters. Representatives from AID and its contractors involved in Unispace were also in attendance. Brainard and Toma also visited Scientific Atlanta in Georgia to obtain instructions on set up of the 4.6 meter antenna being loaned to AID for Unispace 82.

Tangaye, Upper Volta - A new roof has been installed on the mill building to replace the one blown off during a recent storm. The mill and water pump continue to operate satisfactorily. Mill operating time has been averaging 45 hours per week.

CENTER <u>Lewis Research Ctr.</u> RESPONSIBILITY: APPROVAL <u>W. MASICA</u> ACCOMPLISHMENT <u>W. J. BIFANO</u>	MASTER PROGRAM/PROJECT SCHEDULE PROJECT: PHOTOVOLTAIC DEVELOPMENT AND SUPPORT PROGRAM <div style="border: 1px solid black; border-radius: 50%; width: 30px; height: 30px; display: flex; align-items: center; justify-content: center; margin: 0 auto;"> 263 LEVEL </div>	STATUS AS OF <u>June 30, 1982</u> <small>(DATE) (INITIALS)</small>
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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	COMPLETE FOR PV MEDICAL APPLICATIONS																	
4.1.1 SURVEY, ANALYSIS AND SELECTION																		
4.1.2 SYSTEM DEFINITION STUDY	<div style="border: 2px solid black; height: 15px; width: 100%; position: relative;"> K C </div>																	
4.2 FIELD TEST SUPPORT																		
4.2.1 PROJECT DEFINITION	<div style="border: 2px solid black; height: 15px; width: 100%; position: relative;"> I V M E H S </div>																	
4.2.2 LOAD IDENTIFICATION																		
o CATALOG OF MEDICAL APPLIANCES	<div style="border: 2px solid black; height: 15px; width: 100%; position: relative;"> K C </div>																	

NOTES:

<p>1... N = RESCHEDULED MILESTONE</p> <p>A AWARD CONTRACT OR GRANT</p> <p>B BEGIN</p> <p>C ACTIVITY COMPLETE</p>	<p>K CONTRACT COMPLETE</p> <p>R RELEASE RFP OR IFB</p> <p>V SITE VISIT</p> <p>P PROCUREMENT</p>	<p>T TESTING</p> <p>a ANNUAL REVIEW</p> <p>b ANNUAL OPERATING PLAN COMPLETE</p>	<p>S - Senegal/Mali/UV TDY</p> <p>I - Indonesia TDY</p> <p>M - Medical Systems TDY</p> <p>E - Egypt TDY</p> <p>H - Haiti/Barbados TDY</p>
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MASTER PROGRAM/PROJECT SCHEDULE

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PROJECT:

PHOTOVOLTAIC
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2 & 3
LEVEL

STATUS AS OF June 30, 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)																		
4.3.2 MEDICAL SYSTEMS																		
o CONTRACT FOR DESIGN, DEVELOPMENT AND DEPLOYMENT																		
4.3.3 REMOTE EARTH STATION(S)																		
o CONTRACT FOR DESIGN, DEVELOPMENT AND DEPLOYMENT																		
4.4 TRAINING AND INFORMATION.																		
5.0 PROJECT MANAGEMENT																		

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

2

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FINANCIAL STATUS

OBLIGATIONS AND COSTS FOR TOTAL PROJECT, INCLUDING PURCHASES, PERSONNEL EFFORT AND TRAVEL.

RESPONSIBILITY:

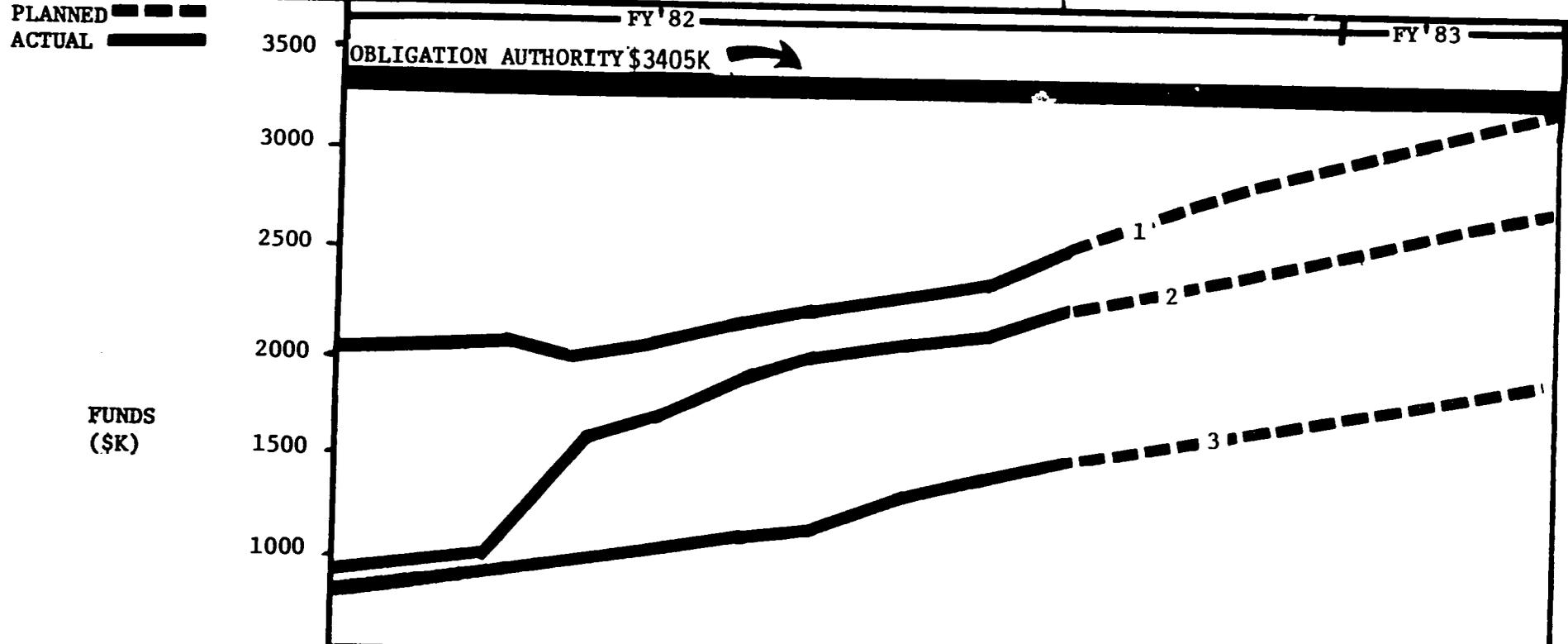
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PROJECT: PHOTOVOLTAIC DEVELOPMENT AND SUPPORT PROJECT

2&3 LEVEL

STATUS AS OF June 30, 1982
(DATE)



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						
2	Obligations (Actual)	940	963	1780	1794	1996	2015	2127	2187	2235						
3	Costs (Actual)	862	921	971	986	1027	1180	1306	1429	1513						

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

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IN-HOUSE PERSONNEL

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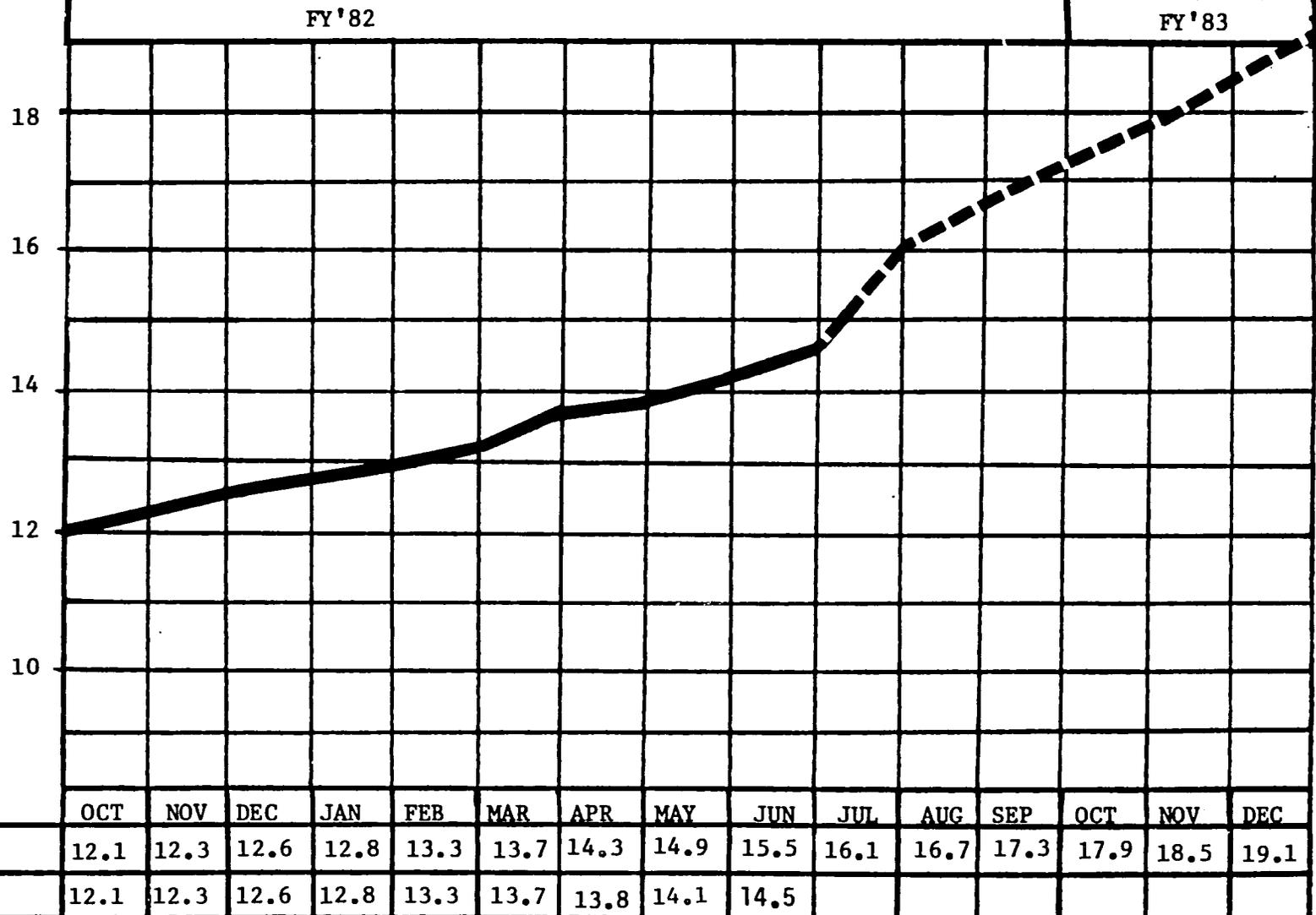
PHOTOVOLTAIC
DEVELOPMENT AND SUPPORT
PROJECT

283
LEVEL

STATUS AS OF June 30, 1982
(DATE)

PLANNED 
ACTUAL 

Cumulative Person Years



Total	Planned	12.1	12.3	12.6	12.8	13.3	13.7	14.3	14.9	15.5	16.1	16.7	17.3	17.9	18.5	19.1
	Actual	12.1	12.3	12.6	12.8	13.3	13.7	13.8	14.1	14.5						

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D. Sprague	T. Georges
J. Zedalis	H. Keller
C. Duisberg	Chief, Health and
B. Turner	Nutrition Division
	(Bureau for Latin
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A. Long	500-305

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