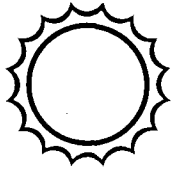


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Sandia Laboratories
Solar Energy



San Francisco
Operations
Office

SOLAR THERMAL POWER

**Large
Power
Systems
Applications**

**STATUS LETTER FOR
JANUARY 1980**

L. V. GRIFFITH, EDITOR
LARGE POWER SYSTEMS DIVISION
SANDIA LABORATORIES, LIVERMORE

ROBERT W. HUGHEY, DIRECTOR
SOLAR ENERGY DIVISION
SAN FRANCISCO OPERATIONS

PROGRAM ELEMENT SUMMARY

CENTRAL RECEIVER SYSTEMS

This report, issued monthly, covers the portion of the Solar Thermal Power Systems Program which is directed toward systems applications -- primarily Central Receiver system applications to electrical power generation at 10 MWe and above, but also with consideration of direct, high temperature thermal applications and of alternative collector configurations. The Central Receiver concept employs a field of individually guided mirrors called heliostats that redirect the sun's energy to a receiver mounted on top of a tower. In the receiver, the radiant solar energy is absorbed in a circulating fluid and is then transported to an electrical power generation subsystem or to an industrial thermal process; excess thermal energy may be stored for later use, if operationally desirable and economically justifiable.

Responsibility for managing the development and assessment of large solar thermal power systems for various applications has been delegated by DOE Headquarters to the San Francisco Operations Office. Technical management is drawn from Sandia Laboratories, Livermore, and the Aerospace Corporation.

MILSESTONES/HIGHLIGHTS

- VEDA Unified Heliostat Array Life-Cycle Cost -- Negotiations are complete on this award, and work will start early next month. Results will be presented at the Fall, 1980 Central Receiver Semi-Annual Review.
- Cost Estimating Contract -- Kaiser Engineers has just been contracted to provide an independent evaluation of the capital cost estimates for solar central receiver hybrid and advanced water/steam systems. The objective is to assure that cost estimating is reduced to a common set of assumptions and cost bases.
- Westinghouse Value Analysis -- The Westinghouse value analysis contract will be expanded to include an evaluation of solar central receiver plants in the Pacific Gas & Electric (PG&E) utility system. This is a useful complement to the current study which models solar power's value in synthetic utilities.
- Repowering -- A draft of the Repowering Program Plan has been written and is being circulated in industry and government for comment.

MILESTONES MISSED

- Several "Technology Comparison Milestones" were rescheduled for completion in early April. Rescheduling was necessary because of delays in contract starts.

PROBLEMS

- None

COMING EVENTS

- Repowering midterm reviews are scheduled throughout February and March. See Table 1 on the following page.

TABLE 1
 Repowering/Industrial Retrofit
 Midterm Meeting Schedule

<u>Prime Contractor</u>	<u>Meeting Date</u>	<u>Meeting Location</u>	<u>Program Manager</u>
1. Foster Wheeler	Feb. 26, 1980	Provident Oil Co., Phoenix, AZ	Ramjee Ragahaven
2. Arizona Public Service	Feb. 27-28, 1980	APS, Tucson, AZ	Eric Weber
3. PFR Inc.	Feb. 28-29, 1980	Valley Nitrogen Prod., El Centro, CA	Tzvi Rozenman
4. El Paso Electric Co.	Feb. 29-Mar. 1, 1980	El Paso Electric, El Paso, TX	Jim Brown
5. Black & Veatch	Mar. 3-4, 1980	PSO, Oologah, OK	Sheldon L. Levy
6. McDonnell Douglas	Mar. 3-4, 1980	Sierra Pacific, Reno, NV	C. R. (Bob) Easton
7. Boeing	Mar. 5-6, 1980	U. S. Gypsum, Sweetwater, TX	D. K. (Don) Zimmerman
8. Martin Marietta	Mar. 7, 1980	Sandia Labs, Livermore, CA	David N. Gorman
9. Rockwell-ESG	Mar. 7-8, 1980	WTU, Haskell, TX	Tom Springer
10. General Electric	Mar. 11-12, 1980	SPS, Earth, TX	Jim Elsner
11. Northrup, Inc.	Mar. 13-14, 1980	ARCO, Bakersfield, CA	R. L. Henry
12. Rockwell-ESG	Mar. 13-14, 1980	TESCO, Monahans, TX	Tom Springer
13. McDonnell Douglas	Mar. 21, 1980	Gulf, Denver, CO	L. W. Glover

Unsolicited Proposals
(WBS 00.01.00)

SRI Mesoscale Weather Study -- It appears that while a hypothetical 100-MWe plant at Barstow could modify the local climate to the extent of causing cloudiness and precipitation under some specialized assumptions, (summer day, maritime humidity conditions prevailing well inland) it will have no significant effect under normal weather conditions. Model runs are currently underway for winter weather conditions. Possible follow-on activities include: (a) application of the current two-dimensional model (normalized height above terrain vs. distance along wind vector) to a site at the eastern extremity of the "Sun-Belt" in Texas/Oklahoma, (b) adaptation of an existing three-dimensional model to produce more realistic simulations. A letter pre-proposal will be submitted by SRI early next month for review and discussion.

El Paso Electric Co. - Feedwater Heating Study -- El Paso Electric (EPE) is pursuing an analysis of the economics and fuel savings from the use of a solar powered feedwater heating system in an electric utility plant. To date they have completed a comparison of their proposed system versus systems previously studied by FIRL, Sheidahl, and Westinghouse. Differences include collector technology, working fluid, and thermal storage utilization.

The economic analysis has also been completed and it shows no benefit from solar feedwater heating for the economic assumptions used. Some slightly different scenarios can show a positive savings and will be discussed further in their final report.

Energy Foundation of Texas (EFT) Vortex Shedding Wind Tunnel Study -- Previous experience with a variety of full-size heliostats and numerous analyses have all indicated that vortex shedding contributes little to the stress problem. In view of the limited relevance and value of this work and in view of the extremely constrained operating budget for the CRS Program it is recommended that this effort not be funded. Because of the broad coverage of the EFT seven proposal package across various TPS program elements, it is requested that HQ notify EFT of this recommendation.

Generic Studies
(WBS 01.01.01)

Small Systems -- A study has begun at Sandia Livermore to define optimized central receiver systems. The technical and economic feasibility of providing small loads with mixed (high and low) quality power from solar central receivers will be assessed. This study will extrapolate from previous designs of larger systems and draw heavily on the complementary studies at SERI, Battelle, and McDonnell Douglas. The Sandia analysis will study the component and overall cost effectiveness of small cogeneration, repowering, and total energy applications. This information will serve to identify areas where research is needed.

Steam Industrial Process Heat (IPH) Systems
(WBS 01.01.01)

Foster Wheeler Development Corporation (FWDC) is to prepare a conceptual design of a solar powered steam generating system for a .092 m³/s crude oil refinery to be constructed near Phoenix, Arizona, by the Provident Energy Company, Inc. The refinery is scheduled for operation in 1984, with a planned average steam consumption of 21.4 kg/s on an annual basis. The refinery will be equipped with three 12.6 kg/s oil-fired boilers that will operate in parallel to produce superheated steam at 4.13 MPa-gage and 371°C. The refinery will utilize steam at the generated conditions and at reduced conditions of 1.21 MPa-gage and 0.34 MPa-gage as dictated by the various process and driver requirements of the refinery.

The solar steam generating system will be designed to operate in parallel with the refinery boilers to supply 20 percent of the annual steam needs. As steam is generated by the solar plant, the refinery boilers will be turned down to minimum load conditions to conserve fuel while still providing the capability of ramping rapidly to full load should sudden increases in steam demand arise.

Trade off studies on the solar receiver configuration, method of superheating, and the need for buffer storage are continuing.

McDonnell Douglas/Gulf Research - Mt. Taylor Uranium Mine -- The objective of this study is to develop a site-specific conceptual design that (a) provides practical and effective use of solar energy for industrial retrofit of process heat at the Gulf Mt. Taylor Uranium Mill; (b) has the potential for construction and operation by 1985; (c) makes maximum use of existing solar thermal technology; and (d) provides the best possible economics for the mill.

The objective is pursued through the accomplishment of seven tasks as follows: (1) system Requirements Specification (SRS); (2) Selection of the Site-Specific System Configuration; (3) Plant Conceptual Design; (4) Plant Performance Estimates; (5) Plant Cost Estimates and Economic Analysis; (6) Development Plan; and (7) Program Plan and Management.

Task 1 was completed this month and incorporates changes to the SRS as recommended by Sandia. Task 2 was continued as planned for the system sizing and thermal storage trade studies. The control strategy trade study has been deferred to next month, because the mill piping and instrumentation diagrams (P&ID's) have just become available. Task 3 effort is limited to only activities that are common to either system alternative until system selection is completed. Initial task 4 and 5 effort has been completed and will not resume until next month to provide support for the system selection under task 2. Task 6 will be initiated at a later time in accordance with the Program Plan and task 7 continues as required to provide effective program management and reporting.

Steam Electric Systems
(WBS 01.01.02)

MDAC 70-Tube Pilot Plant Receiver SRE -- Following unsuccessful attempts to tune the CRTF field and flux reconcentrators to achieve transverse flux uniformity, the commercial-flux testing of 70-tube panel was discontinued on January 11. The existing SAN contract, retained in force to cover administrative support and instrumentation rental, will be closed out next month, with an estimated net fund recovery of about \$50K. If a total of \$460K in Plant & Captial Equipment funds can be made available to SAN (\$200K is presently on hand), the receiver SRE can be fully capitalized at the same time; the approximately \$500K in operating funds thus released would greatly assist in relieving present and future budget pressures.

ESG/TESCO Repowering Utility Advisory Committee Meeting -- This voluntary panel was formed by ESG and its repowering partner Texas Electric Services Company (TESCO) to review the progress of the repowering design. The second meeting was held January 22, 1980 at the Airport Marina Hotel, Albuquerque NM. Sixteen utilities attended, as well as, personnel from Aerospace, EPRI, the City of Austin TX, Sandia Livermore and Albuquerque, the Users Association, and the ESG/TESCO team. Brief presentation topics included the ESG/TESCO repowering concept, economics of solar, and Repowering as a step toward central receiver commercialization. Working groups were established to respond to the presentations. Summaries of these group sessions will be distributed by ESG.

Cogeneration
(WBS 01.01.03 or 01.02.03)

Central Receiver Cogeneration Facility RFP -- Cogeneration is an element of the Solar Central Receiver Systems Program. Solar cogeneration will utilize solar central receiver technology integrated into an existing or new cogeneration facility for the combined production of electrical/mechanical energy and other useful thermal energy. Current plans are to issue a solicitation in February of this year which will call for proposals for site-specific conceptual design for a subsequent construction project with potential for operation by 1986. The solar cogeneration project has been expanded to include "District Heating" as well as industrial process heat. Proposals will be requested in two categories, one involving solar cogeneration with Industrial Process Plants, the other involving solar cogeneration with District Heating facilities. The later will include on-site facilities that serve residential, institutional, commercial or military complexes. The solicitation will encourage the offerors to give special consideration to the selection of central receiver technology (gas or liquid cooled receivers) and applications (solar fraction, plant size, etc.) which will result in an adequate demonstration project for solar cogeneration. It is expected that the proposals will be in the range of 5 MW_T to 25 MW_T but others will be considered.

This solicitation was originally funded with \$800K of Plant Engineering and Design funds. Termination of the Fort Hood Project has made it possible to broaden the scope with \$400K in operating funds.

Gas Industrial Process Heat (IPH) Systems
(WBS 01.02.01)

Boeing, U. S. Gypsum, Gypsum Drying -- An informal review of the U. S. Gypsum Plant Solar Retrofit Program was held with the Boeing technical team. Various options with respect to gas circulating equipment were discussed in detail. A decision has been made to base case a gas turbine instead of a turboexpander to drive the compressor. A gas turbine has a number of advantages including easier installation, lower cost, less energy required to start, and overall system flexibility. Boeing noted that U. S. Gypsum's primary concern is heliostat cost. An encouraging note: U. S. Gypsum indicated to Boeing that they may be willing to cost share in the project up to the level of the nth plant.

PFR Engineering/Valley Nitrogen Producers (VNP) Industrial Solar Repowering Conceptual Design -- An informal review of this contractors progress was held at PFR Engineering January 21, 1980. Since this concept and design is new to the central receiver program more supporting detail is provided to describe current progress. The preparation of the desired product, ammonia, requires nitrogen (from air) and hydrogen. The last is obtained by reacting steam and methane over a catalyst in a reactor commonly called a reformer. To achieve large conversion amounts of hydrogen, the reformer operates at elevated temperatures ~870°C (1450°F); this temperature is presently achieved by radiant heating of the reformers with natural gas fired burners. It is the natural gas used for heating the reformers that the PFR/VNP team proposed to partially displace by using a solar heated reformer.

PFR has assumed that materials, operating conditions of pressure, temperature and flow, and catalysts will be as close to the state of the art as possible. (See P&G visit discussion below). Major emphasis is upon solar reformer design, integration and process optimization. The solar reformer will be added to an existing process and must be matched with other reactors. A parallel arrangement with the existing fired reformer is currently favored. PFR claims this is superior to the series arrangement originally proposed because pressure drops are matched and temperatures are lower in value controlled feedlines.

Receiver limits of 1200°C for refractory wall materials and 870°C for reformer tube alloys have been set. Six candidate alloys are being considered with ultimate selection dependant upon the desired creep fatigue properties, material availability, and cost. Covering the cavity aperature reduces the thermal cycling frequency to that characteristic of present commercial reformers PFR claims.

To assess current operating requirements for reformers a user site was visited.

Proctor and Gamble Manufacturing Co. Long Beach, CA has a steam methane reforming plant which is used to supply hydrogen gas for vegetable oil hydrogenation. P&G purchased the hydrogen plant approximately 25 years ago. The reformer is supplied with untreated natural gas and operates at 2 atmospheres pressure and 1400°F + 50°F. Hydrogen of 95% + 1/2% purity is produced Monday through Friday; the plant is shutdown completely Friday night. From a cold start, approximately six to eight hours are required to re-establish desired hydrogen purity and production rates. Except for start up and shut down, control is automatic and unattended, approximately 1950's technology. P&G is replacing this unit with an off-site supply of hydrogen, transported and stored as a cryogenic liquid. The source is a nearby petroleum cracking unit which produces hydrogen as a by product.

STMPO Operations
(WBS 01.03.01)

SAN/SED is working closely with STMPO to coordinate requirements and scheduling of operating funding support required through plant checkout. This process is also closely integrated with the planning for Pilot Plant operational testing, refinement of the FY81 budget, and development of FY82 and out-year budgets.

The existing Purchase Order with White Sands Missile range carries sufficient funding for approximately one month of further tests; the following periods have been tentatively identified as available in 1980; - 1 week; July - 2 weeks; August - 1 week. The period of performance has been extended through the end of FY80 to accommodate STMPO or SFDI test requirements.

Pilot Plant Operations
(WBS 01.03.02)

10MWe Pilot Plant Project Technical Overview and Planning Barstow Costs -- Sandia is attempting to assign and order Barstow construction costs and cost estimates into the construction cost codes and account structure established for the ACR, hybrid, repowering and other central receiver programs. The purpose of this exercise is to highlight recurring and non-recurring cost on a subsystem basis and to separate out costs which would not be necessary for a normal power plant e.g. visitors center special diagnostic information.

STMPO has agreed to properly assign cost and budget information available from a variety of sources (Forms 44's, SFDI phase I and II cost estimates, long lead purchases, and separately contracted bid packages, etc.) The goal is to identify these subsystems and components which can benefit from advanced development efforts or redesign and accurately access one-time expenditures.

In cooperation with STMPO, a rough draft Management Plan has been prepared for the Pilot Plant operational testing period (including the transition from design through construction, checkout and acceptance). Following

discussion and further development during the week of February 4, a revised draft will be prepared for review with George Kaplan at SAN February 13-15. We expect to meet the March 31 schedule for approval of the Plan and designation of the Director of Test Operations ("Test Manager").

The current figures for operating requirements (for a two-year operational testing period following IOC) have been identified:

Item (Source)	\$K by FY: 80B/A	80B/O	81BA	81B/O	82B/A	82B/O	Total
Heliostats (MMC)	123	4	0	120	10	9	
Other Solar S/S (MDAC)	1290	915	575	946	163	167	
	1413	919	575	1066	173	176	

Operating estimates for the Test Manager/Test Director function, and the excess costs for plant separation by SCE, for which DOE is liable, are currently under development, and will be factored into budget planning as they become available.

International Programs
(WBS 01.04.00)

U. S./Italian Cooperation -- Mr. Giorgio Cefaratti and Mr. Giorgio Dinelli from ENEL, the Italian National Electricity Generating board, visited Sandia Livermore on January 14-15, 1980. Their visit was arranged by Mathew Sand, SERI, for the purpose of establishing the details of mutual participation in the "Utility Applications Study of Solar Central Receiver Technology" in the Italian electric grid. Results of the meeting included a detailed statement of study tasks for both ENEL and Sandia, a schedule for the study, technical specification for the study, and reporting and review procedures. Initiation of this project is subject to final approval of The Annex by the U. S. and Italy. This will be coordinated by SERI.

The first day of the meeting was intended to establish the current solar central receiver technology available at Sandia which would be the basis for U. S. participation in the study. This was accomplished by having experts in the various technologies present the current status of their work. Copies of all vugraph material used during the presentations were provided to Mr. Dinelli and Mr. Cefaratti. Mr. Dinelli gave a brief description of ENEL's solar energy activities with emphasis on Italy's participation in the EURELIOS project, the European Economic Community (EEC) 1 MWe Experimental Solar Thermal Electrical Power Plant. EURELIOS is a joint project supported by the EEC and three member countries: Federal Republic of Germany, France, and Italy. This 1 MWe water/steam plant will be built at Adrano, Sicily, Italy. Mr. Cefaratti provided Sandia with several papers describing EURELIOS which had been presented at conferences on solar energy.

Having established the technology base for the Utility Applications Study the second day was used to define in detail the technologies, plant specifications, schedule, and reporting for the study. Sandia will provide ENEL with preliminary 100 MWe plant definitions and the computer code, DELSOL, which will be used to determine solar central receiver conceptual designs applicable in Italy. ENEL will provide Sandia an Italian data base including insolation, electric generating grid demand and loads, economics, and Italian construction costs for the preliminary 100 MWe plants. Using all of this information, conceptual designs of several solar central receiver electric power plants will be developed. These conceptual designs will be used by both ENEL and Sandia to assess the Utility Applications in Italy. ENEL plans to use their own in-house economic assessment techniques while Sandia will follow its current procedure of utilizing the Westinghouse economic assessment capabilities.

IEA/SSPS Central Receiver Overview
(WBS 01.04.02)

IEA -- The Small solar Power Systems (SSPS) program had its groundbreaking ceremony on January 17, 1980 at Almeria, Spain. The ceremony was attended by officials from all the participating countries, prime contractors to the project, and representatives from the press. The U. S. representative was Ms. Omi Walden, Special Assistant to the secretary of the Department of Energy. Ms. Walden was accompanied by Mr. Selvage and Dr. Bramlette both from Sandia.

After the groundbreaking ceremony on January 18, the SSPS Executive Committee (EC) met. One item on the agenda at the EC meeting was heliostat procurement for the SSPS Central Receiver System (CRS). The EC approved the hardware procurement for the SSPS/CRS heliostat by the DOE as part of the Barstow heliostat procurement and allowed a 2.0 million deutsche mark credit toward the U. S. 1980 contribution. Assembly, installation, and check-out of the SSPS/CRS heliostat field is covered by a contract between the SSPS Operating Agent and Martin Marietta.

CENTRAL RECEIVER SYSTEMS FISCAL STATUS

San Francisco Operations Office

Obligations (B/A): SAN FY80 Operating, Capital Equipment and PE&D obligational authority remained constant in January at \$7,100K, \$200K and \$800K respectively. To partially offset the planned withdrawal of \$900K in operating funds to meet HQ obligations an additional \$260K has been requested in Capital Equipment funds. Completing the capitalization of the MDAC receiver SRE (See WBS 01.01.02) would release approximately \$500K in Operating B/A.

SAN obligations for January were \$1,122K vs. a planned \$700K; the \$422K (+60%) variance is due to delays in signoff by contractors of modifications mailed the previous month. Cumulative obligations are \$1,842K vs. a planned \$4,150K; the variance of \$2,308K (-56%) is due to: 1) termination of the \$1,500K Ft. Hood Project, and 2) several contracts/modifications still out for signature.

Cost Status (B/O): SAN FY80 Operating, Capital Equipment and PE&D costing authority remained constant for January at \$7,429K, \$200K and \$800K, respectively, for a total B/O of \$8429K.

Continuing delays in conversion to and startup of the FORS accounting system preclude provision of cost planning and status data below the ET-S level. Cost charting will be resumed once the FORS system is fully implemented.

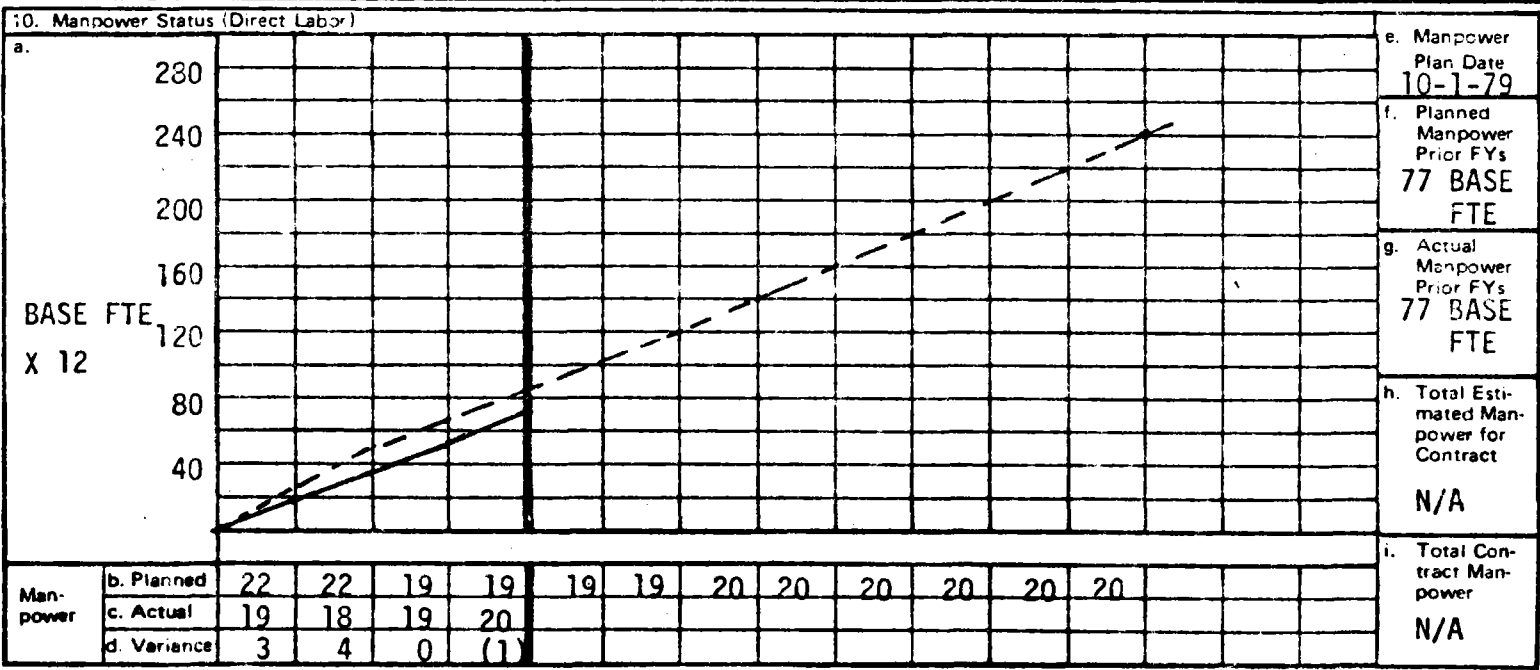
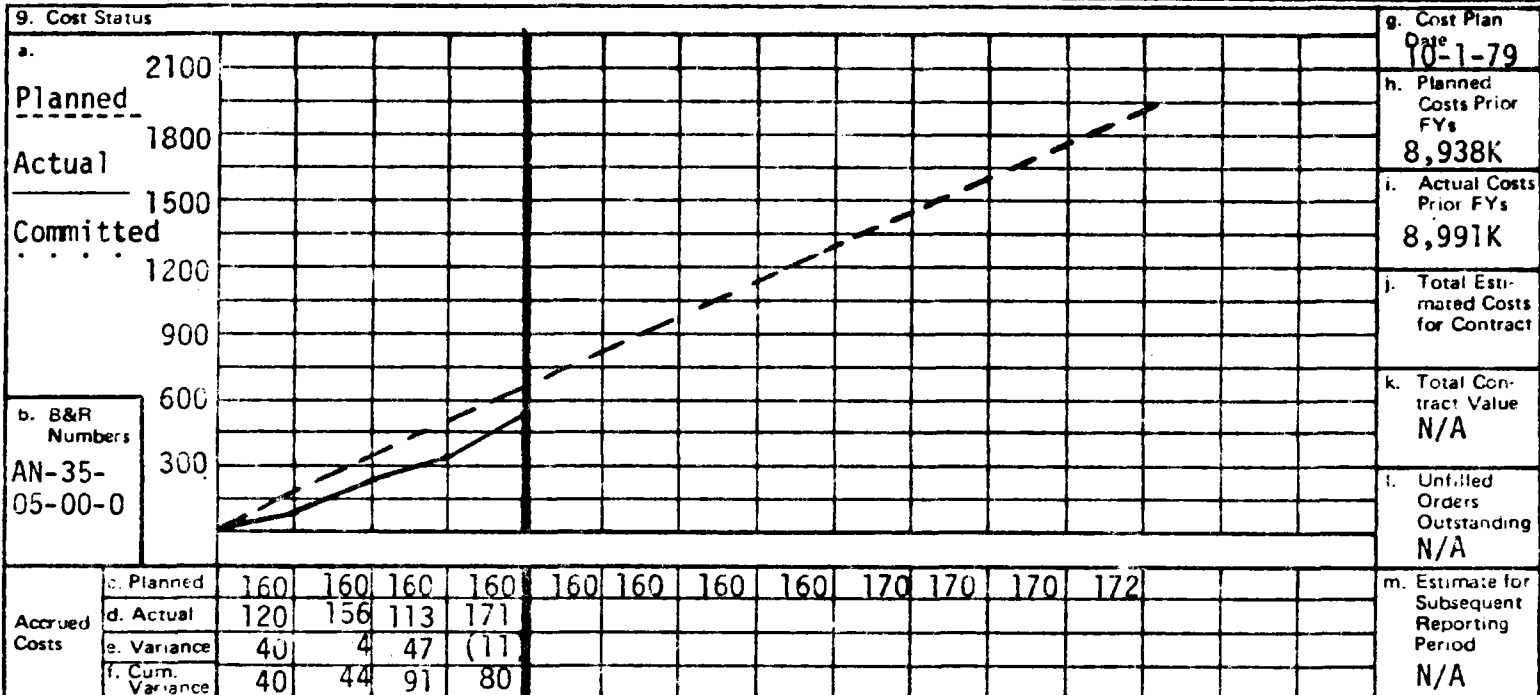
Financial Status (SLL)

The Financial Plan dated 12/27/79 for the month of January 1980 authorizes \$1,750K as Budget Authority (BA) for FY-80. Costs to date are \$560K. Reserves for Salaries, internal support and other commitments are \$1,090K. This leaves a balance to date of \$100K.

CONTRACT MANAGEMENT SUMMARY REPORT

1. Contract Identification SOLAR LARGE POWER SYSTEMS APPLICATION		2. Reporting Period <u>2 Jan.</u> through <u>31 Jan.</u>	3. Contract Number AN-35-05-00-0
4. Contractor (Name and Address) SANDIA LABORATORIES, LIVERMORE, CALIFORNIA		5. Contract Start Date FY75	6. Contract Completion Date N/A

7. Months	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	& FY 80
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OVERALL LPSA OBLIGATION STATUS

U.S. DEPARTMENT OF ENERGY

FORM DOE 538
(1/78)

CONTRACT MANAGEMENT SUMMARY REPORT

FORM APPROVED
OMB NO. 38R-0190

1. Contract Identification LARGE POWER SYSTEMS APPLICATIONS (WBS 1.0)					2. Reporting Period 2 Jan. through 31 Jan.					3. Contract Number					
4. Contractor (Name and Address) SAN FRANCISCO OPERATIONS OFFICE										5. Contract Start Date N/A					
										6. Contract Completion Date N/A					
7. Months		O	N	D	J	F	M	A	M	J	J	A	S	FY - 80	
9. Cost Status Obligation Status															
6. Planned														Plan Date - 12/5/79***	
Actual 12M														Planned Prior FY8 Obligations	
Authority 10M														\$12,400K	
8M														Actual Obligations Prior FYs *	
6M		\$11,588K													
4M		Total Estimated Accrued Obligations, FY80**													
2M		\$ 8,100K													
d. B&R Numbers Oper.: AN350001 PE&D: 3921 000															
\$K, Planned		0	160	3290	1700	300	100	1000	0	0	300	800	250	***	
Actual		0	125	595	1122									(V)	
Variance		0	35	2695	578										
Cumulative		0	35	2730	3308										

* Operating plus PE&D

** Operating, PE&D and Capital Equipment

*** Planning base is Annual Procurement Plan submitted 9/19/79 (\$7,900K Oper. & PE&D). APP is under revision to reflect projected final FY80 budget. Obligation Plan will be revised to suit.

MILESTONE SCHEDULE AND STATUS REPORT

ID-- CENTRAL RECEIVER SYSTEM TASKS		WBS- WBS - 1.1													REPORTING PERIOD											
		START 04/01/79 END 09/30/83													01/02/80 THRU 01/31/80											
		FY 80													FY 81				FY 82				83			
		O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	Q2	Q3	Q4	Q1	Q2	Q3	Q4		PL	AC
01.01	STEAM WORKING FLUID SYSTEMS																									
01.01.01	---INDUST PROC HEAT-RETRO/NEW						∇E				∇G		∇H	∇J							∇K					
01.01.02	---ELECTRIC REPOWERING - NEW			∇G		∇J			∇L		∇M		∇N	∇O							∇P		19	19		
01.01.03	---COGENERATION - RETROFIT/NEW							∇C												∇E	∇F		17	17		
01.02	GAS WORKING FLUID SYSTEMS																									
01.02.01	---INDUST PROC HEAT-RETRO/NEW						∇G				∇J		∇K	∇L							∇M		19	19		
01.02.02	---ELECTRIC - REPOWERING/NEW			∇E			∇F			∇H		∇J	∇K								∇L		19	19		
01.02.03	---COGENERATION - RETROFIT/NEW						∇B	∇D			∇G									∇F			17	17		
01.03	10MWE PILOT PLANT PROJECT																									
01.03.01	---STMPO OPERATIONS	∇F		∇G	∇J						∇K												19	19		
						▲H																				

15

MILESTONE SCHEDULE AND STATUS REPORT

ID-- INTERNATIONAL SUPPORT		WBS- 0841.000 START 10/01/78 END 09/30/80		REPORTING PERIOD 01/02/80 THRU 01/31/80																						
		FY 80					FY 81				FY 82				83	PL	AC									
		O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	Q2	Q3	Q4	Q1	Q2	Q3	Q4			
04.00.00	IEA SSPS CRS PROJECT	▽B					▽C				▽D				△	△	△	43	43							

IDENT	DESCRIPTION
01.01.A	STEAM WORKING FLUID SYSTEMS
01.01.01.A	---INDUST PROC HEAT-RETRO/NEW
01.01.01.E	E COMP CR TECH EVALUATION
01.01.01.F	F PUBLISH CR TECH USERS+ DJC
01.01.01.G	G COMP REFWR/IPH RETRO CON DN
01.01.01.H	H REG APPR FOR REPWR/RETRO PRO
01.01.01.J	J ISS REPWR/IPH RETROFIT PON
01.01.01.K	K AWARD 1ST REPWR/IPH RETRO CO
01.01.02.A	---ELECTRIC REPOWERING - NEW
01.01.02.F	F AWARD REPWR/IPH RETRO CONTR
01.01.02.G	G COMP BECHTEL DN FOR OIL/STEA
01.01.02.J	J COMP DN DOE/BR HYDRO/STEAM
01.01.02.L	L FINAL REP W/UTILITY MODEL ST
01.01.02.M	M COMP REPWR/IPH RETRO CON DN
01.01.02.N	N REG APPR FOR REPWR/RETRO PRO
01.01.02.O	O ISS REPWR/IPH RETROFIT PON
01.01.02.P	P AWARD 1ST REPWR/IPH RETRO CO
01.01.03.A	---COGENERATION - RETROFIT/NEW
01.01.03.C	C AWARD COGENERATION CONC DN
01.01.03.E	E COMP COGEN CONC DN CONTRACT
01.01.03.F	F ISS RFF FOR CONCEPT DESIGN
01.02.A	GAS WORKING FLUID SYSTEMS
01.02.01.A	---INDUST PROC HEAT-RETRO/NEW
01.02.01.G	G COMP CR TECH EVALUATION
01.02.01.H	H PUBLISH CR TECH USERS+ DJC
01.02.01.J	J COMP REPWR/IPH RETRO CON DN
01.02.01.K	K REG APPR FOR REPWR/RETRO PRO
01.02.01.L	L ISS REPWR/IPH RETROFIT PON
01.02.01.M	M AWARD 1ST REPWR/IPH RETRO CO
01.02.02.A	---ELECTRIC - REPOWERING/NEW
01.02.02.E	E COMP CD BECHTEL HY/GEN PLANT
01.02.02.F	F COMP CR TECH EVALUATION
01.02.02.G	G PUBLISH CR TECH USERS+ DJC
01.02.02.H	H COMP REPWR/IPH RETRO CON DN
01.02.02.J	J REG APPR FOR REPWR/RETRO PRO
01.02.02.K	K ISS REPWR/IPH RETROFIT PON
01.02.02.L	L AWARD 1ST REPWR/IPH RETRO CO
01.02.03.A	---COGENERATION - RETROFIT/NEW
01.02.03.B	B ISS RFP FOR CONCEPT DESIGN
01.02.03.D	D AWARD COGENERATION CONC DN
01.02.03.F	F COMP COGEN CONC DN CONTRACT
01.03.A	10MWE PILOT PLANT PROJECT
01.03.01.A	---STMPO OPERATIONS
01.03.01.F	F COMP PRE-PRO HELIO TESTS
01.03.01.G	G COMP VIS CTR DISPLAY FAB
01.03.01.H	H HELIO PROD CONTRACT PLACED
01.03.01.J	J INIT VISITOR CTR OPERATIONS
01.03.01.K	K COMP FINAL DN EVALUATIONS
04.00.00.A	IEA SSPS CRS PROJECT
04.00.00.B	B HELIOSTAT ACCEPTANCE
04.00.00.C	C RECEIVER ACCEPTANCE
04.00.00.D	D TURBINE ACCEPTANCE
04.00.00.E	E SUBSYSTEM TEST
04.00.00.F	F START UP

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