DOE/SF/10501--T1
(STMPO-801)

REVISED

SOLAR ONE
OPERATION AND MAINTENANCE REPORT #1
APRIL 1982

This report summarizes the operational activities and highlights maintenance work that was required during the month. Additionally, it presents plant statistics generated and an operation and maintenance cost summary.

It is planned to publish a report of this type each month to document O&M activities. If anyone has suggestions for improvement, please contact C.W. Lopez, Supervisor of Operation & Maintenance with recommendations.

Operating Highlights

- The turbine/generator was synchronized to the SCE grid at 3:09 p.m., Monday, April 12, 1982. The generator was loaded to 1.2MW net output for several hours.

- The operating staff is fully manned with four Operating Foremen and 15 operators. Operation and start-up testing of the plant is being implemented at a subsystem level.

- Receiver steam test 1030A was completed on April 16 and receiver blended temperature control test 1030B was initiated.

- A rental boiler fueled with excess caloria was moved on site to expedite conditioning of the thermal storage system and initiate the thermal storage warm-up and activiation tests 1040A.

Maintenance Activities

- The maintenance staff manning has been filled to budget levels (nine people) and maintenance training continues; however, work on most plant equipment is still being done under start-up labor jurisdiction.

- Problems with equipment included:

  - Generator air cooler temperature control valve and generator RTDs did not function correctly. No permanent damage.
  - Receiver tower main steam leads seismic restraints were found to be bound, the steam leads were galled and support "I" beams deformed.
  - Receiver panel 5 experienced high temperature gradients which caused panel warpage. No permanent damage.
  - Some receiver panel flowmeters were replaced with temperature compensated units in order to stabilize their bias set points.
  - Receiver panel inlet filters were inspected several times and found to be clean.
  - Several condensate pump trips were caused by a defective hotwell level transmitter.
  - A ground fault was discovered in TSS charging oil pump 302 inverter.

Plant Statistics

The statistics shown in Table 1 reflect the test and operational activities this month. In future reports, more statistics will be presented that can be used to determine plant capacity and availability factors. The test hours shown are hours credited for specific tests completed and do not include the time for start-up or shutdown. Plant outage hours have been categorized into scheduled and unscheduled and reflect outages due to plant equipment only.

	April	To Date
Energy Production (kwh)	56,400	56,400
Peak MW (net)	3.5	3.5
Test Hrs.	62	62
Plant Outage Hrs. (Total)	61	61
Scheduled	20	20
Unscheduled	41	41
Weather Outage	7	7

Operation and Maintenance Costs

A summary of the O&M labor, material, contract and other costs for the month of April 1982 are attached. Costs are categorized as follows:

Field Costs	-	Includes plant supervision, engineering, accounting, clerical, office supplies, and miscellaneous indirect expenses.
Operations	-	Includes total cost of operating expenses and staff.
Miscellaneous	-	Includes station supplies and rentals, safety and job training and site security.
Maintenance	-	Includes total cost of maintenance expenses and staff allocated to major plant subsystems.
Overheads	-	Includes costs associated with direct labor plus company administrative and general expenses.

SOLAR ONE

MONTHLY O&M COST SUMMARY
($ x 1000)

MONTH OF APRIL 1982

	LABOR	MATERIAL	CONTRACT	OTHER	TOTAL
FIELD OFFICE	4.9	–	1.8	2.4	9.1
OPERATIONS	59.4	–	–	.7	60.1
MISC. NON-PRODUCTIVE COSTS	8.0	–	–	.6	8.6
MAINTENANCE					
Supervision/Indirects	7.3	7.6	1.0	.2	16.1
Control System	1.8	.8	–	–	2.6
Receiver System	–	–	–	–	–
Thermal Storage System	.6	–	6.3	–	6.9
Collector System	1.9	–	–	.1	2.0
EPGS System	3.2	3.2	.3	5.2	11.9
Misc.	1.7	–	–	.2	1.9
SUB TOTAL	88.8	11.6	9.4	9.4	119.2
Injuries and Damages					.8
Division O.H.					22.6
TOTAL DIRECT					142.6
Workman's Compensation					8.7
Payroll Tax					30.9
Pension & Benefits					9.8
Administrative & General				A+G ADJUSTMENT	<2.9>
GRAND TOTAL					189.1

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DOE/SF/10501--T7
(STMPO-802)

SOLAR ONE
OPERATION AND MAINTENANCE REPORT #2
May 1982

This report summarizes the operational activities and highlights maintenance work that was required during the month. In addition, it presents plant statistics generated and an operation and maintenance cost summary.

Operating Highlights

- Receiver boiler panels continue to experience excessive lateral temperature gradients.
- Heliostat mirror assemblies are experiencing varying degrees of silver corrosion.
- A new peak turbine/generator load of 8.8MW (net) was achieved on 5-19-82 with steam conditions of 1400 psi, 950°F, and 92,000 lb/hr.
- SCE operators placed the plant in weekend service on 5-27-82 unassisted by McDonnell Douglas engineers.
- The first of the two TSS charging and extraction trains were water cleaned on 5-25-82.

Maintenance Activities

- The maintenance staff manning has been filled to budget levels (9 people) and maintenance training continues; however, work on most plant equipment is still being done under start-up labor jurisdiction.
- Problems with equipment include:
  - The 18 receiver boiler panels and 2 of the preheat panels were modified to allow their increased axial expansion.
  - The replacement of receiver main steam leak/seismic restraints.
  - Software development of the Data Acquisition System (DAS), Heliostat Array Controller (HAC), and the Beam Characterization System (BCS).

Plant Statistics

The statistics shown below reflect the test and operational activities this month. Energy production figures represent net kilowatthours produced while the generator was synchronized to the electric grid. The test hours shown are hours credited for specific tests completed and do not include the time for start-up or shut-down. Plant outage hours have been categorized into scheduled and unscheduled and reflect outages due to plant equipment only.

Plant Statistics	May	To Date
Energy Production (kWH)	225,400	281,800
Peak MW (net)	9.0	9.0
Test Hrs.	46.5	108.5
Plant Outage Hrs. (total)	59	120
Scheduled	30	50
Unscheduled	29	70
Weather Outage	34	41

Operation and Maintenance Costs

A summary of the O & M labor, material, contract and other costs for the month of May 1982 are attached. Costs are categorized as follows:

Field Costs	-	Includes plant supervision engineering, accounting, clerical, office supplies, and miscellaneous indirect expenses.
Operations	-	Includes total cost of operating expenses and staff.
Miscellaneous	-	Includes station supplies and rentals, safety and job training and site security.
Maintenance	-	Includes total cost of maintenance expenses and staff allocated to major plant subsystems.
Overheads	-	Includes costs associated with direct labor plus company administrative and general expenses.

LJW

SOLAR ONE

MONTHLY O&M COST SUMMARY
($ x 1000)

MONTH OF MAY, 1982

	LABOR	MATERIAL	CONTRACT	OTHER	TOTAL
FIELD OFFICE	12.8	.5	3.2	.3	16.8
OPERATIONS	101.8	-	-	.4	102.2
MISC. NON-PRODUCTIVE COSTS	10.3	.2	.1	.3	10.9
MAINTENANCE					
Supervision/Indirects	7.0	2.9	1.2	.2	11.3
Control System	8.0	-	.5	.3	8.8
Receiver System	2.2	-	.1	.5	2.8
Thermal Storage System	.9	-	.6	1.3	2.8
Collector System	3.0	.6	-	.3	3.9
EPGS System	5.5	1.4	.1	3.7	10.7
Misc.	5.4	.7	-	.1	6.2
SUB TOTAL	156.9	6.3	5.8	7.4	176.4
Injuries and Damages					.9
Division O.H.					30.2
TOTAL DIRECT	156.9	6.3	5.8	7.4	207.5
Workman's Compensation					
Payroll Tax					13.0
Pension & Benefits					45.9
Administrative & General					12.1
			AUDIT ADJUSTMENT		(.3)
GRAND TOTAL					278.2

DOE/SF/10501--T2
(STMPO-803)

SOLAR ONE
OPERATION AND MAINTENANCE REPORT #3
June 1982

This report summarizes the operational activities and highlights maintenance work that was required during the month. In addition, it presents plant statistics generated and an operation and maintenance cost summary.

Operating Highlights

- Receiver - stability tests were performed on the receiver feedwater pump speed pressure controllers with low flow at flash tank pressure and high flow at full operating pressure.
- The TSS tank valving has been restored and tank's venting is being directed to the Ullage Maintenance Unit (UMU) rather than to atmosphere.
- The turbine/generator tripped off the line at 1301 hours on Friday, 6-4-82, on generator undervoltage.
- A simulated cloud passage test was conducted on Tuesday, 6-15-82. Receiver steam was directed to the thermal storage charging heat exchanger successfully on Monday, 6-14-82.
- Collector field reflectivity measurements evidence a 72.6% reflectivity which is considerably less than design (91%).
- Receiver generating steam for turbine and thermal storage.
- The generator experienced a high temperature excursion on 6-22-82.

Maintenance Activities

- The maintenance staff manning has been filled to budget levels (nine people) and maintenance training continues; however, work on most plant equipment is still being done under start-up labor jurisdiction.
- Problems with equipment include:
  - Collector field power loss - HAC software revised to preclude failover on loss of collector field power.
  - PV-1001 (steam dump to condenser) was discovered to have a broken actuator piston.
  - The turbine/generator system underwent dynamic testing by Tom Eberly of the SCE Apparatus Department.
  - Station auxiliary load kWH meter was installed and functioning.

Plant Statistics

The statistics shown below reflect the test and operational activities this month. Energy production figures represent net kilowatthours produced while the generator was synchronized to the electric grid. The test hours shown are hours credited for specific tests completed and do not include the time for start-up or shut-down. Plant outage hours have been categorized into scheduled and unscheduled and reflect outages due to plant equipment only.

Plant Statistics	June	To Date
Energy Production (kWH)	56,569	338,459
Peak MW (net)	6.0	9.0
Test Hrs.	40.5	149
Plant Outage Hrs.(total)	84	204
Scheduled	16	66
Unscheduled	68	138
Weather Outage	31	72

Operation and Maintenance Costs

A summary of the O&M labor, material, contract and other costs for the month of June 1982 are attached. Costs are categorized as follows:

Field Costs	-	Includes plant supervision, engineering, accounting, clerical, office supplies, and miscellaneous indirect expenses.
Operations	-	Includes total cost of operating expenses and staff.
Miscellaneous	-	Includes station supplies and rentals, safety and job training and site security.
Maintenance	-	Includes total cost of maintenance expenses and staff allocated to major plant subsystems.
Overheads	-	Includes costs associated with direct labor plus company administrative and general expenses.

SOLAR ONE

MONTHLY O&M COST SUMMARY
($ x 1000)

MONTH OF JUNE, 1982

	LABOR	MATERIAL	CONTRACT	OTHER	TOTAL
FIELD OFFICE	16.8	-	2.2	-	19.0
OPERATIONS	59.1	.8	-	.2	60.1
MISC. NON-PRODUCTIVE COSTS	8.2	-	2.5	.1	10.8
MAINTENANCE					
Supervision/Indirects	6.2	9.2	.8	-	16.2
Control System	2.3	.1	.1	.5	3.0
Receiver System	1.6	-	-	-	1.6
Thermal Storage System	2.1	.1	.9	.6	3.7
Collector System	2.5	-	.1	-	2.6
EPGS System	8.8	.1	-	.8	9.7
Misc.	2.6	.7	-	-	3.3
SUB TOTAL	110.2	11.0	6.6	2.2	130.0
Injuries and Damages					.6
Division O.H.					19.6
TOTAL DIRECT	110.2	11.0	6.6	2.2	150.2
Workman's Compensation					
Payroll Tax					8.2
Pension & Benefits					29.2
Administrative & General					10.7
GRAND TOTAL					198.3

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DOE/SF/10501--T3
(STMPO-804)

SOLAR ONE
OPERATION AND MAINTENANCE REPORT # 4
July 1982

This report summarizes the operational activities and highlights maintenance work that was required during the month. In addition, it presents plant statistics generated and an operation and maintenance cost summary.

Operating Highlights

- Receiver steam dump valve oscillated under low conditions on 7-1-82. The receiver steam dump valve failed on 7-2-82 and was repaired under the direction of Control Components Incorporated (CCI).
- The thermal storage system charging train underwent activation on 7-7-82 and 7-8-82.
- The Beam Characterization System (BCS) was placed in automatic operation and functioned per design.
- On 7-22-82, a passing thunder storm caused several 33kV line voltage excursions. No equipment damage or failure occurred.
- The heliostat washing program resulted in an available power increase of 28%.

Maintenance Activities

- The maintenance staff manning has been filled to budget levels (nine people) and maintenance training continues; however, work on most plant equipment is still being done under start-up labor jurisdiction.
- Problems with equipment include:

-The receiver steam dump valve was repaired on 7-11-82 and was test operated on 7-12-82 and 7-16-82 in the presence of CCI.
-Thermal Storage System, valves and heat exchangers leaked on oil and water side.
-Receiver panels 8,13,14,19, and 21 inlet filter gaskets were replaced due to leaks.

Plant Statistics

The statistics shown below reflect the test and operational activities this month. Energy production figures represent net kilowatt hours produced while the generator was synchronized to the electric grid. The test hours shown are hours credited for specific tests completed and do not include the time for start-up or shut-down. Plant outage hours have been categorized into scheduled and unscheduled and reflect outages due to plant equipment only.

Plant Statistics	July	To Date
Energy Production (kWh)	98,500	436,959
Peak MW (net)	7.0	9.0
Test Hrs.	73.5	222.5
Plant Outage Hrs. (total)	98.5	302.5
Scheduled	56	122
Unscheduled	42.5	180.5
Weather Outage	40	112

Operation and Maintenance Costs

A summary of the O & M labor, material, contract and other costs for the month of May 1982 are attached. Costs are categorized as follows:

Field Costs	- Includes plant supervision, engineering, accounting, clerical, office supplies, and miscellaneous indirect expenses.
Operation	- Includes total cost of operating expenses and staff.
Miscellaneous Non-productive Costs	- Includes station supplies and rentals, safety and job training, and site security
Maintenance	- Includes total cost of maintenance expenses and staff allocated to major plant subsystems.
Overheads	- Includes costs associated with direct labor plus company administrative and general expenses.

SOLAR ONE

MONTHLY O&M COST SUMMARY
($ x 1000)

MONTH OF JULY

	LABOR	MATERIAL	CONTRACT	OTHER	TOTAL
FIELD OFFICE	9.9	—	2.3	—	12.2
OPERATIONS	57.1	9.5	-	4.7	71.3
MISC. NON-PRODUCTIVE COSTS	6.1	.3	3.6	—	10.0
MAINTENANCE					
Supervision/Indirects	9.3	5.0	1.0	-	15.3
Control System	3.8	5.5	4.3	-	13.6
Receiver System	4.2	-	-	3.7	7.9
Thermal Storage System	5.7	.2	-	-	5.9
Collector System	2.6	.1	-	-	2.7
EPGS System	2.9	1.3	.2	1.1	5.5
Misc.	4.2	-	.3	-	4.5
SUB TOTAL	105.8	21.9	11.7	9.5	148.9
Injuries and Damages					.4
Division O.H.					17.8
TOTAL DIRECT	105.8	21.9	11.7	9.5	167.1
Workman's Compensation					7.6
Payroll Tax					26.8
Pension & Benefits					7.3
Administrative & General					
GRAND TOTAL					208.8

DOE/SF/10501--T6
(STMPO-805)

SOLAR ONE
OPERATION AND MAINTENANCE REPORT #5
AUGUST 1982

This report summarizes the operational activities and highlights maintenance work that was required during the month. In addition, it presents plant statistics generated and an operation and maintenance cost summary.

Operating Highlights

.On August 6, the thermal storage tank was charged to its rated value, 575°F for the first time.

.An effort was made during August to determine the maximum plant generation capability using receiver steam. Despite a calculated load of 12 MW gross, the maximum achieved was 7.0 MW gross. An investigation of the heliostat reflectivity, receiver absorption coefficient, receiver radiant and convective losses, piping losses, and turbine system efficiency revealed that steam losses due to bypass and drain leaks were responsible for the power derating. After the leaks were repaired, the plant reached the rated 10 MW net load.

.On August 15, a turbine net load of 9.9 MW was achieved with a parasitic load of 0.9 MW. Insolation was 882 w/m^2 with 1739 out of 1818 heliostats in service. Turbine throttle conditions were 949°F, 1526 psig, and 99 klb/hr.

.Aerial and Ground Beam Safety Tests were performed to validate calculated eye hazards above and around the plant for various heliostat configurations. The tests developed by Tom Brumleve measured light intensity with a video camera. Preliminary results indicated that present operational safety procedures are satisfactory. Sandia is preparing a formal report which will document the results of the tests.

.One hundred random heliostat mirrors were checked by x-ray for water in the heliostat honeycomb area. Analysis showed approximately sixty percent of the heliostat tested contained some water. A large number of heliostats showed mirror corrosion; however, this represents a negligible loss of reflective area on the order of 0.002%.

.On August 24th, the turbine reached a net load of 3.4 MW on thermal storage (TSS) admission steam for the first time on two extraction trains. Turbine throttle conditions were 213 psig, 507°F, and 63 klb/hr.. Oil flow was 209 klb/hr. at 525°F.

.While charging the TSS tank on August 26, the plant weathered two severe insolation drops, 750 w/m^2 to 25 w/m^2. Both receiver and TSS remained in service.

Maintenance Highlights

.Oil and steam leaks developed in the thermal storage charging train subcooler and extraction boiler end flanges respectively. Both leaks were temporarily stopped by tightening end flange bolts. The leaks were apparently caused by daily start-up and shut-downs. Leaks in the receiver panels were also attributed to the same cause.

.The receiver main steam dump valve to the condenser required an extensive warm up period, delaying start-up, due to temperature differentials across the valve body. Heat tracing was installed to maintain the valve body at 400°F during start-up. A transient temperature study is in progress.

.While the turbine is operation on TSS admission steam, a bypass steam leak through the intermediate turbine shaft packing gland is causing turbine speed control and synchronization problems. Admission steam stop valves are being used for throttling til the leak is fixed. Awaiting General Electric recommendations.

.While cleaning out TSS extraction steam and feedwater lines, the hot well was contaminated by high iron concentrations of up to 1000 ppb. The entire system was cleaned by blowing down for several days.

Plant Statistics

.The statistics shown below reflect the test and operational activities this month. Energy figures represent net kilowatthours produced while the generator was synchronized to the electric grid. The test hours shown are hours credited for specific tests completed and do not include the time for start-up or shut-down. Plant outage hours have been categorized into scheduled, unscheduled, and reflect outages due to plant equipment only.

Plant Statistics	August	To Date
Energy Production (KWH)	142,305	579,264
Peak MW (net)	9.7	9.7
Test Hours	93.5	316
Plant Outage Hours (Total)	103.5	406
Scheduled	24	146
Unscheduled	79.5	260
Weather Outage Hours	112	224

Operation and Maintenance Costs

A summary of the O&M labor, material, contract and other costs for the month of May 1982 are attached. Costs are categorized as follows:

Field Costs	- Includes plant supervision, engineering, accounting, clerical, office supplies, and miscellaneous indirect expenses.
Operation	- Includes total cost of operating expenses and staff.
Miscellaneous Non-productive Cost	- Includes station supplies and rentals, safety and job training, and site security.
Maintenance	- Includes total cost of maintenance expenses and staff allocated to major plant subsystems.
Overheads	- Includes costs associated with direct labor plus company administrative and general expenses.

SOLAR ONE

MONTHLY O&M COST SUMMARY

($ x 1000)

MONTH OF AUGUST, 1982

	LABOR	MATERIAL	CONTRACT	OTHER	TOTAL
FIELD OFFICE	18.2	2.1	-	-	20.3
OPERATIONS	60.8	30.6	-	-	91.4
MISC. NON-PRODUCTIVE COSTS	4.6	3.6	.2	-	8.4
MAINTENANCE					
Supervision/Indirects	12.2	13.2	3.8	17.7	46.9*
Control System	4.6	.1	3.7	-	8.4
Receiver System	2.1	.1	4.2	.1	6.5
Thermal Storage System	6.4	1.6	1.6	4.0	13.6
Collector System	.2	.1	.1	.2	.6
EPGS System	4.5	.3	2.0	-	6.8
Misc.	3.0	1.8	-	-	4.8
SUB TOTAL	116.5	53.5	15.6	22.0	207.7
Injuries and Damages					1.5
Division O.H.					18.6
TOTAL DIRECT					227.8
Workman's Compensation	Overhead amounts are derived from a combination of rates for Start Up and O&M Expenses.				.4
Payroll Tax					8.0
Pension & Benefits					25.6
Administrative & General					17.4
GRAND TOTAL					279.2

* Reflects approximately $27,000 of Start Up Costs.

RA/PES 11/16/82

dlg

DOE/SF/10501--T5
(STMPO-806)

SOLAR ONE
OPERATION AND MAINTENANCE REPORT #6
SEPTEMBER 1982

This report summarizes the operational activities and highlights maintenance work that was required during the month. In addition, it presents plant statistics generated and an operation and maintenance cost summary.

Although the main objective for September was testing of the TSS charging and extraction systems, September was the third highest production period (after May and August). This generation level was achieved despite the highest number of testing hours and the most time lost due to overcast skies for any month since plant operation began in April, 1982.

Operating Highlights

.The thermal storage system (TSS), using the auxiliary oil pump, began supplying all plant auxiliary steam systems this month instead of using the electric boiler. The use of the TSS to provide the auxiliary steam is a part of the normal operating procedure. In addition, the electric boiler had multiple circuit breaker and electrode failures. The cause of the electric boiler failures are under investigation.

.On September 15-16, the turbine averaged a net load of 0.9 MW for 11.8 hours on TSS extraction steam. The thermal storage tank discharged from 85% to 20% full charge capacity. The thermal storage tank charge level is the percentage of oil above 550°F.

.On September 17, the turbine achieved a net load of 4.5 MW on extraction steam with both extraction trains at 50% oil flow.

.On September 23, the turbine transitioned successfully from receiver steam supply to receiver and extraction simultaneous steam supply to extraction steam supply only. Then the mode transitions were successfully accomplished in the reverse order. Pressure control was transferred from the turbine to the steam source and back to the turbine. Some logic control problems required operator intervention; however, in general the control system performed well.

.On September 29, the turbine achieved a net load of 5.6 MW on both TSS extraction trains.

Maintenance Highlights

.Flowmeter electronics on the TSS skids were moved to remote location because of local high ambient temperatures. This is consistent with a previous design change where the receiver flowmeter electronics were relocated from the receiver core area to an environmentally controlled remote station.

.Recurring steam flange leaks on the TSS extraction and charging trains were attributed to daily thermal cycling by the vendor, Wiegmann and Rose. The flange gaskets well be replaced and the flange bolts tightened to higher torque values during the next maintenance outage.

.The receiver core was modified to accommodate a skyclimber (a short work platform suspended by rope, suitable for lifting two men) to inspect and repair receiver boiler panels. The pyromark paint on the surface of the boiler panels is in satisfactory condition after six months of operation.

.The Data Aquisition System, DAS, had signal noise problems when communicating with the heliostat field. Loose connections in the heliostat tracking motors were tightened which seemed to solve the problem. Diagnostic testing continues.

.Contract construction crews installed missing thrust blocks and fire hydrant pads for the fire protection system.

.The TSS condensible heptane tank stores heptane liquid and vapor created in the thermal storage tank during charging operations. The 300 gallon heptane tank was discovered to be undersized, so a portable 6000 gallon tank was connected to the existing heptane tank to store excess liquid heptane for salvage. A nitrogen blanket is required since analysis revealed the heptane condensate has a flash point of 70°F.

Plant Statistics

.The statistics shown below reflect the test and operational activities for this month. Energy production figures represent net kilowatt hours produced while the generator was synchronized to the electric grid. The test hours shown are hours credited for specific tests completed and do not include the time for start-up or shut-down. Plant outage hours have been categorized into scheduled and unscheduled and reflect outages due to plant equipment.

Plant Statistics	September	To Date
Energy Production (KWH)	111,900	681,254
Peak MW (net)	9.2	9.7
Test Hours	115	460
Plant Outage Hours (Total)	75	481
Scheduled	37.5	181.5
Unscheduled	37.5	271
Weather Outage Hours	120	356

Operation and Maintenance Costs

.A summary of the O&M labor, material, contract and other costs for the month of September 1982 are shown in the table on the following page. Costs are categorized as follows:

Field Costs - Includes plant supervision, engineering, accounting, clerical, office supplies, and miscellaneous indirect expenses.

Operation - Includes total cost of operating expenses and staff.

Miscellaneous Non-productive Cost - Includes station supplies and rentals, safety and job training, and site security.

Maintenance - Includes total cost of maintenance expenses and staff allocated to major plant subsystems.

Overhead - Includes costs associated with direct labor plus company administrative and general expenses.

SOLAR ONE

MONTHLY O&M COST SUMMARY

($ x 1000)

MONTH OF SEPTEMBER, 1982

	LABOR	MATERIAL	CONTRACT	OTHER	TOTAL
FIELD OFFICE	21.0	-	1.8	.6	23.4
OPERATIONS	72.3	1.5	4.4	1.0	79.2
MISC. NON-PRODUCTIVE COSTS	4.6	.5	5.9	.1	11.1
MAINTENANCE					
Supervision/Indirects	9.3	3.7	2.4	10.7	26.1
Control System	4.6	12.7	1.7	3.6	22.6
Receiver System	1.1	.1	28.1 *	8.4	37.7
Thermal Storage System	4.5	1.5	1.4	4.7	12.1
Collector System	1.5	-	.3	-	1.8
EPGS System	2.7	5.2	8.7	11.2	27.8
Misc.	4.3	1.1	7.8	2.9	16.1
SUB TOTAL	125.9	26.3	62.5	43.2	257.9
Injuries and Damages					(.6
Division O.H.					20.3
TOTAL DIRECT					277.6
Workman's Compensation					1.6
Payroll Tax					10.0
Pension & Benefits					24.7
Administrative & General					67.1
GRAND TOTAL					381.0

Overhead amounts are derived from a combination of rates for Start Up and O&M Expenses.

*This reflects a late billing for start-up expenses.

RA/PES:dlg
12/01/82

SOLAR ONE
OPERATION AND MAINTENANCE REPORT #7
OCTOBER 1982

DOE/SF/10501--T4
(STMPO-807)

This report summarizes the operational activities and highlights maintenance work that was required during the month. In addition, it presents plant statistics generated and an operation and maintenance cost summary.

The testing accomplished on the TSS control loops was limited because forced outages and overcast skies accounted for two weeks. The forced outages were caused by gland seal exhauster pump and HAC failures. Despite losing half the month, October was the second highest generation period since operations began in April.

Operating Highlights

.Heliostat Array Controller (HAC) failures are thought to be caused by noise in the station ground system and direct current noise as previously reported. Martin Marietta is installing a noise filter on the HAC and will continue diagnostic testing.

.The receiver main steam dump valve required excessive warm-up time and delayed start-up. Heat tracing was installed to maintain the value at 400°F but thermostat and thermocouple failures delayed testing. Preliminary test results indicate that the heat tracing will eliminate the warm-up time and decrease start-up delays.

.On October 9, the Thermal Storage System (TSS) contaminated the entire plant feed water, steam, and condensate system with silica and iron, carryover from one of the extraction boilers. The extraction boiler and TSS flash tank were isolated and cleaned by blowdown over a four day period. The hotwell, deareator, and the receiver system were cleaned by the normal start-up procedure; where the hotwell, the deareator, the receiver are cleaned sequentially by blowing down and going through the in-line demineralizers. Rocketdyne and Stearns-Roger are investigating ways to prevent future carryover.

.The turbine was rolled on TSS extraction steam to evaluate high pressure to low pressure turbine shaft packing as recommended by General Electric. The test results will allow G.E. to establish corrective measures needed to provide turbine speed control during extraction steam start-up.

.On October 10, the turbine reached a new high net load of 10.4 MW on receiver steam with an auxiliary load of 1.0 MW. The insolation was 954 w/m^2 with 1703 out of 1818 heliostats in service. Turbine throttle conditions were 950°F, 1520 psig, and 103 klb/hr.

.On October 11, the receiver supplied steam to the turbine and TSS charging trains as a stable operating mode for the first time. The turbine operated at 6.3 MW net with an auxiliary load of 1.1 MW. The steam and oil flows to the charging trains were 25 and 13 klb/hr respectively. Steam flow was limited due to silica and iron contamination.

Maintenance Highlights

.Five of sixty-four heliostat field controllers (HFC) were replaced when the crystal element controlling the input/output communication frequency to the heliostat array controller computer failed. The defective crystal chips were replaced.

.The gland seal exhauster pump failed twice due to the solids in the service water plating out on the pump rotor and case and causing the pump to sieze. A temporary condensate supply replaced the service water as the quenching water for the gland seal spray chamber. A permanent condensate supply will be installed during the next maintenance outage.

.Elbows in the PVC waste water line from the TSS area drains appeared to fail due to thermal expansion of a 400 feet straight straight section of the waste line. The expansion was caused by the TSS boiler and subcooler leaking hot condensate into the drains, to a sump, and into the waste line. The water temperature 400 feet from the sump was 110°F. Schedule 80 fittings replaced the defective schedule 40 elbows.

.All 4 KV circuit breakers were found to trip when an Interlock Logic System (ILS) input/output card was replaced. The card appears to ground when it is removed causing a discrete logic system trip. A factory representative is investigating the problem. The 4 KV circuit breakers carry most of the station auxiliaries except for certain control computers on an uninterruptable power supply.

Plant Statistics

.The statistics shown below reflect the test and operational activities this month. Energy figures represent net kilowatt hours produced while the generator was synchronized to the electric grid. The test hours shown are hours credited for specific tests completed and do not include the time for start-up or shut-down. Plant outage hours have been categorized into scheduled, unscheduled, and reflect outages due to plant equipment only.

Plant Statistics	October	To Date
Energy Production (KWH)	154,831	836,085
Peak MW (net)	10.4	10.4
Test Hours	34	494
Plant Outage Hours (Total)	82	563
Scheduled	0	182
Unscheduled	82	357
Weather Outage Hours	91	445

Operation and Maintenance Costs

A summary of the O&M labor, material, contract, and other costs for the month of October 1982 are attached. Costs are categorized as follows:

Field Costs	- Includes plant supervision, engineering, accounting, clerical, office supplies, and miscellaneous indirect expenses.
Operation	- Includes total cost of operating expecses and staff.
Miscellaneous Non-productive Cost	- Includes station supplies and rentals, safety and job training, and site security.
Maintenance	- Includes total cost of maintenance expenses and staff allocated to major plant subsystems.
Overheads	- Includes costs associated with direct labor plus company administrative and general expenses.

SOLAR ONE

MONTHLY O&M COST SUMMARY

($ x 1000)

MONTH OF OCTOBER, 1982

	LABOR	MATERIAL	CONTRACT	OTHER	TOTAL
FIELD OFFICE	22.6	0.2	0.6	3.1	26.5
OPERATIONS	55.4	3.6	-	0.3	59.3
MISC. NON-PRODUCTIVE COSTS	4.6	0.5	1.8	1.8	8.7
MAINTENANCE					
Supervision/Indirects	10.7	3.7	1.6	10.5	26.5*
Control System	6.2	0.2	8.6	0.3	15.3
Receiver System	3.4	0.7	0.5	4.4	9.0
Thermal Storage System	3.1	0.4	2.4	5.4	11.3
Collector System	1.7	-	-	-	1.7
EPGS System	4.7	1.2	2.9	1.8	10.6
Misc.	3.9	1.3	13.4*	5.2	23.8
SUB TOTAL	116.3	11.8	31.8	32.8	192.7
Injuries and Damages					
Division O.H.					23.1
TOTAL DIRECT					215.8
Workman's Compensation					1.0
Payroll Tax					9.3
Pension & Benefits					26.1
Administrative & General					38.0
GRAND TOTAL					290.2

NOTES: Overhead amounts are derived from a combination of rates for start-up and O&M expenses.

*Reflects start-up expenses.

RA:dlg

12/06/82

DOE/SF/10501--T10
(STMPO-808)

SOLAR ONE
OPERATION AND MAINTENANCE REPORT #8
NOVEMBER 1982

This report summarizes the operational activities and highlights maintenance work that was required during the month. In addition, it presents plant statistics generated and an operation and maintenance cost summary.

The principle activity for November was implementation of the planned two week total plant maintenance outage. Major work was performed on the receiver boiler panels and Thermal Storage System (TSS) extraction boilers, charging subcoolers, and feedwater pump. Also, the last stage turbine blades were inspected and the operational control system software modified. The outage and high number of weather outage hours severely curtailed power production and TSS testing.

Operational Highlights

- A study by SCE determined that once through boilers, such as a solar central receiver boiler, require a low chloride caustic (60 ppm chlorides) instead of standard grade caustic presently used to regenerate the polisher anion bed. The low chloride caustic should minimize feedwater high cation conductivity problems and decrease the number of required regenerations. The low chloride caustic will be used after the present supply is exhausted.

- The Thermal Storage Unit (TSU) was fully charged before the outage and isolated to study the natural thermal energy degradation over the two week period. Preliminary results indicate a average 0.11 thermal megawatt loss per hour, which is better than the design loss of 0.12 thermal megawatt per hour. The temperature of the oil in the top of the tank dropped from 575°F to 550°F, approximately four percent, while the temperature in the bottom of the tank decayed from 476°F to 397°F, 17 to 20%, in the 19 day period. The temperature decay is relative to an ambient oil temperature of 60°F.

- During the planned outage, selected receiver boiler panels had Pyromark paint removed to reduce temperature gradients across the respective panels. Subsequently, absorptivity readings were taken on all panels. The maximum absorptivity reading was 0.93 on three south facing preboiler panels and the minimum was 0.91 on two north facing boiler panels.

- The plant backup 4KV power supply was modified so that the plant can now restart on the 4KV if the primary 33KV power supply was lost. This significantly improves plant reliability.

Maintenance Highlights

- The following are major items worked on during the outage:
  - New boiler panel inlet strainer gaskets were installed.

- Eight major receiver control valves were repaired for leak through.
- The TSS feedwater pump was rebuilt by the manufacture to return pump tolerances to the original specifications.
- Both charging subcoolers had their channel box cover gasket replaced and the cover bolts tightened to 4800 ft-lb.
- Both extraction boilers tube bundles were pulled out seven inches to repair the steam leaks past the shell-side tube-sheet gaskets. One gasket was wrapped with "graphoil" and the other replaced with a carbon/stainless steel gasket. Both boilers were thermally cycled and the bolts retorqued to 368 ft-lbs.
- Eight tube leaks found in the charging subcoolers were seal welded.
- Sample lines were installed on the TSS extraction boilers and flash tank.
- Inspection of the turbine rotating element showed no unusual conditions.
- Inspection of the main and admission stop valve strainers showed no debris or fouling. The admission stop valve plug and seat ring were dye tested for wear and none was found, even though it had been used to throttle for admission steam start-up speed control.

- An overspeed sensing relay on the turbine failed when its contacts burned, forcing the turbine out of service until the relay was replaced.

- Inadvertent 4KV system circuit breaker trips were traced to retaining clips that grounded when an Interlock Locic System (ILS) logic card was removed. All logic cards were modified to eliminate the problem.

Plant Statistics

- During November, 240 hours were available for all activities. Power production on main steam and TSU charging was curtailed for 144 hours or 60% of the month by cloudy skies, of which 98 hours occurred during the 112 hours of planned outage. The plant was unable to operate due to weather 20% of the time. The unscheduled hours were due to a defective turbine overspeed sensing relay that failed. The test hours this month were utilized on extraction and charging operations.

Plant Statistics	November	To Date
Energy Production (DWH)	44,160	880,695
Peak MW (net)	8.4	10.4
Test Hours	19	513
Plant Outage Hours (Total)	136	675
Scheduled	114	297
Unscheduled	22	379
Weather Outage Hours	144	590

Operation and Maintenance Costs

- A summary of the O&M labor, material, contract, and other costs for the month of November 1982 are shown in the following table. Costs are categorized as follows:

Field Costs	- Includes plant supervision, engineering, accounting, clerical, office supplies, and miscellaneous indirect expenses.
Operation	- Includes total cost of operating expenses and staff.
Miscellaneous Non-productive Cost	- Includes station supplies and rentals, safety and job training, and site security.
Maintenance	- Includes total cost of maintenance expenses and staff allocated to major plant sub-systems.
Overhead	- Includes costs associated with direct labor plus company administrative and general expenses.

SOLAR ONE

MONTHLY O&M COST SUMMARY
($ x 1000)

MONTH OF NOVEMBER 1982

	LABOR	MATERIAL	CONTRACT	OTHER	TOTAL
FIELD OFFICE	33.7	.1	1.5	1.9	37.2
OPERATIONS	83.5	13.8	-	.4	97.7
MISC. NON-PRODUCTIVE COST	6.0	.2	5.7	3.3	15.2
MAINTENANCE					
Supervision/Indirects	13.2	5.7	2.3	1.9	23.1
Control System	9.9	.8	3.3	.7	14.7
Receiver System	2.3	.5	-	1.6	4.3
Thermal Storage System	3.9	6.7	1.0	4.4	16.1
Collector System	1.7	-	-	-	1.7
EPGS System	7.7	1.1	1.7	11.8	22.3
Misc.	4.4	.1	1.3	3.6	9.4
SUBTOTAL	166.3	29.1	16.8	29.6	241.7
- Injuries and Damages					(.2)
Division O.H.					29.5
TOTAL DIRECT					271.1
Workman's Compensation					1.8
Payroll Tax					13.0
Pension & Benefits					34.8
Administrative & General					61.2
GRAND TOTAL					381.8

Overhead amounts are derived from a combination of rates for start-up and O&M expenses.

RA:dlg
01/07/83

DOE/SF/10501--T9
(STMPO-809)

SOLAR ONE
OPERATIONAL AND MAINTENANCE REPORT #9
DECEMBER 1982

The report summarizes the operational activities and highlights maintenance work that was required during the month. In addition, it presents plant statistics generated and an operation and maintenance cost summary.

Performance verification during the "worst design case"; winter solstice, was the primary goal for December. Preliminary results indicate the plant meets the design performance criteria despite low insolation level, 867 w/m^2, which limited load to 10.1 MW gross for 90 klbs/hr flow at 1460 psi and 1000°F. Work continued on automating the Thermal Storage System (TSS) charging train controls which are 70% complete.

Operating Highlights

- On November 30, the plant did not suffer wind damage as a consequence of 70 MPH winds. The plant is designed to withstand 90 MPH winds.

- On December 13 and 14, level surges in the TSS extraction boiler level transmitter reference legs caused several boiler trips. The reference legs were modified to eliminate the surge problem.

- TSS extraction boiler isolation valves will be installed to prevent steam/feedwater system contamination due to dissolved solid carryover from the extraction boilers. In addition, a sample system will be installed to monitor the extraction boiler blowdown and superheated steam as well as the TSS flash tank condensate.

- On December 20, the turbine reached a net load of 6.0 MW on admission steam, with an auxiliary load of 0.9 MW, and oil flow of 1000 klb/hr at 540°F. McDonnell Douglas test coordinators believe the turbine would have reached the 7.0 MW net design load if the oil had been at the 575°F rated design temperature.

- The TSS extraction boilers are being used to supply auxiliary steam instead of the station electric auxiliary boiler to reduce the plant auxiliary electrical load. Also, a smaller auxiliary TSS feedwater pump is being used instead of the main TSS feedwater pump for the same reason.

- Southern California Edison operators were certified to operate TSS single train charging, to allow blanketing the plant with TSS steam at night, over the Christmas holidays without McDonnell Douglas supervision.

Maintenance Highlights

- Due to intermittent oil leaks in the TSS charging trains, all flange bolts were retorqued in the TSS area.

- Cracks were discovered in the annular shell fillet weld to the channel box tubesheet on both TSS extraction boilers. The boilers are a double tubesheet design with a 6" longitudinal space between the tubesheets. The failure mechanism is thought to be differential expansion between the stainless steel tubes and the carbon steel annular shell and/or differential radial expansion between the two tubesheets. No repairs were required since the annulus does not provide significant mechanical support to the tubes.

- A trip relay was installed to close the main steam dump valve on high temperature downstream of the steam dump desuperheater to prevent superheated steam from damaging the condenser.

- Small pieces of graphoil tape used in sealing receiver panel flowmeter flanges, temporarily fouled the receiver feedwater inlet strainer and water sampling lines. The strainer and lines remained clear after cleaning.

- Continuous steam leakage into the electronic portion of three thermal storage system flowmeters resulted in failures. The flowmeters were removed and sent back to Ramapo for modification and repair.

Plant Statistics

- There were 248 hours available for test activities in December. December was the second highest generation period after May despite a 40% weather outage. The delay in receiving the generator speed sensing relay and delays due to poor extraction boilers water chemistry accounted for the unscheduled outage hours.

- The statistics shown on page 3 reflect the test and operational activities this month. Energy figures represent net kilowatt hours produced while the generator was synchronized to the electric grid. To clarify the <u>total</u> net KWH consumption, which includes the period when Solar One was not on-line, see Attachment 1. This shows that the <u>total</u> net consumption has been 4,476,500 KWH's. The test hours shown are hours credited for specific tests completed and do not include the time for start-up or shut-down. Plant outage hours have been categorized into scheduled, and unscheduled, and reflect outages due to plant equipment only.

Plant Statistics	December	To Date
Energy Production (KWH)	185,700	1,066,200
Peak (net)	10.1	10.4
Test Hours	15	504
Total Plant Outage Hours	46	749
Scheduled	0	297
Unscheduled	46	452
Weather Outage Hours	98	680

The table below contains the correct monthly and cumulative figures for 1982. Discrepancies found in different data sources and reporting methods have been corrected during the year.

SOLAR ONE PLANT STATISTICS SUMMARY FOR 1982

ACTIVITIES
(MONTH/CUMULATIVE)

MONTH	NET MWH	TEST HRS	TOTAL EQUIP. OUTAGE HRS	SCHEDULED OUTAGE HRS	FORCED OUTAGE HRS	WEATHER OUTAGE HR
APRIL	56/56	62/62	61/61	20/20	41/41	7/7
MAY	225/281	46.5/108.5	59/120	30/50	29/70	34/41
JUNE	47/328	40/149	84/204	16/66	68/138	31/72
JULY	98/426	73.5/222.5	99/303	56/122	45/181	40/112
AUGUST	143/569	91.5/314	103/406	24/146	79/260	112/224
SEPT	112/681	123/437	75/481	37/183	38/298	124/348
OCT	155/836	33/470	86/567	0/183	86/384	90/438
NOV	44/880	19/489	136/703	114/297	22/406	144/582
DEC	186/1066	15/504	46/749	0/297	46/452	98/680

NOTE: The net peak for 1982 was 10.4 MW which occurred on October 10, 1982.

Operation and Maintenance Costs

- A summary of the O&M labor, material, contract, and other costs for the month of December 1982 is shown on the following table. Costs are catergorized as follows:

  Field Office - Includes plant supervision, engineering, accounting, clerical, office supplies, and miscellaneous indirect expenses.

  Operation - Includes total cost of operating staff and expenses.

  Miscellaneous Non-productive Cost - Includes station supplies and rentals, safety and job training, and site security.

  Maintenance - Includes total cost of maintenance staff and expenses allocated to major plant sub-systems.

  Overheads - Includes costs associated with direct labor plus company administrative and general expenses.

SOLAR ONE

MONTHLY O&M COST SUMMARY
($ X 1000)

MONTH OF DECEMBER 1982

	LABOR	MATERIAL	CONTRACT	OTHER	TOTAL
FIELD OFFICE	25.3*	0.2	0.2	0.1	25.8
OPERATION	60.3	12.0	-	-	72.3
MISC. NON-PRODUCTIVE COSTS	4.5	0.8	3.0	0.7	9.0
MAINTENANCE					
Supervision/Indirects	6.3	12.7**	1.8	6.6	27.4
Control System	6.3	10.8	1.9		19.0
Receiver System	0.7	0.3	-	1.3	2.3
Thermal Storage System	3.3	1.1	0.5	2.9	7.8
Collector System	2.9				2.9
EPGS System	4.5	6.9	9.9*	1.7	23.0
Misc.	4.2	4.8	1.2	3.0	13.2
Total Maintenance	28.2	36.6	15.3	15.5	95.6
SUB TOTAL	118.3	49.5	18.7	16.3	202.8
Division O. H.					20.4
TOTAL DIRECT					223.2
Workman's Compensation					1.0
Payroll Tax					8.3
Pension & Benefits					23.1
Administrative & General					45.2
GRAND TOTAL					300.8

* These expenses are abnormally high because previous start-up cost are included.

** This includes an amount for stocking of the warehouse with misc. materials (eg; nut, bolts etc...)

ATTACHMENT 1

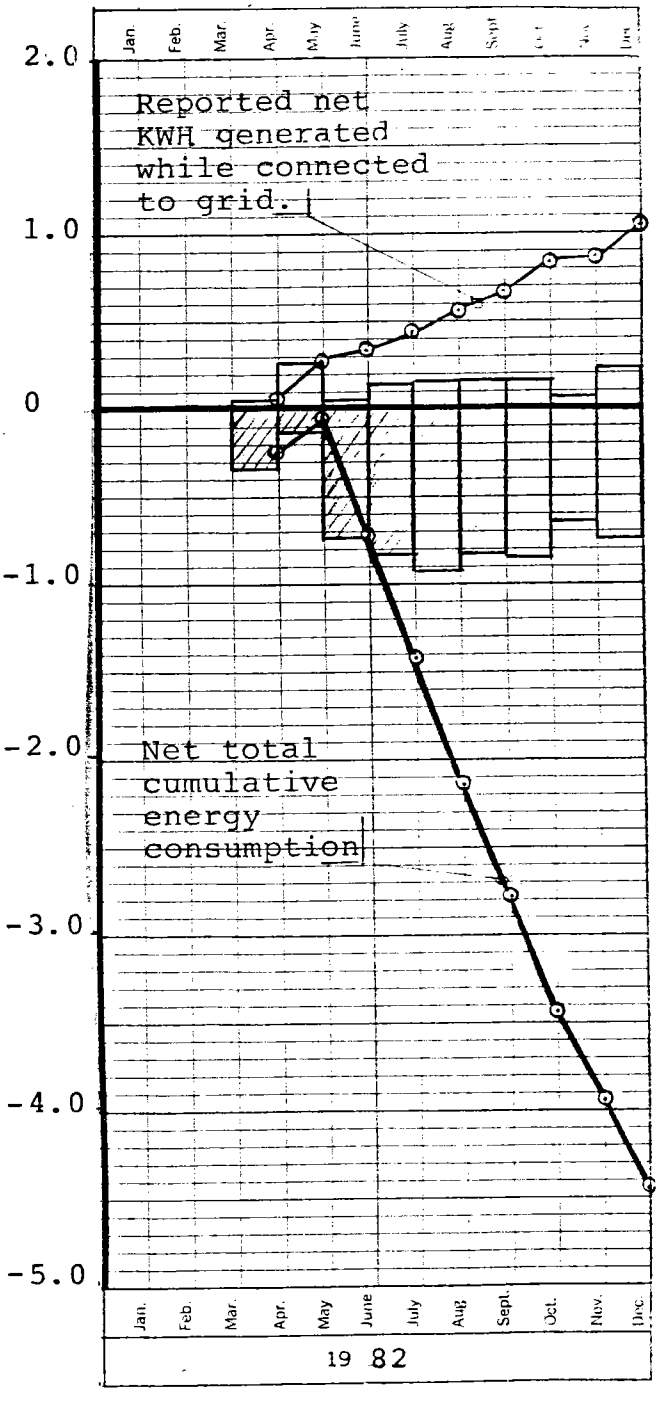
-SOLAR ONE-

MONTHLY AND CUMULATIVE
ENERGY GENERATED AND CONSUMED

1982

This chart summarizes the power generated and consumed in 1982. In May 1982, the metering system was modified, which accounts for the discontinuity in the May net total consumption.

The graph shows that even though slightly over one million net KWHs have been produced while Solar One was on-line, total net consumption at the plant has been -4,476,500 KWHs in 1982.



DOE/SF/10501--T8
(STMPO-810)

SOLAR ONE
OPERATION AND MAINTENANCE REPORT #10
JANUARY 1983

This report summarizes the operational activities and highlights maintenance work that was required during the month. In addition, it presents plant statistics and an operation and maintenance cost summary.

In January, the main activity at Solar One was open loop control testing of the thermal storage system (TSS) charging trains, and turbine performance verification at derated temperatures, pressures, and steam flows. The TSS charging train control automation is 90% complete as reported by McDonnell Douglas, the program test coordinators. McDonnell Douglas also started installing software interfaces between operational control system and other plant control system.

Operating Highlights

- While charging the thermal storage unit (TSU) on January 4, a 480 volt circuit breaker opened and simultaneously, the receiver feedwater pump speed sensor failed. The zero output from the speed sensor caused the receiver feedwater pump to overpressurize the receiver and open the receiver safety valves while several areas of the plant, including the receiver electronics equipment, were without AC power. Investigation traced the probable cause to a spurious signal from an interlock logic system (ILS) input/output card. A relay was installed on the ILS to assist in tracing the problem should it occur again. Additionally, a task force was formed to investigate this problem and recommend further action.

- On January 7, the TSU tripped during charging on high vapor pressure in the TSU. The problem was a plugged vapor vent line that restricted flow. A valve was removed to decrease minor pipe losses in order to improve flow as recommended by Rocketdyne.

- McDonnell Douglas performed diagnostic tests to remedy minor oil flow oscillations through the TSS charging trains at low flows. The tests were performed using only one charging train.

- A milestone occurred on January 14, when Solar One smoothly went from turbine and charging operations on main steam to turbine operation on admission and main steam and charging operation on main steam. This was impressive because the turbine and charging operations continued dispite insolation transients from 800 w/m^2 to 90 w/m^2. During the low insolation periods, the turbine operated under load control at 5.0 MW on admission steam.

- Solar One began generating one additional hour per day during power production periods, instead of coming off-line when the insolation dropped to 450 w/m^2. The extended operation is possible due to smooth turbine and receiver valve control at derated temperatures and pressures. The turbine now operates at

these levels while on main steam during low insolation periods.

- Solar One operated in Mode 2, generating and charging TSS on each of nine consecutive days from January 7 to 15. This is the longest production run to date.

- On January 25, a simulated operation control system program automatically brought the heliostat field from standby to tracking the receiver with increments of heliostats until steam was in the downcomer and all receiver boiler panels were in temperature control. The program went very smoothly and lasted 50 minutes. McDonnell Douglas believes that larger increments of heliostats can be brought on the receiver faster to reduce the start-up time to 20 to 25 minutes.

- On January 30 and 31, Southern California Edison Operators took 70 minutes and 93 minutes respectively to transition from initial tracking of the receiver to sychronization of the generator. This start-up time is an improvement over past effort due to heat tracing installed on the main steam dump valve that eliminates the time required preheating the valve.

- The new heliostat stow position was initiated to mitigate mirror corrosion due to water seeping into the honeycomb mirror support. All heliostat mirrors are stowed in a vertical, east-west plane. All mirrors face the east-west access road.

- A total of 13,500 gallons of caloria were added to the thermal storage unit (TSU) to raise the caloria level above the upper header. The make-up was required to account for minor oil leaks and spills, decomposition of caloria to hydrogen, condensible and noncondensible carbon chains, and removal of residual water vapor from rock and gravel in the TSU.

- The collector field began using the summer wirewalk in mid January. This change was made to minimize the number of singularities that occur in the south quadrants during wire-walks. A singularity occurs when a heliostat reaches one limit of azimuth movement and must rotate toward the other limit to continue tracking the sun through the aimpoint.

- A small portion of the canvas winterizing blanket caught fire when wind blew it into contact with a hot uninsulated steam drain line. The fire was immediately extinguished. The canvas tarp was previously draped around the auxiliary bay to minimize freeze damage to piping and associated instrumentation during freezing weather.

Maintenance Highlights

- Sandia and McDonnell Douglas made software improvements in the heliostat array controller computer programs to improve reliability and operation while the automatic Beam Characterization System (BCS) program is running. Previously, Primary HAC

fail over would occur when trying to run Auto-BCS, which resulted in stoppage of BCS operations, since the BCS only operates with the Primary HAC in service. This had no impact on the operation of the plant.

- The pipe tap on the bottom of the TSS extraction boilers for the boiler level transmitter was blocked with scale on several occasions. Larger taps and drain valves were installed for blowdown capability.

- The condensers and subcoolers on both TSS charging trains began leaking small amounts of oil, less than 1 gph, past shellside tubesheets. The flange bolt torques will be checked by an ultrasonic method during the next outage.

- On January 18, the flow indicator on a preheater panel shorted the 24 volt power supply to all receiver panel flowmeters. The defective flowmeter was bypassed as that meter is not required for plant operations.

- On January 24, McDonnell Douglas began inputting the software interfaces between the Operational Control System (OCS) and HAC and Data Aquisition System (DAS). The OCS, when fully operational, will be able to automatically control the plant via the HAC and the Subsystem Distributed Process Controllers.

- All one inch treaded inspection plugs on top of the receiver boiler panels were seal welded to prevent recurring steam leaks. Previously, random inspection plugs had to be tightened every morning before start-up.

- The decision was made to send the TSS steam flowmeters back to Ramapo, the manufacturer, for modifications to improve their accuracy and to mitigate water intrusion into the electronic components. The modified flowmeters will allow collection of meaningful test data for the TSS test program.

- The average number of heliostats out of service is 65 out of 1818 or 3.6%. The primary cause for heliostat failures are shorted mechanical relays, shorted solid state relays, and off frequency communication crystals in the individual heliostat controllers (HC). Less frequent problems include loose motor connections, reduction gear-shaft separation in the motor reduction gear housing during high winds, and position encoder problems. SCE electricians began installing fuses on each motor circuit in each HC to protect sensitive microprocessor and rectifier relay shorts.

Plant Statistics

- January was the highest generation period to date with 245,500 KWH. Twenty-four hours of total plant outage hours for the month is the lowest to date. The test hours were primarily spent on TSS charging control testing and turbine/generator performance verifications. Eighty-nine hours of weather outage accounted for 35% of the available time for generation or testing utilizing the receiver.

- The statistics shown below reflect the test and operational activities this month. Energy figures represent net kilowatt hours produced while the generator was synchronized to the electric grid. The test hours shown are hours credited for specific tests completed and do not include the time for start-up or shut-down. Plant outage hours have been categorized into scheduled and unscheduled, and reflect outages due to plant equipment only. Weather outage hours are the number of hours the plant was available but could not operate due to cloudy skies.

Plant Statistic	January	To Date
Generation (KWH)	245,500	1,131,700
Peak MW (Net)	9.9	10.4
Total Plant Outage Hours	24	772.8
Scheduled	8	305
Unscheduled	16.3	467.8
Weather Outage Hours	89	769

Operation and Maintenance Costs

- A summary of the O&M labor, material, contract, and other costs for the month of January 1983 is shown on the following table. Costs are categorized as follows:

Field Office - Includes plant supervision, engineering, accounting, clerical, office supplies, and miscellaneous indirect expenses.

Operation - Includes total cost of operating staff and expenses.

Miscellaneous Non-productive Cost - Includes station supplies and rentals, safety and job training, and site security.

Maintenance - Includes total cost of maintenance staff and expenses allocated to major plant subsystems.

Overheads - Includes costs associated with direct labor plus company administrative and general expenses.

SOLAR ONE

MONTHLY O&M COST SUMMARY
($ X 1000)

MONTH OF JANUARY 1983

	LABOR	MATERIAL	CONTRACT	OTHER	TOTAL
FIELD OFFICE	21.3	-	<.3>	1.3	22.2
OPERATIONS	45.5	22.1	-	0.1	67.7
MISC. NON-PRODUCTIVE COST	4.7	0.7	2.2	2.7	10.3
MAINTENANCE					
Supervision/Indirects	7.4	5.6	0.3	0.6	13.9
Control System	3.9	2.5	1.8	-	8.2
Receiver System	0.5	-	-	-	0.5
Thermal Storage System	1.0	0.6	0.5	8.6	10.7
Collector System	1.1	-	0.2	-	1.3
EPGS System	2.3	1.7	2.5	1.3	7.8
Misc.	4.4	1.2	6.5	9.2	21.3
Total Maintenance	20.6	11.6	11.8	19.7	63.7
SUB TOTAL	92.1	34.4	13.7	23.8	163.9
Division O. H.					13.9
TOTAL DIRECT					177.8
Workman's Compensation					.8
Payroll Tax					6.3
Pension & Benefits					17.5
Administrative & General					30.8
GRAND TOTAL					233.2

RA:dlg
03/09/83

DOE/SF/10501--T12
(STMPO-811)

SOLAR ONE
OPERATION AND MAINTENANCE REPORT #11
FEBRUARY 1983

This report summarizes the operational activities and highlights maintenance work that was required during the month. In addition, it presents plant statistics and an operation and maintenance cost summary.

A new milestone was achieved during February, when the turbine generator reached 7.3 MW (net) on thermal storage admission steam, which exceeds the 7.0 MW (net) design point.

A simulated Operational Control System(OCS) program reduced the time required to bring the receiver and collector subsystems into operation from 50 minutes to 16 minutes.

The turbine/generator performance testing continued at derated steam conditions.

Operational Highlights

- High cation conductivity in the condensate and feedwater was due to service water deposits in the gland seal exhaust condenser system. The gland seal exhauster drains are at present being diverted to waste. The drains will be rerouted to the main condenser as soon as the contaminated equipment and piping are chemically cleaned.

- The trim in receiver panel #8 flow control valve was replaced by one of "more desirable" flow control characteristics at small valve opening, to eliminate ocillations at low flow.

- A simulated Operational Control System(OCS) program singificantly reduced the time, from 50 minutes to 16 minutes, required to bring the collector and receiver into operation (all panels in temperature control). McDonnell Douglas believes that 16 minutes is about the minimum period during which the operators can reliably monitor the start-up process.

- On Friday, February 25th, a milestone was achieved when the turbine generator reached a net load of 7.3 MW for approximately 20 minutes while operating on admission steam; i.e., steam generated with the thermal storage subsystem. Steam flow conditions were 540°F, 349.4 psia, and 105,000 lbs/hr. This verifies the design point for maximum load on admission steam of 7.0 MW (net) at 525°F, 385 psia, and 110,000 lbs/hr.

Maintenance Highlights

- The heliostat mirrors are corroding due to water intrusion into the mirror modules. As an experiment, a second vent was installed opposite the existing vents, in 14 of the mirror modules that presently contain water, to determine whether this will aid in water removal. This experiment may result in one of several

possible solutions, proposed by Sandia, to remedy the corrosion problem.

- On February 9th, the cooling tower 4KV supply circuit breaker failed open. Investigation of the incident found a spurious discrete logic signal from the interlock logic system (ILS) to have caused the breaker to open. McDonnell Douglas is testing the system to determine the cause of and solution to the problem.

- On February 21st, while charging the thermal storage unit, the oil leak on charging train #2 condenser increased from 1 gph to 5 gpm. The train was taken out of service and will be repaired during a plant outage. At that time, a special stainless steel/carbon gasket will be installed on all charging heat exchanger flanges to prevent similar future leaks.

- Two defective heat flux sensors were removed from panel #11 and sent to the manufacturer for repairs. They were replaced by new ones.

- Due to excessive steam leakage at the intermediate turbine steam seal packing, the General Electric turbine/generator has to be synchronized manually when starting on admission steam and requires an excessive amount of steam. The interim repair involves using an internal bypass in the admission stop valve as a throttling valve to provide turbine/generator speed control.

- Plant waste water line failures continue despite the installation of several expansion loops. Temporary action has been taken to minimize incidents by controlling waste water temperature.

- Receiver feed pump recirculation valve control logic has been revised to expedite transitions to speed, pressure, and valve control. Receiver feed pump being in pressure control during initial fill resulted in several unit trips. Under the new program, the receiver feed pump will be under speed control with the recirculation valve in automatic until flow is established.

- Heliostat Array Controller (HAC) and heliostat field loss of communication problems have been experienced intermittently. Electrical noise interference, a possible cause, has been minimized by the installation of capacitors at selected heliostat motors. However, tests continue and data to date indicate that the loss of communication incidents may be related to azimuth commands.

- A safety inspection and fire protection review was made by representatives from Sandia, SCE, and Stearns-Roger. The inspection lasted two days and no serious violations were uncovered. A check list of safety items will be compiled for near term correction and reference during routine safety inspections.

- On February 28th, 1803 of 1818 or 99.2% of the heliostats were available for service.

- McDonnell Douglas initiated work on a non-interference basis to automate plant control functions and to install the plant operational displays (POD's). The purpose of automating controls is to maximize plant operating time and minimize operator work load (e.g., automatic start-up of the collector field...). The POD's will aid operators by displaying summary-type integrated plant system information.

Plant Statistics

- In an effort to make the plant statistics more meaningful several charts have been included with this month's report. Attachment 1 shows the Daily and Cumulative Energy Production since turbine roll. Attachment 2 shows a Plot of On-Line Hours, Test Hours, Plant and Weather Outage Hours.

- February had the lowest period of plant outage (12.5 hours) and the third highest generation period (202.7 MWH) since operation began, despite 116 hours of weather outage.

- The test hours were utilized for turbine generator performance testing at derated steam conditions and thermal storage system (TSS) single charging train flow control refinement.

Plant Statistics	February	To Date
Energy Production (KWH)	202,700	1,514,600
Peak MW (net)	9.7	10.4
On-Line Hours	43.59	380.7
Test Hours	59.5	657.8
Total Plant Outage Hours	12.5	749.3
Scheduled	0	277.5
Unscheduled	12.5	471.8
Weather Outage Hours	116.0	900.3

Operation and Maintenance Costs

- A summary of the O&M labor, material, contract, and other costs for the month of February 1983 is shown on the following table. Costs are categorized as follows:

Field Office	- Includes plant supervision, engineering, accounting, clerical, office supplies, and miscellaneous indirect expenses.
Operation	- Includes total cost of operating staff and expenses.
Miscellaneous Non-productive Cost	- Includes station supplies and rentals, safety and job training, and site security.

Maintenance - Includes total cost of maintenance staff and expenses allocated to major plant subsystems.

Overheads - Includes costs associated with direct labor plus company administrative and general expenses.

SOLAR ONE

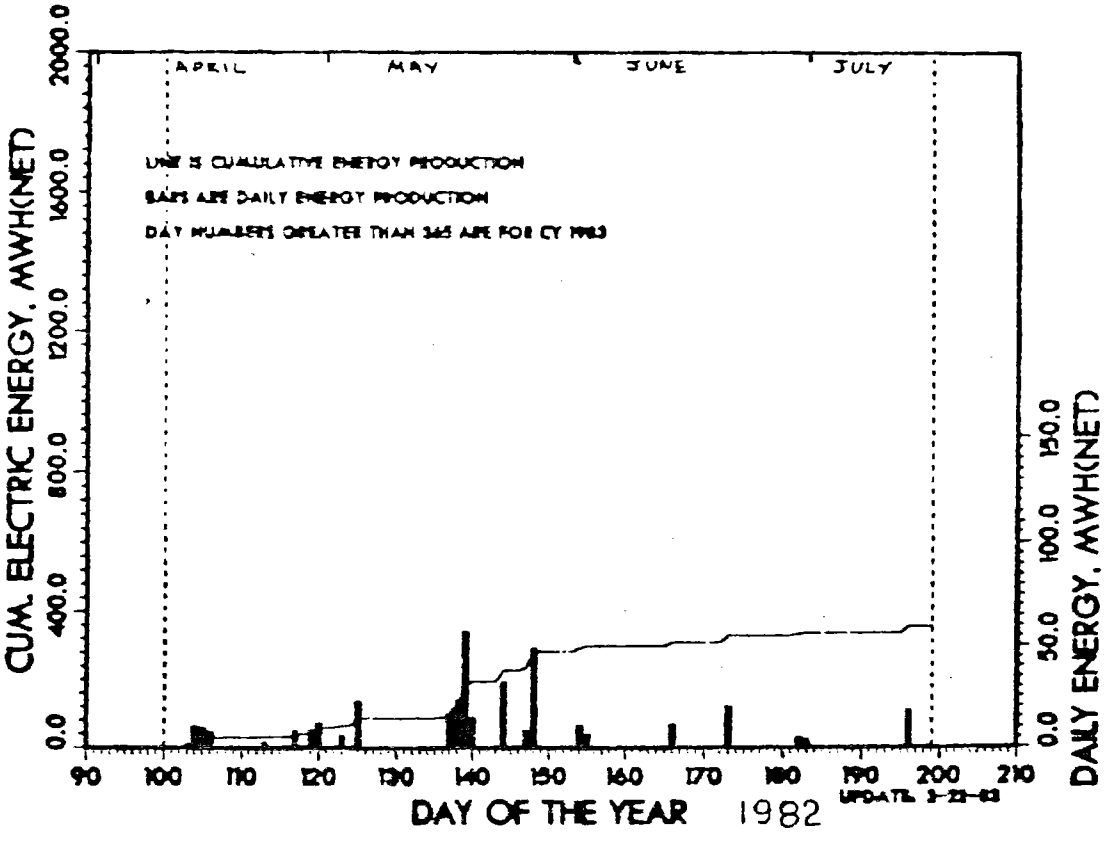
MONTHLY O&M COST SUMMARY
($ X 1000)

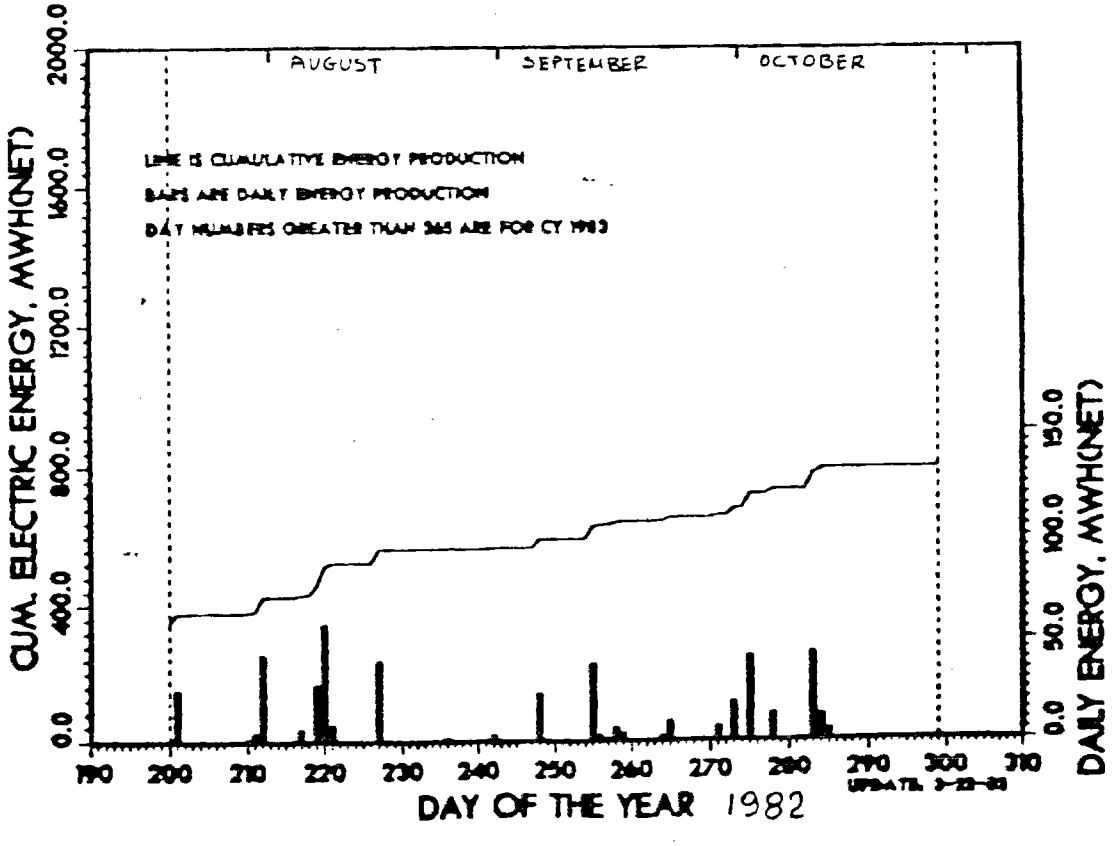
MONTH OF February, 1983

	LABOR	MATERIAL	CONTRACT	OTHER	TOTAL
FIELD OFFICE	24.6	0.4	-	3.5	28.5
OPERATIONS	56.5	0.1	-	0.1	56.7
MISC. NON-PRODUCTIVE COSTS	4.6	0.2	2.9	0.6	8.3
MAINTENANCE					
Supervision/Indirects	9.7	2.6	0.5	1.1	13.9
Control System	5.3	9.7	5.0	-	20.0
Receiver System	1.8	-	8.8	0.3	10.9
Thermal Storage System	3.8	0.5	8.5	0.2	13.0
Collector System	3.2	-	-	-	3.2
EPGS System	3.6	5.3	8.3	0.3	17.5
Misc.	2.8	2.1	1.5	0.1	6.5
Total Maintenance	30.2	20.2	32.6	2.0	85.0
SUB TOTAL	115.9	20.9	35.5	6.2	178.5
Division O. H.					20.5
TOTAL DIRECT					199.0
Workman's Compensation					1.0
Payroll Tax					8.2
Pension & Benefits					22.6
Administrative & General					36.6
GRAND TOTAL					267.4

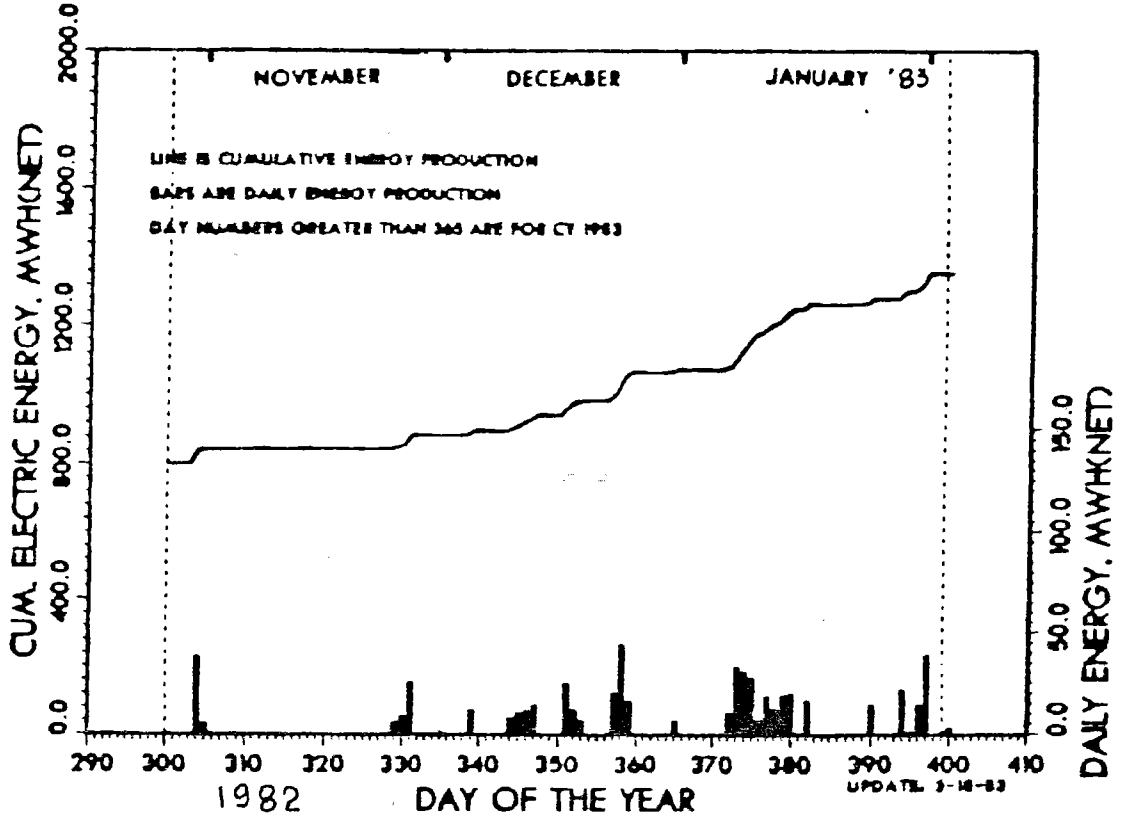
K:dlg
03/22/83

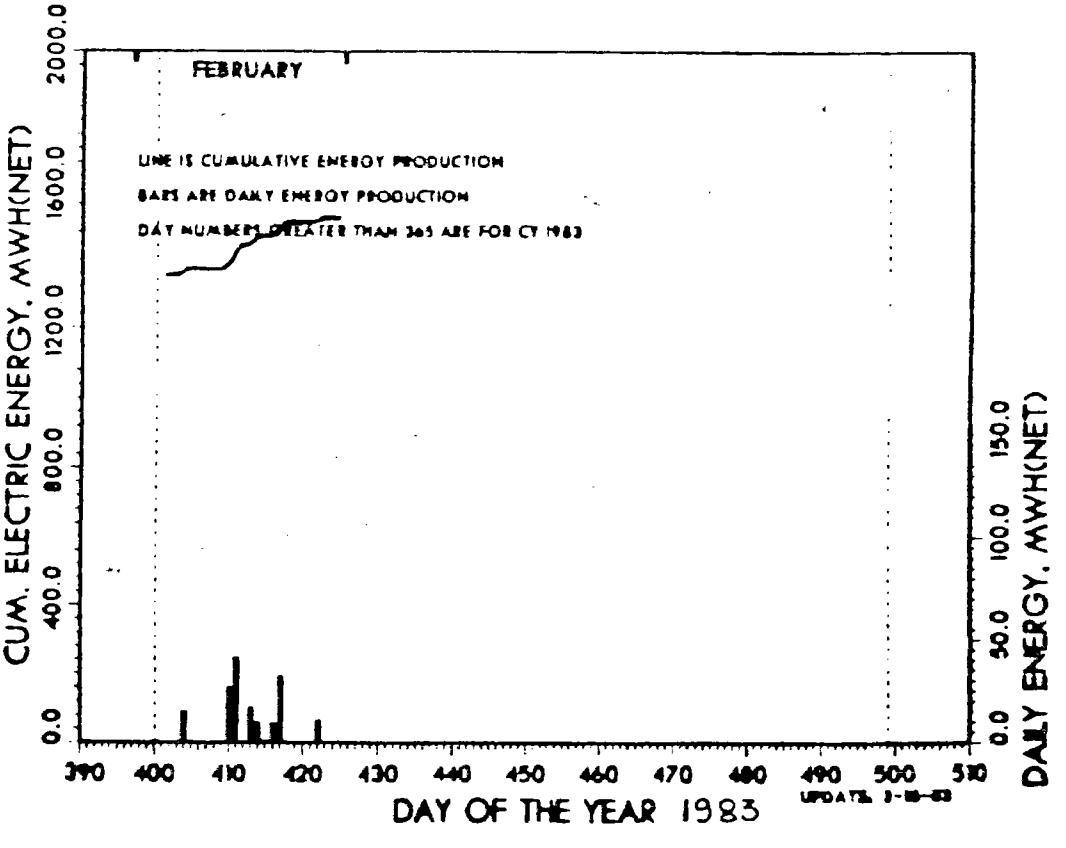
SOLAR ONE NET ELECTRICAL PRODUCTION



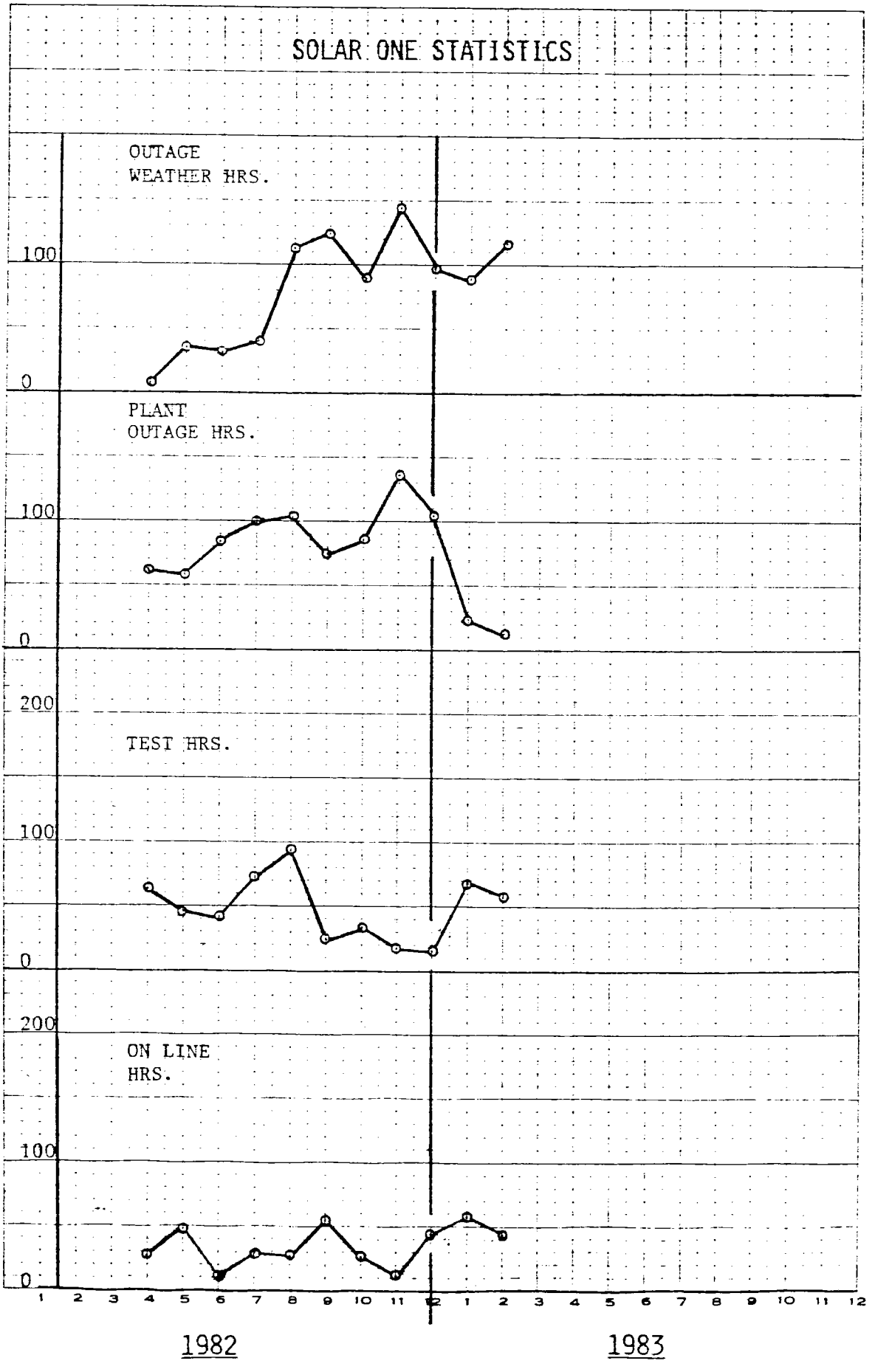


SOLAR ONE NET ELECTRICAL PRODUCTION





ATTACHMENT 2



AZK/03/17/83

DOE/SF/10501--T11
(STMPO-812)

SOLAR ONE
OPERATION AND MAINTENANCE REPORT #12
MARCH 1983

This report summarizes the operational activities and highlights maintenance work that was required during the month. In addition, it presents plant statistics and an operation and maintenance cost summary.

March was a highly active period for Solar One. Despite the adverse weather conditions, which accounted for about 153 hours of outage, power generation attained 397.2 MWH, the highest monthly value since operations began. Part of the work performed during a five day maintenance outage brought the plant automation near completion.

Operational Highlights

- A new high wind stow procedure was developed in order to reduce the time, 25 minutes or more, normally required to move the heliostats from tracking to the stow position. This procedure will be in effect when wind speed is at 40 mph and records show that there were three or more occurrences of winds in excess of 35 mph within the previous ten minutes, and will ensure that 99.5% of the heliostats will be in to stow position within 17 minutes.

- Solar One has been released to SCE personnel for unassisted weekend thermal storage system (TSS) charging operations Mode 5. Previously, the plant was limited to Mode 1 receiver/turbine direct, only. Weekend charging operations will ensure availability of steam for auxiliary usage thus minimizing the operation of the electric auxiliary boiler, a high power consumption component. This will significantly reduce the parasitic energy requirements of the plant.

- Receiver flux transducer sensitivity tests were conducted to detect any deviations from the original calibration. Test results indicated changes in transducer sensitivities which are generally less than the originally calibrated ones. In addition, there are indications that high environment temperatures rather than flux may account for the changes.

- A turbine trip was experienced due to a malfunction of the Beckman subsystem controllers. An operator entered valve position command was not transferred correctly and the thermal storage system (TSS) steam flow control valve stepped from 10% to 90% open, causing diversion of all receiver steam from the turbine to the TSS charging train. Investigation found defective PROMs (Programmable Read Only Memories) in the operator station processor (OSP) to be the cause of the anomalies. The PROMs were replaced.

- The condensate high cation conductivity problem, that had been experienced in the past, was effectively resolved with the chemical cleaning of the gland steam condenser system performed during the plant outage. The system's drains are presently being routed back to the main condenser with absolutely no effect on the hotwell water quality.

- Consulting Engineers from Burns and McDonnell, under contract with Electric Power Research Institute (E.P.R.I.), conducted a study concerning the plant's auxiliary power consumption. Field data was collected and a report will be submitted to project staff for review.

- A licenced SCE Fire Equipment Inspector inspected and tested all fire extinguishing equipment at Solar One. He, also, conducted a refresher training session on fire extinguishing for all station personnel.

Maintenance Highlights

- Four incidents of plant waste water line failures were experienced during March. The failures are attributed to thermal expansion of the pipe material (PVC has high thermal expansion coefficient). Due to the high frequency of the incidents, replacement of the waste water line is under consideration.

- The thermal storage extraction system oil flowmeters were replaced with new ones of higher sensitivity to ensure accurate measurements at low load operations. Extraction system feedwater flowmeters were cleaned, inspected, and calibrated. Charging train #2 steam flowmeter was removed and shipped to the manufacturer for repairs of damages caused by moisture intrusion into the meter's electronic components.

- Failures of the thermal storage system flash tank steam side rupture disk were experienced twice during March. Investigation to determine if the disk meets design requirements is in progress.

- Solar One was shut-down on March 20th for a five day maintenance outage. The following are the major work accomplishments during the outage.

  - Control room Beckman consoles were relocated to accommodate the operational control system (OCS) computer hardware. The OCS will allow plant automation and its function will be to place and monitor the plant in a steady state mode and perform transitions between modes as required.

  - The heliostat array controller (HAC) computers were relocated to facilitate the installation of additional memory. The additional memory will aid in resolving HAC/BCS communication problem.

- Manual steam isolation valves were installed at the thermal storage system extraction heat exchanger trains. Previously, the plant had to be shut down in order to do maintenance work on either of the two trains.

- The thermal storage charging system desuperheater attemperator valve was replaced. The valve body and internals were damaged due to erosion.

- Two thermal storage charging train #1 boiler water level indicator valves were replaced with full flow valves to ensure accurate level indication.

- Eleven valves at the west air compressor were rebuilt or replaced. Erosion had caused extensive valve leakage.

- Minor repairs were made on various other valves (i.e., feedwater, steam, oil, etc.) to minimize heat losses.

Plant Statistics

- Test hours this month, although limited due to faulty equipment, were primarily utilized for thermal storage charging system open loop testing to verify and refine controllers. However, turbine/generator performance tests were conducted in parallel with power production (See Attachment 1).

- Attachment 2 shows that during March Solar One was on-line for 66 hours, the longest production period since operations began. This increase in power production was achieved because of more weekend operation.

Plant Statistics	March	Turbine Roll To Date
Energy Production (kHw net)	397,200	1,911,800
Peak MW (net)	10.3	10.4
On-Line Hours	66.1	458.3
Test Hours	25.5	683.3
Total Plant Outage Hours	72.5	821.8
Scheduled	63	340.5
Unscheduled	9.5	481.3
Weather Outage Hours	152.9	1053.2

Operation and Maintenance Costs

- A summary of the O&M labor, material, contract, and other costs for the month of March 1983, is shown on the attached table. Cost are categorized as follows:

Field Office	- Includes plant supervision, engineering, accounting, clerical, office supplies, and miscellaneous indirect expenses.
Operation	- Includes total cost of operating staff and expenses.
Miscellaneous Non-productive Cost	- Includes station supplies and rentals, safety and job training, and site security.
Maintenance	- Includes total cost of maintenance staff and expenses allocated to major plant subsystems.
Overheads	- Includes costs associated with direct labor plus company administrative and general expenses.

SOLAR ONE

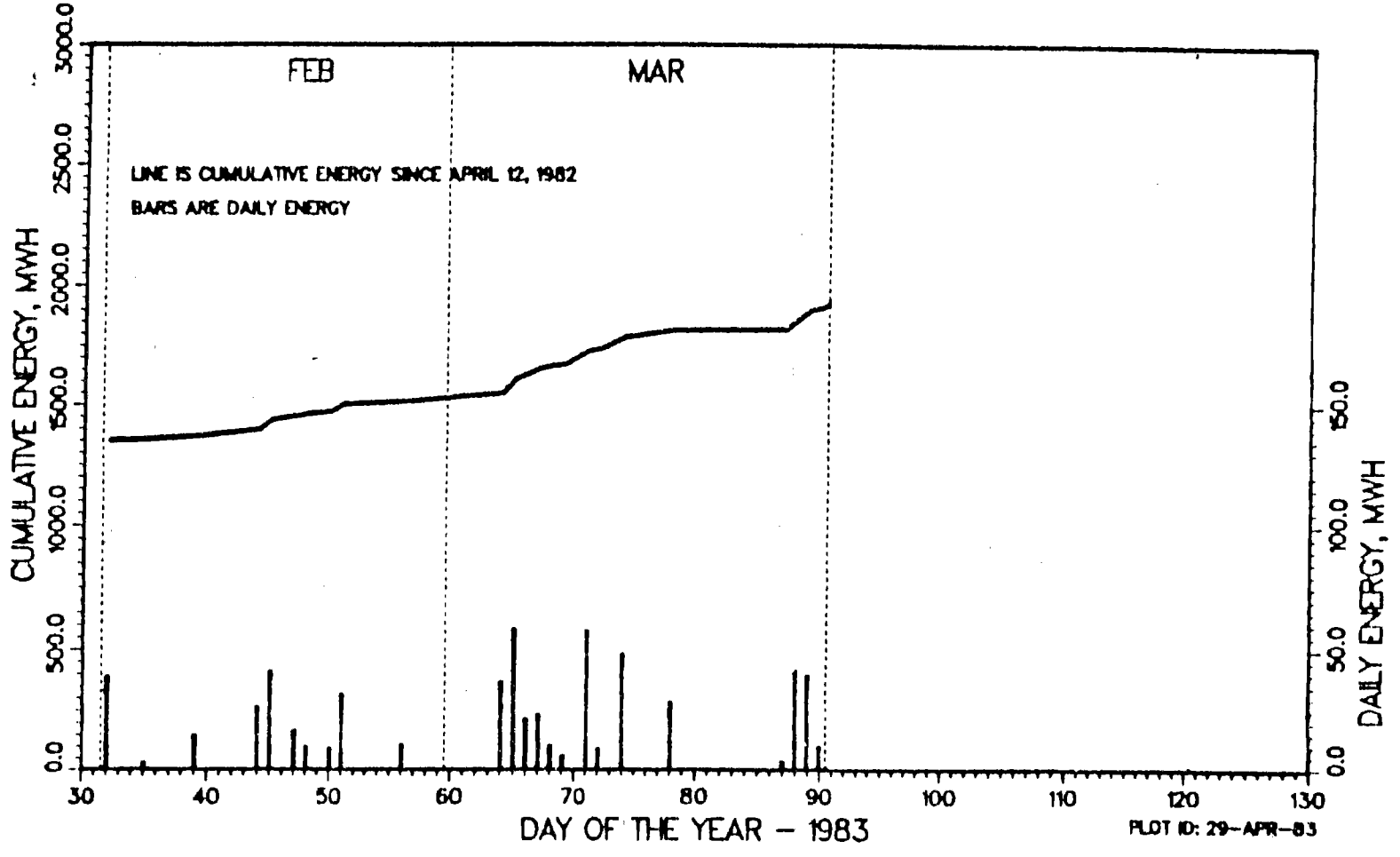
MONTHLY O&M COST SUMMARY
(& X 1000)

MONTH OF MARCH 1983

	LABOR	MATERIAL	CONTRACT	OTHER	TOTAL
FIELD OFFICE	11.6	-	.1	1.2	12.9
OPERATIONS	55.4	18.6	-	5.5	79.5
MISC. NON-PRODUCTIVE COSTS	4.0	-	3.1	.7	7.8
MAINTENANCE					
Supervision/Indirects	8.3	1.8	1.4	1.4	12.9
Control System	8.0	2.3	2.5	-	12.8
Receiver System	1.2	-	-	-	1.2
Thermal Storage System	1.9	.2	18.7	.2	21.0
Collector System	1.9	-	-	-	1.9
EPGS System	2.9	1.9	-	-	4.8
Misc.	3.7	.6	.8	-	5.1
Total Maintenance	27.9	6.8	23.4	1.6	59.7
SUB TOTAL	98.9	25.4	26.6	9.0	159.9
Division O.H.					20.4
TOTAL DIRECT					180.3
Workman's Compensation					.9
Payroll Tax					7.7
Pension & Benefits					21.2
Administrative & General					35.6
GRAND TOTAL					245.7

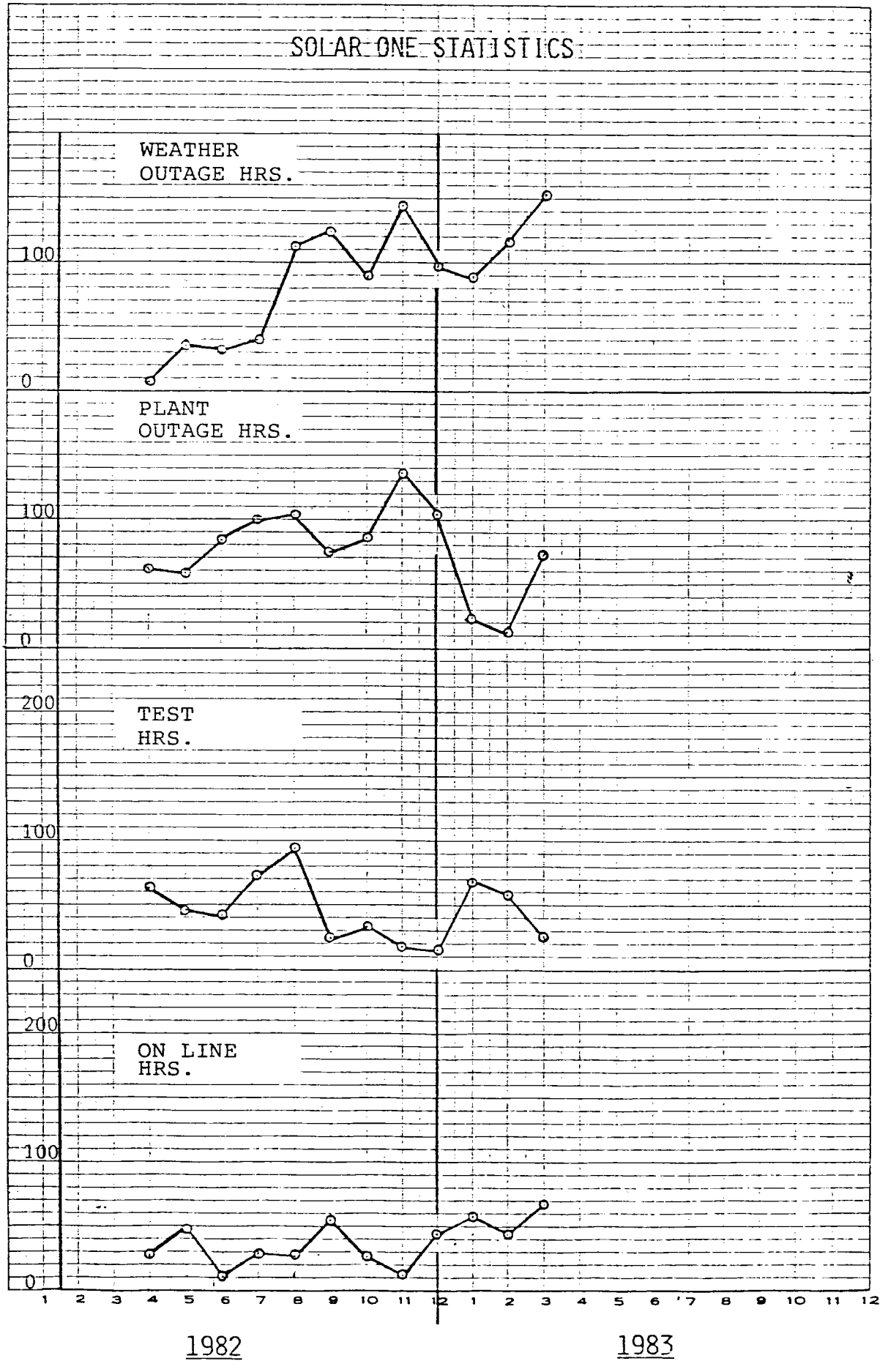
PES/AZK:dlg
04/26/83

SOLAR ONE NET ELECTRICAL PRODUCTION



ATTACHMENT 1

ATTACHMENT 2



AZK/03/17/83

U.S. DEPARTMENT OF ENERGY

memorandum

DATE JUL 12 1983

REPLY TO ATTN OF S. D. Elliott, Jr., Director, DOE Site Office, Daggett, CA.

SUBJECT Submission of Monthly Operation & Maintenance Reports, April, 1982 through March, 1983, under Cooperative Agreement DE-FC03-77SF10501, for Patent Clearance and TIC.

TO Don Holz, ISEA
Roger Gaither, OPC
TIC - Document Control

With definitization of Fiscal Year 1983 scope and funding under the subject Cooperative Agreement, agreement was reached between DOE/SAN and Southern California Edison (on behalf of the Associates) with respect to Uniform Reporting System requirements for the 10-MWe Central Receiver Solar Thermal Pilot Plant Test Operations period (August 1, 1982 through July 31, 1983). These agreements are reflected in the attached DOE Form CR-537. Items A.6 and A.7 of the "Checklist" call for a combined Operations & Maintenance Status and Cost report on a monthly basis, in SCE format. Monthly O&M reporting was initiated upon completion of construction in April, 1982. These reports have proven highly valuable in the management of the Test Operation phase of the Project, and have been circulated among Project advisory and oversight personnel and others interested in its progress.

Three sets of Monthly O&M Reports Nos. 1 through 12, covering the period from April, 1982 through March, 1983 are hereby forwarded for review by SAN/OPC (one set, with SAN Form 70, "Request for Patent Clearance") and for archiving and reproduction on request by the DOE Technical Information Center, Oak Ridge (two legible, reproducible sets, with DOE Form RA-426).

It is requested that SAN/OPC provide confirmation of patent clearance, when granted, to both the SCE Site Manager and the DOE Technical Representative, at the Project Office.

Future monthly reports will be collected and forwarded in the same manner at approximately six-month intervals for the duration of the Project.

Attchs.: Forms DOE CR 537, SAN Form 70; DOE RA 426

Encls.: 3 sets, 12 each

S. D. Elliott, Jr.

cc: R. W. Hughey, DOE/SAN (FGS)
P. E. Skvarna, SCE-Daggett

U.S. DEPARTMENT OF ENERGY

REPORTING REQUIREMENTS CHECKLIST

DOE Form CR-1[illegible]
(1-78)

(See Instructions on Reverse)

FORM APPROVED
OMB NO. 38B-019

1. IDENTIFICATION: 10-MWe SOLAR THERMAL CENTRAL RECEIVER PILOT PLANT OPER. & MAINT.	2. OBLIGATION INSTRUMENT: COOP. AGREEMENT DE-FC03-77SF10501, MOD. A008

3. REPORTING REQUIREMENTS

A. PROJECT MANAGEMENT	Frequency	B. TECHNICAL INFORMATION REPORTING	Frequency
1. ☐ Management Plan		1. ☒ Notice of Energy RD&D Project (SSIE)	Y
2. ☐ Milestone Schedule & Status Report		2. ☒ Technical Progress Report	Y
3. ☒ Cost Plan	O,Y,C	3. ☒ Topical Report	A
4. ☒ Manpower Plan	O,Y,C	4. ☒ Final Technical Report	F
5. ☐ Contract Management Summary Report		C. PMS/MINI-PMS	
6. ☒ Project Status Reports (2) (See 4.B)	M	1. Cost Performance Report	
7. ☒ Cost Management Report (See 4.B)	M	☐ Format 1 WBS	
8. ☐ Manpower Management Report		☐ Format 2 Functional	
9. ☐ Conference Record		☐ Format 3 Baseline	
10. ☐ Hot Line Report		☐ Format 5 Problem Analysis	
		2. ☐ Cost/Schedule Status Report	
		3. ☐ Management Control System Description	
		4. ☐ Summary System Description	
		5. ☐ WBS Dictionary	

FREQUENCY CODES:
A — As Required
C — Contract Change
F — Final (End of Contract)
M — Monthly
O — One Time (Soon After Contract Award)
Q — Quarterly
S — Semi-Annually
X — Mandatory for Delivery with Proposals/Bid
Y — Yearly or Upon Contract Renewal

4. SPECIAL INSTRUCTIONS

A. Reports A.3 and A.4 shall be submitted annually, with funding proposal for succeeding fiscal year, and shall be updated as required following definitization of annual funding modification. Report A.7 shall be based upon current Report A.3.

B. Reports A.6 and A.7 shall be delivered by the 20th calendar day of the month following the reporting month. Report(s) A.6 shall address both Visitors' Center operation and Plant operation and maintenance; if desired, these may be combined in a single report submission. Report A.7 shall be keyed to the current Report A.2, and may be combined with or appended to Report(s) A.6. SCE's format for these reports is acceptable.

C. Report B.2 shall be submitted within 60 days following the completion of each year of the Test Operations period, initiated August 1, 1982, and shall summarize progress, achievements, issues and resolution thereof durin the preceding year.

D. Report B.3 shall be prepared and submitted on an as-required basis, in accordance with Item I.A.6.a-d of App. A to the Cooperative Agreement.

E. Report B.4 shall be submitted within 90 days following completion of the Test Op'ns. period, and shall be prepared in accordance with Item I.B.1.f, App. A to the C.A.

ATTACHED HEREWITH:
☐ Report Distribution List
☐ WBS/Reporting Category

Three (3) copies of Reports A.3 and A.4, and ten (10) copies of other reports shall be provided to the DOE Site Office for further distribution.

6. PREPARED BY (Signature and date): June 9, 1983	7. REVIEWED BY (Signature and date):

DEPARTMENT OF ENERGY
SAN FRANCISCO OPERATIONS OFFICE

CONTRACTOR REQUEST FOR PATENT CLEARANCE
FOR RELEASE OF UNCLASSIFIED DOCUMENT

Prime Contract No.	Coop. Agreement DE-FC03-77SF10501
Subcontract No.	N/A
Report No.	Monthly Operations & Maintenance Reports (w/ Cost Reports) Nos. 1 - 12
Date of Report	April, 1982 thru March, 1983
Name & Phone No. of DOE Technical Representative	S. D. Elliott, Jr (619) 254-2672

TO: Roger S. Gaither, Asst. Chief for Prosecution
Office of Patent Counsel/Livermore Office
P.O. Box 808, L-376
Livermore, California 94550

FROM: 10-MWe Central Receiver Solar Thermal Pilot Plant
Project Office
Post Office Box 366
Daggett, CA 92327

1. Document Title:
SOLAR ONE OPERATION & MAINTENANCE REPORT

2. Type of Document: ☑ Technical Report, ☐ Conference Paper, ☐ Journal Article, ☐ Abstract or Summary, ☐ Copy of Oral Presentation, ☐ Other (please specify): _____

3. In order to meet a publication schedule or submission deadline, patent clearance by (routine) would be desired.

SENDER IS TO CHECK BOX #4 OR #5 BELOW.

☑ 4. I have reviewed (or have had reviewed by technically knowledgeable personnel) this document for possible inventive subject matter (Subject Inventions) and that no inventions or discoveries (Subject Inventions) are deemed to be disclosed in this document except as stated below:

a. Attention should be directed to pages _____ of this document.

b. This document describes matter relating to an invention:

i. Contractor Invention Docket No. _____.
ii. A disclosure of the invention was submitted to DOE on _____ (date)
iii. A disclosure of the invention will be submitted shortly _____ (approximate date)
iv. A waiver of DOE's patent rights to the contractor:
☐ has been granted, ☐ has been applied for; or ☐ will be applied for _____ (date)

☐ 5. This document is being submitted, but no review has been made of this document for possible inventive subject matter.

6. Remarks:

Reviewing/Submitting Official: Name (Print/Type) Paul E Skvaeda
Title SCE R&D Site Manager - Solar One
Signature Paul E Skvaeda Date June 26, 1983

TO: INITIATOR OF REQUEST

FROM: ASSISTANT CHIEF FOR PROSECUTION
Office of Patent Counsel/Livermore Office

☐ No patent objection to above-identified release.

☐ Please defer release until advised by this office.

Signed _____ Date Mailed _____

DOE Form RA-426
(10/80)

U.S. DEPARTMENT OF ENERGY

OMB NO. 038-R0190

DOE AND MAJOR CONTRACTOR RECOMMENDATIONS FOR ANNOUNCEMENT AND DISTRIBUTION OF DOCUMENTS

See Instructions on Reverse Side

1. DOE Report No.	2. Contract No.	3. Subject Category No.
DOE/SF/10501-0M1 through -0M12	DE-FC03-77SF10501	UC-62

4. Title
SOLAR ONE OPERATION & MAINTENANCE REPORT, NOS. 1 (April, 1982) - 12 (March, 1983)

5. Type of Document ("x" one)
- [X] a. Scientific and technical report
- [ ] b. Conference paper: Title of conference _____
  _____ Date of conference _____
  Exact location of conference _____ Sponsoring organization _____
- [ ] c. Other (specify planning, educational, impact, market, social, economic, thesis, translations, journal article manuscript, etc.)

6. Copies Transmitted ("x" one or more)
- [ ] a. Copies being transmitted for standard distribution by DOE–TIC.
- [ ] b. Copies being transmitted for special distribution per attached complete address list.
- [X] c. Two completely legible, reproducible copies being transmitted to DOE–TIC. (Classified documents, see instructions)
- [ ] d. Twenty-seven copies being transmitted to DOE–TIC for TIC processing and NTIS sales.

7. Recommended Distribution ("x" one)
- [ ] a. Normal handling (after patent clearance): no restraints on distribution except as may be required by the security classification.

Make available only [ ] b. To U.S. Government agencies and their contractors. [ ] c. within DOE and to DOE contractors. [ ] d. within DOE. [ ] e. to those listed in item 13 below.

- [X] f. Other (Specify) Archive only - access unrestricted; primary distribution has been made by Project Office

8. Recommended Announcement ("x" one)
- [X] a. Normal procedure may be followed. [ ] b. Recommend the following announcement limitations:

9. Reason for Restrictions Recommended in 7 or 8 above.
- [ ] a. Preliminary information. [X] b. Prepared primarily for internal use. [ ] c. Other (Explain)

10. Patent, Copyright and Proprietary Information

Does this information product disclose any new equipment, process or material? [X] No [ ] Yes If so, identify page nos. _____

Has an invention disclosure been submitted to DOE covering any aspect of this information product? [X] No [ ] Yes

If so, identify the DOE (or other) disclosure number and to whom the disclosure was submitted.

Are there any patent-related objections to the release of this information product? [X] No [ ] Yes If so, state these objections.

Does this information product contain copyrighted material? [X] No [ ] Yes

If so, identify the page number _____ and attach the license or other authority for the government to reproduce.

Does this information product contain proprietary information? [ ] No [ ] Yes If so, identify the page numbers _____.

("x" one [ ] a. DOE patent clearance has been granted by responsible DOE patent group.

[X] b. Document has been sent to responsible DOE patent group for clearance.

11. National Security Information (For classified document only; "x" one)

Document [ ] a. does [X] b. does not contain national security information

12. Copy Reproduction and Distribution

Total number of copies reproduced 50 ea. Number of copies distributed outside originating organization 25 ea.

13. Additional Information or Remarks (Continue on separate sheet, if necessary)

14. Submitted by (Name and Position) (Please print or type)
S. D. Elliott, Jr., Director

Organization
DOE Solar One Site Office, P.O. Box 366, Daggett, CA 92327; ph. (619)254-2672

Signature S. D. Elliott Jr. Date July 12, 1983

DEPARTMENT OF ENERGY
SAN FRANCISCO OPERATIONS OFFICE

CONTRACTOR REQUEST FOR PATENT CLEARANCE
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SOLAR ONE OPERATION & MAINTENANCE REPORT

2. Type of Document: ☑ Technical Report, ☐ Conference Paper, ☐ Journal Article, ☐ Abstract or Summary, ☑ Copy of Oral Presentation, ☐ Other (please specify): _____

3. In order to meet a publication schedule or submission deadline, patent clearance by (routine) would be desired.

SENDER IS TO CHECK BOX #4 OR #5 BELOW.

☑ 4. I have reviewed (or have had reviewed by technically knowledgeable personnel) this document for possible inventive subject matter (Subject Inventions) and that no inventions or discoveries (Subject Inventions) are deemed to be disclosed in this document except as stated below:

a. Attention should be directed to pages _____ of this document.

b. This document describes matter relating to an invention:

i. Contractor Invention Docket No. _____.
ii. A disclosure of the invention was submitted to DOE on _____ (date)
iii. A disclosure of the invention will be submitted shortly _____ (approximate date)
iv. A waiver of DOE's patent rights to the contractor:
☐ has been granted, ☐ has been applied for; or ☐ will be applied for _____ (date)

☐ 5. This document is being submitted, but no review has been made of this document for possible inventive subject matter.

6. Remarks:

Reviewing/Submitting Official: Name (Print/Type) Paul E Skvarna
Title SCE R&D Site Manager - Solar ONE
Signature Paul E Skvarna Date June 26, 1983

TO: INITIATOR OF REQUEST

FROM: ASSISTANT CHIEF FOR PROSECUTION
Office of Patent Counsel/Livermore Office

☒ No patent objection to above-identified release.

☐ Please defer release until advised by this office.

Signed Harold M. Dixon Date Mailed 7/28/83

COPY FOR CONTRACTOR'S (SENDER'S) FILES AFTER OPC RELEASE

Department of Energy
San Francisco Operations Office
1333 Broadway
Oakland, California 94612

Reply to:
DOE Site Office
Post Office Box 366
Daggett, CA 92327

NOV 2 5 1983

Mr. William D. Matheny
Chief, Control Branch
Document Control & Evaluation Div.
DOE Technical Information Center
Post Office Box 62
Oak Ridge, TN 37830

Subj.: Agreements on TIC Numbering of Solar One Project Documentation

Dear Mr. Matheny:

Thank you for your thoughtful and informative reply to my last letter. I believe it provides an excellent basis for mutual understanding of the system we shall be using for past and upcoming documentation on this Project. I will document our understanding following the paragraphing in your letter of November 22, with our comments where appropriate.

1. The drawings referred to here are the current (in some cases preliminary) issues of those later addressed under Item 10. Since we are still doing a substantial amount of work on the Plant, especially in the controls and wiring areas. I think it would be counterproductive to file drawings now with TIC/NTIS; doing so would require us to send you updates as they come in - several per week - and you to purge obsolete issues and replace them with the new ones, a most onerous task. We maintain a document control system on-site which can insure that an inquirer is provided the latest drawing issue, with necessary caveats as to possible future changes being planned, etc. I do (Item 10) plan to file the complete, as-built and -modified drawing set before disestablishment of the Project Office at the end of 1984, after we are essentially through with fine-tuning and modification of the Plant systems and components. (A further complication is that drawings are presently grouped by work discipline - i.e., piping & mechanical, electrical, civil, etc. - rather than by system; we are developing a comprehensive numbering, cataloging and cross-referencing system which, we hope, will facilitate pulling drawings out in any pattern that may be required, but I would rather wait for a while to see whether requesters tend to be concerned with systems, work disciplines, or some other categorization, before divvying up the drawings into groups.)

2. I wholeheartedly support this! That is the purpose of this correspondence.

3. The use of the "STMPO-xxx" number as a secondary report number is also my preference; after typing out several in my last letter, I came to realize just how cumbersome the "local suffix" system could be. We will follow your suggestion as given.

4. I would like to leave open the issue of "backfitting" the secondary, "STMPO-xxx" number to the 275-300 reports now on file at TIC/NTIS, until we see how users of the Bibliography make use of this designator vis-à-vis the "official" numbers cited therein. If we get a lot of requests by "STMPO-xxx" number, it might be worthwhile.

5. I agree, having had a chance to stand back and review the hodgepodge in my last letter, and in a draft of the Bibliography. I propose the following for documents under the Cooperative Agreement:

Document Category	Document Number	Note
So. Cal. Edison Plans & Specs.	DOE/SF/10501-001 through -100	
Visitors' Center Monthlies	DOE/SF/10501-101 through -200	1
Operation & Maintenance "	DOE/SF/10501-201 through -300	2
Other Associates/SCE Reports	DOE/SF/10501-301 through -400	3
Project Office Documents	DOE/SF/10501-501 through -600	4

NOTES: 1. We will start our next batch with -137; the previous ones, presently labeled -1-VC through -36-VC in your printout, will "really" be -101 through -036. Incidentally, I note that the last two printouts I have - those of August 28 and September 27 - omit nos. -22-VC through -33-VC; did these not get through to you? (If not, I will send another two sets to you, directly, since they have been patent-cleared; for these I will use the "VC" numbers, so they will fit into your printout properly.)

2. The next batch will start with - 213; your -T1 through -T12 are, again "really"-201 through -212.

3. There are three reports in this category currently en-route to TIC via SAN/ISEA, to which I had assigned the numbers "-TR01" (STMPO-091), "-TR02" (STMPO-603) and "-FS01" (STMPO-602) - copies of RA-426's attached for your identification. If we can catch these in time, they should be re-labeled as "DOE/SF/10501-301 through -303, as indicated in red on the attachments. If not, we will "reserve" these numbers and start the next batch with -304

4. This will include the solicitations, Project Office planning documents and a few items generated by contractors directly for the Project Office; an example of the latter is a group of four or five reports generated by the Energy Technology Engineering Center staff resident at the former Project Office, under a special task under Contract DE-AC03-76SF00700 - the report numbers under the latter heading in your printout have so many variations I wouldn't know where to start!

6. I would like to include the solicitation documents in the DOE/SF/10501-501 thr -600 series, as stated in my prior letter. If it gives you a problem to distribute something that looks like a solicitation package through NTIS, I could, as previou ly suggested, extract just the "specification" (i.e., scope of work and related ap pendices) elements from the "boiler plate". Would this allow you to send them on to NTIS?

7. I will not attempt to continue the "-Tyy" numbers; for Contract DE-AC03-79SF-10499, I will start with "DOE/SF/10499-100 (you have about 86 documents already l ted here, under various designations, including "DOE/SF/10499-46, -8-3, -83REV an -84" plus a whole raft of "-Tyy's" and other miscellaneous ones). EXCEPTION: I will, as previously proposed (un-numbered paragraph, "Revisions and Updates," top of Page 3 in my letter of November 8) use the existing "-Tyy" numbers with an app ded "REV" for the half-dozen such documents requiring updating.

8. Noted, as per paras. 5 and 7, above.

9. I will follow your suggestion, and not "batch" the monthly reports or any others. We are O.K. here for now, since (a) these reports came out since the cutoff date for the present Bibliography, and (b) I presume you did not pick up the "STMPO -600" and "-601" secondary numbers for the reports sent down under Contract DE-FC03 -77SF10501 (Visitors' Center and O&M reports; Item 5, above). I will assign a specific "STMPO-xxx" secondary report number to each document submitted from here on out, and these will be properly picked up in the Bibliography update next year.

10. See comments under Item 1, above.

11. Thanks; we will do two copies for you wherever possible (subject to availability of Xerox paper).

12. We will do full UC-62 print runs on the "final" Project reports.

As regards the present issue of the Bibliography, publishing constraints (the document must, under the terms of the Burns & McDonnell contract with EPRI, be "locked up" and in ready-to-print form November 30) preclude further changes. We are using three methods to identify documents for requestors:

a. Where you, Mary Soderstrum, "DIALOG/RECON" and we agree on an appropriate request number, and the document has been verified as being at TIC/NTIS, the existing report number is given at the top of the data block, and the requestor is "cued" by a "TIC, NTIS" in the "distribution block that the document should be requested from TIC or NTIS, as appropriate, and not from the Project Office. These should amount to about 275, or half of the presently-catalogued material.

b. Where you do not have the document (or we are not sure), but we do, the data block will use a "working" number (usually the contractor's transmittal or internal report number - such as SAN-0499-xx, MCR-80-yyyy), and the absence of a "TIC, NTIS" in the distribution block should "cue" the requestor to come to the Project Office, rather than TIC or NTIS. (About 225 documents.)

c. Where a number has not been assigned at all (in the case of Project Office documents that have as yet to be assembled from raw material, etc.), the report number line at the top of the data block has been left blank; again, the requestor will be "cued" to come to us, not you or NTIS - but in this case, he will have to use the Bibliography page number (identical to the "STMPO-xxx" number). (About 55 documents.)

While it would be nice to have pre-assigned all the numbers prior to publication of the Bibliography in early December, it may also be helpful to retain some flexibility, to wrap up some of the items still under discussion. I would hate to have us locked-in on some advance numbering scheme that might turn out to be untenable, or that might preclude some future change in the TIC system. I will provide you with several copies of the Bibliography (how many would you like?) for your reference; we will retain comprehensive distribution records, and may be able to provide sets of "change pages" as future sets of documents are processed into TIC/NTIS, to all recipients of record. I currently expect that the 1984 update would be a complete, stand-alone document, incorporating the initial issue plus all changes and new documents, and again, it would go to all recipients of record of the previous issue(s).

Finally, you might wish to "flag" the relevant contract numbers, as well as anything including a "STMPO" on it, for "special attention" by your staff; for my part, I will insure that the RA-426's, and the documents themselves, are unmistakeably marked with the proper numbers, with a secondary, "STMPO-xxx", report number below.

The relevant contract numbers are:

Contract Number	Contractor	Note
NSF-C797	Aerospace Corporation	1
NSF-C933	Aerospace Corporation	1
DE-AC03-76SF80064	Aerospace Corporation	
DE-AT03-76CS51101	Aerospace Corporation	
DE-AT03-76CS21060	Aerospace Corporation	
DE-AC03-78ET20517	Aerospace Corporation	
DE-FC03-77SF10501	So. Calif. Edison Co.	
DE-AM03-76SF00700	Rockwell/ETEC	2
DE-AC03-76ET20417	McDonnell Douglas	
DE-AC03-76ET20071	Townsend & Bottum	
DE-AC03-79ET21006	McDonnell Douglas	
DE-AC03-79SF10499	McDonnell Douglas	
DE-AC03-76ET20422	Martin Marietta	
DE-AC03-78ET21007	Martin Marietta	
DE-AC03-80SF10539	Martin Marietta	
NSF-GI-39456	Rockwell/Univ. of Houston	1
DE-AC04-76DP00789	Sandia Laboratories	3
DE-AC03-76ET20341	So. Calif. Edison Co.	
DE-AC03-79SF10496	Townsend & Bottum	
DE-AM03-76SF00012	Univ. of California/LBES	4

NOTES:
1. Pre-DOE/ERDA work by National Science Foundation; via NTIS.
2. Only for items submitted under DOE/SF/10501-501 - -600.
3. Only for items identified as "STMPO" documents.
4. Only for "STMPO" or UC-62 items.

I believe the above list covers all documents we are likely to be sending to TIC.

One again, thanks to you and your staff for your support. I shall await your response to our comments under Items 1, 4, 5 (notes 1, 3 and 4), 6 and 7 before proceeding further in these areas.

Attchs.: Three corrected RA-426's
w/document covers

cc: Mary Soderstrum, Burns & McDonnell
John Bigger, EPRI
Bob Hughey, DOE/SAN (FGS)
Don Holz, DOE/SAN (ISEA)

Sincerely yours,

S. D. Elliott, Jr., Director,
DOE Project Office, Barstow