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MARCH 1982 LOFT PROGRESS REPORT
TO FOREIGN PARTICIPANTS

NRC Research and/or Technical Assistance Report

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U.S. Department of Energy

Idaho Operations Office • Idaho National Engineering Laboratory



This is an informal report intended for use as a preliminary or working document

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This document was prepared primarily for preliminary or internal use. It has not received full review and approval. Since there may be substantive changes, this document should not be considered final.

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INTERIM REPORT

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MARCH 1982 LOFT PROGRESS REPORT
TO FOREIGN PARTICIPANTS

ACCOMPLISHMENTS

General Overview of LOFT Program

The major LOFT Program activities during March were directed towards completion of final preparations for Experiment L9-3 on the target date of April 7, 1982, and Experiment L6-6 on the target date of April 21, 1982.

Experiment L9-3 will be the first anticipated transient without scram (ATWS) performed in a nuclear facility. The experiment will be initiated by turning off feedwater to the steam generator and inhibiting control rod insertion and auxiliary feedwater injection.

Experiment L6-6 will simulate an inadvertent boron dilution event initiated from a cold shutdown condition. The test will first be performed with the recirculation flow rate set at 75 gpm and then repeated with the flow rate set at 150 gpm.

The LOFT Program established a two-year financial baseline for the Nuclear Regulatory Commission (NRC) and Foreign funds. The plan is based on conducting the final LOFT experiment in early 1983 followed by core removal and transition into cold shutdown.

LOFT Program Activities

Work and Analysis for Experiment Preparation

Preparations for Experiments L9-3 and L6-6 continued during March. The power-operated relief valve (PORV) to be used for Experiment L9-3 was tested, calibrated, and installed in the LOFT Facility.

Following plant fill, a modified ASME Section III hydrostatic test was performed. All systems and instruments that will be subjected to the high pressures anticipated in L9-3 were tested to 2875 psig. No significant problems were identified during the testing.

Experiment Data Instrumentation Preparation

Instrumentation to support L9-3 was installed and checked out. Specific items included heat flux sensors and recorders, plenum pressure transducer electronics and the drag disk-turbine transducer rakes.

Design, procurement, and fabrication of instruments for the F2 fuel bundle are proceeding on schedule. Twenty guide-tube thermocouples were fabricated and delivered to Exxon Nuclear Company. The outlet flowmeter for the bundle was also fabricated and delivered to Test Area North.

Collection and evaluation of the embedded-thermocouple (TC) burst test data was completed. The evaluation indicates that the fuel rods pressurized to 350 psig could burst if a cladding temperature of 1080 K is exceeded during L2-5. For fuel rods with embedded TCs installed, the burst threshold temperature would be 1000 K.

Experiment Planning

The Experiment Operating Specification (EOS) and the Experiment Prediction (EP) documents for L9-3 and L6-6 were completed and issued.

The Experiment Definition Document (EDD) for Experiment L9-4 was prepared and distributed for preliminary review. The EDDs for all scheduled LOFT experiments have now been completed.

Posttest Analyses and Documentation

Posttest analyses of Experiments L5-1 and L8-2 are nearly complete and documentation has started. Analysis of L9-1 is continuing.

A LOFT Technical Report titled, "Evaluation of LOFT Experiment L8-1 Heatup Rate," (LTR-LO-14-81-079) was issued. It converts the heatup rate to indications of fuel rod local power for comparison with other LOFT core power profile measurements and analytical predictions. The indicated fuel rod local powers are consistent with other core power profile measurements and show more uniformity in the center fuel bundle than is predicted by neutronic calculation of fuel rod-to-fuel rod radial power distribution.

Topical Reports, Studies, and Presentations

A paper titled "Response of LOFT SPNDs to Reactor Coolant Density Variations During LOCA Simulations," was revised and accepted for publication in the August 1982 issue of Nuclear Technology.

The summary of a paper on self-powered neutron detector (SPND) response in LOFT simulations was accepted by the review committee for the American Nuclear Society (ANS) meeting at Kiamosha Lake, New York, to be held September 22 to 24, 1982.

Summaries of two papers, "Characteristics of Natural Circulation" and "Pump Power Measurement Applications," were completed and sent to the review committee for the ANS meeting to be held in January 1983 at Santa Barbara, California.

A presentation was made on LOFT experience with RELAP5 at a RELAP5 user's meeting in Washington, D.C.

FOREIGN-FUNDED TASK SUMMARIES

Foreign-funded projects are summarized in this section.

Summary of Tasks Funded by Japan (JAERI)

Modifications to the blowdown loop at the LOFT Test Support Facility for post-critical heat flux testing were completed. The test section was

installed and the electrical and instrument hookups were started. Drafts of the system operations test and the experiment procedures were released for review.

The 1982 JAERI \$1-million contribution to LOFT was received, and a Change Control Form (CCF) was prepared to place these funds in the reserve account.

Summary of Tasks Funded by Germany (FRG)

Analysis of the Experiment L9-4 transient for the facility response study was completed, and shows the LOFT system duplicates the physical phenomena of a commercial plant, but in less time. Both plants attain the same equilibrium state following a transient. The Experiment L9-4 transient is the final transient to be analyzed for this study.

Summary of Tasks Funded by the Netherlands (ECN)

Values of core mass flux causing the initial rewet in Experiment L2-3 were calculated. The resulting values will provide the basis for comparing initial core quench flows for Semiscale, LOFT, and Loop Blowdown Investigation (LOBI) facilities.

Summary of Tasks Funded by France (CEA)

The F2 fuel bundle core outlet modular drag disk-turbine transducer was completed and delivered to EG&G Idaho. Modification of the fuel bundle lower tie plate is complete.

IN-KIND FOREIGN TASK SUMMARIES

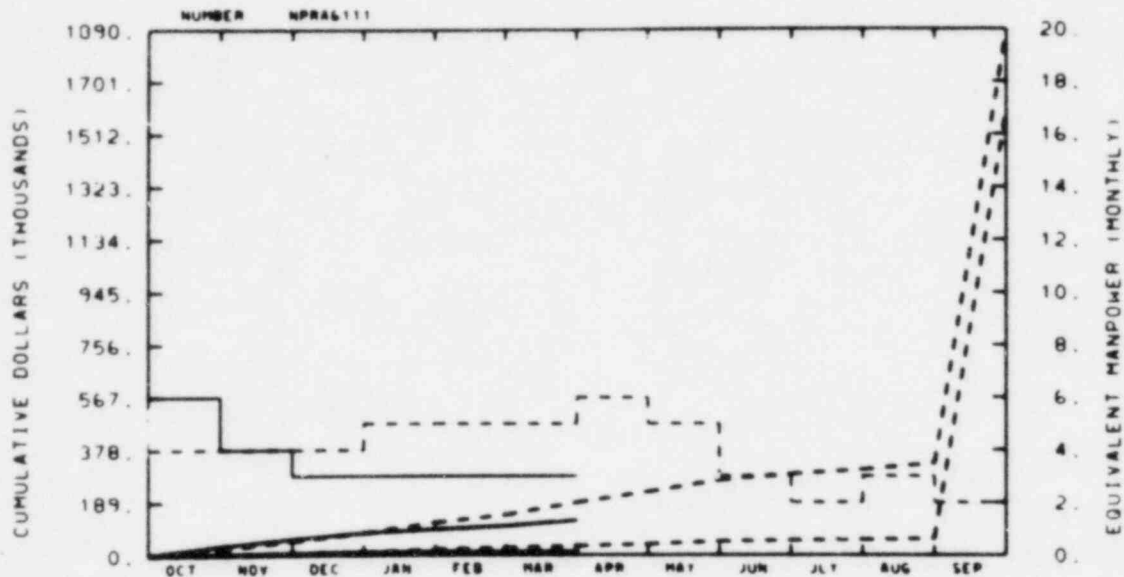
This section summarizes tasks performed by Switzerland (EIR) for LOFT per participating agreement.

Neptun

Repair work on the data acquisition system has been completed and four reflood experiments have been performed. The amplifiers fitted to LOFT thermocouples were tested, with positive results. Since no additional inaccuracy due to the amplifiers was detected, LOFT thermocouples can be scanned without a noise filter, thus increasing the mean scanning rate.

FOREIGN-FUNDED COST GRAPHS

EG&G IDAHO INC.
 JAPANESE FUNDS - 5J



TOTAL PROGRAM

BUDGET	23	50	79	117	145	189	227	269	291	307	329	1882
ACTUAL	33	58	79	92	104	125						

MATERIAL

BUDGET	3	6	9	21	25	32	39	49	53	55	59	1595
ACTUAL	3	7	11	11	11	11						

MANPOWER

BUDGET	4	4	4	5	5	5	6	5	3	2	3	2
ACTUAL	6	4	3	3	3	3						

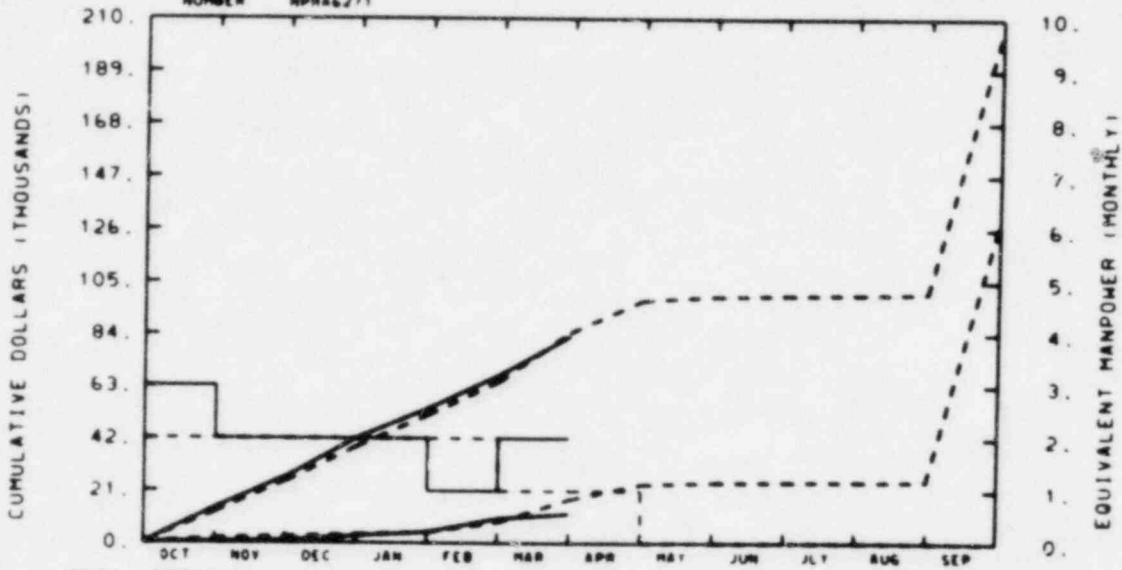
BUDGET

ACTUAL

The indicated underrun is due to schedule delays for the post-CHF testing. Valve calibration tests to support the LOFT Experiment L9-3 caused the delay. A CCF is being prepared to adjust the budget schedule for post-CHF testing.

EG&G IDAHO INC.
 NETHERLANDS FUNDS - 5N

NUMBER NPR46271



TOTAL PROGRAM

BUDGET	12	25	39	51	64	84	97	99	99	100	100	206
ACTUAL	14	27	42	54	67	83						

MATERIAL

BUDGET	2	3	3	4	8	18	24	24	24	25	25	130
ACTUAL	0	1	3	4	10	12						

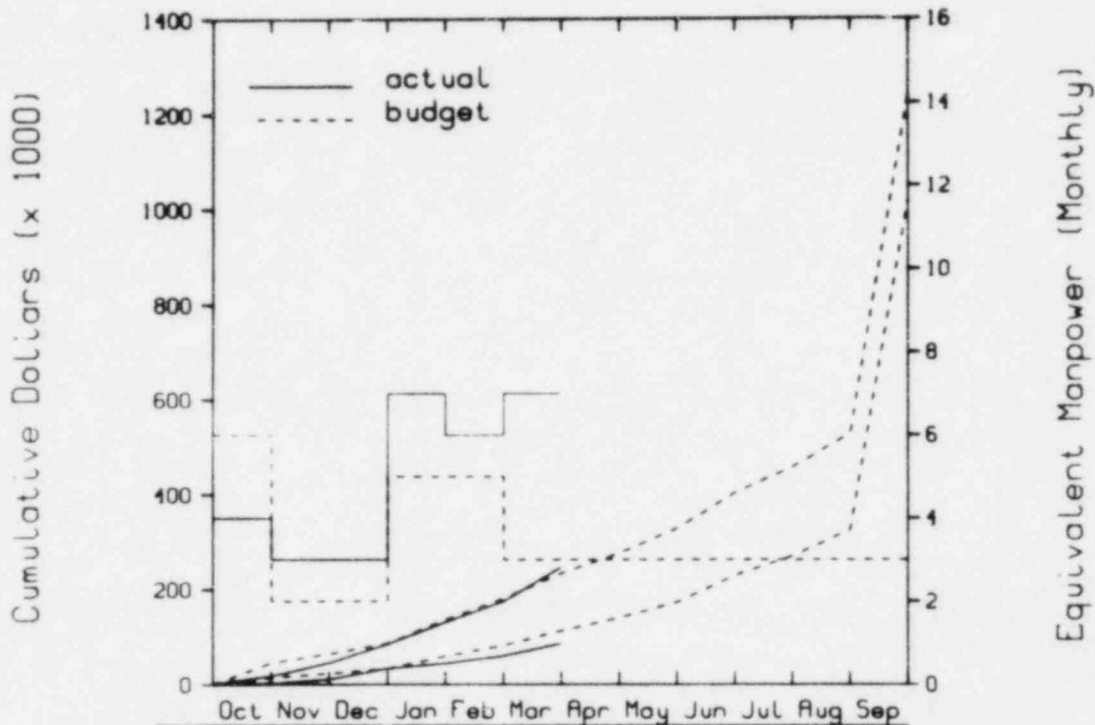
MANPOWER

BUDGET	2	2	2	2	2	1	1	0	0	0	0	0
ACTUAL	3	2	2	2	1	2						

BUDGET
 - - - - -
 ACTUAL

No significant variance.

LOFT Program Cost/Budget Summary
GERMAN FUNDS - NPRA6104

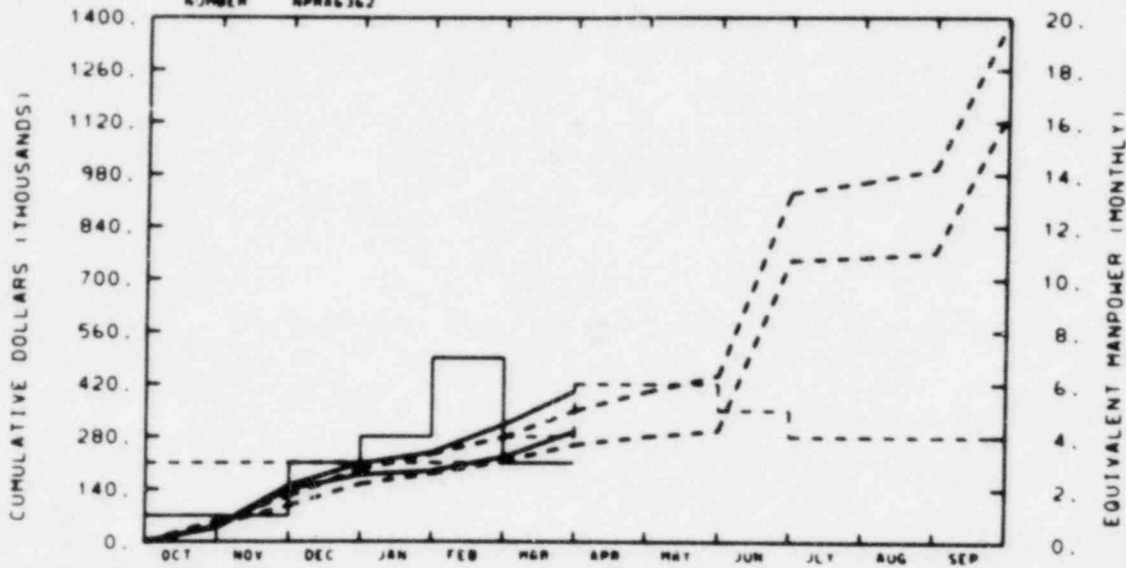


	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
Total	Bud	45	64	86	136	181	234	276	328	403	457	528	1238
	Act	18	45	85	131	175	247						
Material	Bud	11	23	33	59	82	113	140	173	229	270	325	1018
	Act	2	11	34	44	60	86						
Manpower	Bud	6	2	2	5	5	3	3	3	3	3	3	3
	Act	4	3	3	7	6	7						

No significant variance. The year-to-date overrun of \$13K is within 6% of budgeted cost of work scheduled. No major problems exist.

EG&G IDAHO INC.
FRENCH FUNDS - SF

NUMBER NPR66362



TOTAL PROGRAM

BUDGET	57	121	192	233	278	350	399	443	931	959	995	1392
ACTUAL	42	150	208	237	312	401						

MATERIAL

BUDGET	46	97	153	181	214	259	280	296	751	759	770	1143
ACTUAL	37	138	178	188	226	294						

MANPOWER

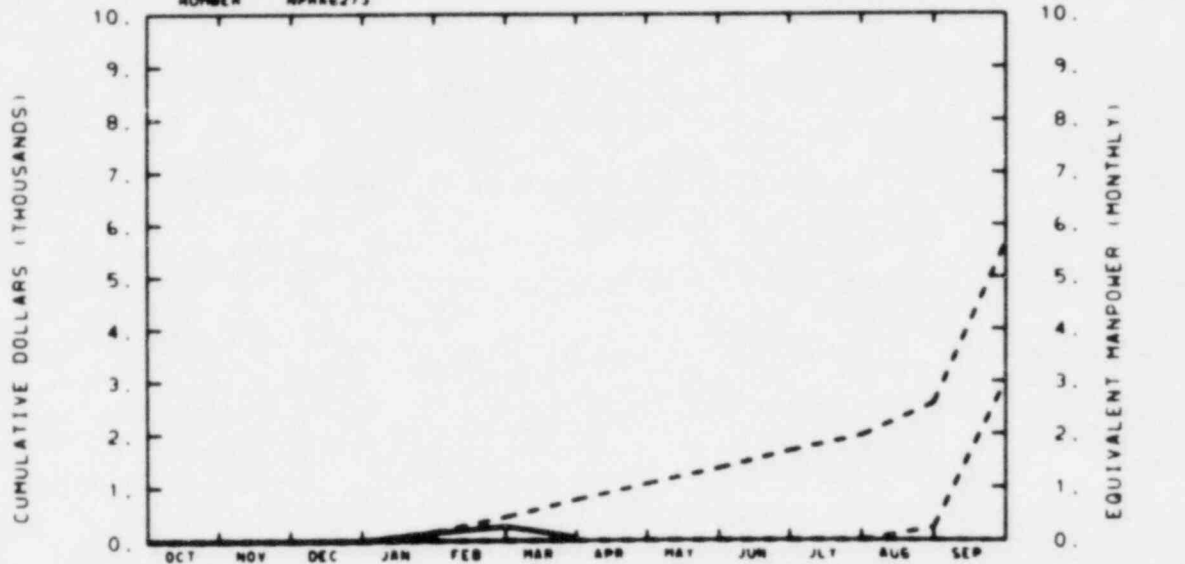
BUDGET	3	3	3	3	3	4	6	6	5	4	4	4
ACTUAL	1	1	3	4	7	3						

BUDGET

ACTUAL

The indicated overrun is a result of incorrect charges against the F2 fuel bundle work. A cost transfer will be made to remove these charges.

EG&G IDAHO INC.
 AUSTRIAN FUNDS - 5A
 NUMBER NPR66273



TOTAL PROGRAM												
BUDGET	0	0	0	0	0	1	1	1	2	2	3	6
ACTUAL	0	0	0	0	0	0	0	0	0	0	0	0

MATERIAL												
BUDGET	0	0	0	0	0	0	0	0	0	0	0	3
ACTUAL	0	0	0	0	0	0	0	0	0	0	0	0

MANPOWER												
BUDGET	0	0	0	0	0	0	0	0	0	0	0	0
ACTUAL	0	0	0	0	0	0	0	0	0	0	0	0

BUDGET
 - - - - -
 ACTUAL

No management costs have been charged to this account this year. No underrun problem exists.

TABLE 1. PLANNED LOFT EXPERIMENT SEQUENCE^a

Test ID	Commitment Date	Description
CV leak test	07/09/81 ^b	Required test of containment leak integrity.
L6-9/L9-2	07/31/81 ^b	Simulated turbine trip multiple failure continuation of L6-7.
L5-1	10/26/81 ^b	Intermediate size break (accumulator line).
L8-2	11/16/81 ^b	Core uncover at high decay heat level.
Replace A2 with F1	11/19/81 through 01/29/82 ^b	F1 center fuel pressurized to 350 psig.
L9-3	04/22/82	Anticipated transient without scram (ATWS) loss of feedwater.
L6-6	05/13/82	Boron dilution from cold shutdown.
L2-5	07/15/82	200% cold leg break at 50 MW to produce the worst probable core thermal-hydraulic conditions, without fuel damage.
L6-8	10/21/82	Three anticipated transients.
L9-4	11/18/82	ATWS.
Replace F1 with F2	02/23/83	F2 fuel bundle pressurized.
L2-6	03/24/83	200% cold leg break double-ended at 50 MW.
Initiate cold shutdown	09/29/83	In standby--cold without core.

a. Test sequence and schedule is tentative and subject to approval.

b. Completed.

TABLE 2. FOREIGN-FUNDED ACCOUNTING AT END OF MARCH 1982
(thousands of dollars)

<u>Participant</u>	<u>Total Funds Provided</u>	<u>Funds Spent (Completed Tasks)</u>	<u>Reserve</u>	<u>Spending Authorized (Current Tasks)</u>
JAERI	7000	4725.0	1511.3	763.7 ^a
FRG	6260	4610.3	629.3	1020.4 ^a
CEA	2000	47.5	347.4	1605.1 ^a
ECN	640	372.0	98.7	169.2 ^a
FZS	<u>147</u>	<u>141.3</u>	<u>0</u>	<u>5.7</u>
Total	16047	9895.8	2586.7	3564.1 ^a

a. Includes FY-83 funds identified for the baseline (Q82-2-0), but spending of those funds has not yet been authorized.

TABLE 3. FOREIGN-FUNDED TASK SUMMARY AT END OF MARCH 1982
(thousands of dollars)

<u>Task Description</u>	<u>Spending Authorized</u>	<u>Spending to Date</u>	<u>Budget to Date</u>	<u>Scheduled Completion</u>
<u>JAERI Tasks</u>				
5J12211 JAERI Management (FY-82)	58.0	32.3	21.6	September 1982
5J12211 JAERI Management (FY-83) ^a	25.4	0	0	September 1983
5J12212 JAERI Delegate Support (FY-82)	19.0	2.6	3.9	September 1982
5J12212 JAERI Delegate Support (FY-83) ^a	16.0	0	0	September 1983
5J12223 International Program Evaluation (FY-82)	64.0	0	8.3	September 1982
5J12223 International Program Evaluation (FY-83) ^a	99.2	0	0	September 1983
5J12231 Post-CHF Phase I	150.9	32.5	107.0	May 1982
5J12232 Post-CHF Phase II	235.1	218.2	226.5	November 1982
5J12233 Density for Post-CHF	44.6	35.0	22.6	July 1982
5J13321 Display Evaluation	<u>51.4</u>	<u>51.0</u>	<u>51.4</u>	Completed
Total	763.6	371.6	441.3	
<u>FRG Tasks</u>				
5G12E11 Experimental Analysis	255.4	259.1	255.4	Completed
5G12211 FRG Management (FY-82)	37.0	21.5	26.6	September 1982
5G12211 FRG Management (FY-83) ^a	25.4	0	0	September 1983
5G12212 FRG Delegate Support (FY-82)	18.0	10.6	6.6	September 1982
5G12212 FRG Delegate Support (FY-83) ^a	15.9	0	0	September 1983
5G12223 International Program Evaluation	70.0	71.1	70	Completed
5G12512 Facility Response Study	104.0	100.0	95.6	May 1982
5G12513 LOFT Scaling	52.0	41.4	46.0	March 1982
5G13311 Temperature Compensation	<u>442.7</u>	<u>113.9</u>	<u>113.9</u>	September 1982
Total	1020.4	617.6	614.1	

TABLE 3. (continued)

<u>Task Description</u>	<u>Spending Authorized</u>	<u>Spending to Date</u>	<u>Budget to Date</u>	<u>Scheduled Completion</u>
<u>CEA Tasks</u>				
5F12211 CEA Management (FY-82)	37.0	17.0	13.2	September 1982
5F12211 CEA Management (FY-83) ^a	24.0	0	0	September 1983
5F12212 CEA Delegate Support (FY-82)	18.0	7.0	4.9	September 1982
5F12212 CEA Delegate Support (FY-83) ^a	15.9	0	0	September 1983
5F13N12 F2 Fuel Bundle	369.4	407 ^b	369.4	Completed
5F13311 Temperature Compensation	649.5	49.6	40.3	September 1982
5F14N21 Fuel Instrumentation	<u>491.3</u>	<u>442</u>	<u>448.7</u>	July 1982
Total	1605.1	922.6	876.5	
<u>ECN Tasks</u>				
5N12211 ECN Management (FY-82)	14.0	4.2	5.2	September 1982
5N12211 ECN Management (FY-83) ^a	14.7	0	0	September 1983
5N12226 Startup and Operational Test	78.1	64.3	64.5	May 1982
5N12227 Nuclear/Electric Rod	<u>62.4</u>	<u>62.0</u>	<u>62.4</u>	Completed
Total	169.2	130.5	132.1	
<u>F25 Tasks</u>				
5A12211 F25 Management	<u>5.7</u>	<u>0.1</u>	<u>0.8</u>	September 1982
Total	5.7	0.1	0.8	

a. FY-83 funding has been identified for the baseline (Q82-2-0), but spending is not yet authorized.

b. An erroneous charge was made to this account. Correction is in progress.