STEAM GENERATOR REPAIR PROGRAM

FOR THE

SURRY POWER STATION

UNIT NO. 2

PROGRESS REPORT - NO. 5

FOR THE PERIOD

OCTOBER 1, 1979 THROUGH NOVEMBER 30, 1979

DOCKET NOS. 50-280
50-281

LICENSE NOS. DPR-32
DPR-37

VIRGINIA ELECTRIC AND POWER COMPANY

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TABLES

1.0 INTRODUCTION

This Progress Report contains information on the radiological effects of the Steam Generator Repair Program (SGRP) for Surry Power Station, Unit No. 2, and the measures taken to maintain these effects "as low as is reasonably achievable" (ALARA), during the period October 1 through November 30, 1979.

With regard to radiological effects, significant tasks performed during the reporting period involved installation and post-installation and startup activities and included: installation of removed reactor coolant pipe sections, installation of blowdown and miscellaneous piping and installation of the steam generator recirculation and transfer system. Several ongoing peripheral and support activities such as temporary scaffolding, cleanup and decontamination, health physics support and project supervision also contributed significantly to the total radiological effects assessed during this period.

The report sections which follow provide an assessment of the occupational radiation exposure expended, the dose reduction techniques employed and their effectiveness, and the radioactive effluents and solid waste generated during the reporting period.

2.0 OCCUPATIONAL RADIATION EXPOSURES

2.1 General

Occupational exposure to radiation may be considered the major radiological effect of the SGRP. Thus, significant importance has been placed upon providing an accurate assessment of the collective radiation exposure which is expended in performing each of the tasks involved. Estimates of these exposures were presented in summary form in Table 5.3-1 of the report entitled "Steam Generator Repair Program", dated August 17, 1977 and amendments thereto, hereafter referred to as the SGRP report.

2.2 Evaluation of Exposure Data

The program established to assess the actual exposures received during the repair effort has been designed to provide data which is compatible with the detail and format of the exposure summary presented in Table 5.3-1 of the SGRP report. This design permits valid comparisons between the estimated and actual exposures for specific tasks. In general, the program utilizes daily worker exposure data, as recorded by self-reading pocket dosimeters, in conjunction with contractor supplied, worker task data to evaluate current manrem expenditures. The worker task data is standardized to a system of discrete work packages (called Engineering Task Assignments) which was developed during the project planning phase. The use of this system to categorize exposure related work for individuals on a daily basis facilitates the process of compiling an accurate breakdown of the collective exposure expended on the many tasks involved. A more detailed description of this program, and

the basis for its design, was presented in Section 2.2 of Progress Report No. 2 for the SGRP.

2.3 Description and Format of Exposure Data

Table 1 presents a summary of the occupational radiation exposure expended during the reporting period, the labor and exposure expenditures to date (i.e. from project commencement on February 3, 1979 to November 30, 1979), and the original estimated expenditures. The following comments are provided for clarification and should be considered when reviewing the data presented.

(a) Additional tasks performed during the repair effort which were not listed in Table 5.3-1 of the SGRP report have been included in Table 1. Similarily, exposures received by personnel performing functions not directly attributable to any one task have been listed separately.

(b) The "Task Status" indications listed in Table 1 are intended to aid in the process of comparing estimated vs. actual manrem expenditures during the repair effort. For tasks indicated as "in progress", significant exposure related work may remain to be performed and a realistic comparison may be impractical. For "completed" tasks, the manrem and manhour values listed in Table 1 can be considered to represent the major significant expenditures for those tasks, therefore valid comparisons are possible. It should be recognized, however, that factors such as field changes to procedures, dismantling of task related support equipment, localized work area cleanup, etc. may continue to contribute small amounts of additional exposure and labor to a task for some time after completion is indicated.

(c) The Phase Subtotals listed in Table 1 are calculated by a summation of values for completed tasks. Expenditures reported for "Additional Tasks" and "Unassigned Personnel Categories" are allocated to a particular phase based upon the major activities being performed at the time they are incurred. Thus, the Phase Subtotals also include these values for phases which can be considered essentially complete. This is the case for Phase I (Shutdown and Preparatory Activities), Phase II (Removal Activities), and Phase III (Installation Activities). For Phase IV (Post Installation and Startup Activities) the Phase Subtotals do not yet include the expenditures mentioned above since a majority of the tasks involved in this phase have yet to be completed.

2.4 Conclusions

A review of the data presented in Table 1 of this report reveals that the total occupational radiation exposure received for tasks completed as of November 30, 1979 is approximately 4% below the original estimate. Furthermore, no worker assigned to the SGRP has to date received radiation exposure in excess of applicable federal standards. These facts, and the exposure reductions effected by the techniques described in Section 3 of this report, illustrate clearly that the committment to maintain occupational exposures ALARA is being successfully applied to the repair effort.

3.0 APPLICATION OF ALARA PRINCIPLES

3.1 General

This section summarizes the techniques and practices which have been effective in providing dose reductions to personnel during the reporting period. Where the available data permits, the following evaluations include a quantitative assessment of the manrem savings which can be attributed to the technique used. Additional information on these techniques and how they relate to the overall steam generator replacement activities can be found in the SGRP report.

3.2 Temporary Shielding

The use of temporary shielding, and the significant exposure rate reductions achieved through its application, have been described in detail in several previous Progress Reports for the SGRP. The lower steam generator cubicles have received the most extensive application of shielding and thus the work performed in these areas has benefitted most directly from its use. During the reporting period, a number of tasks involved some degree of work in the lower cubicles, however, the installation of reactor coolant piping represents the most significant manrem expenditure for which the effectiveness of shielding can be assessed.

Using radiation survey data, it was shown in Progress Report Nos. 3 and 4 that an average exposure rate reduction factor of 5 was achieved through temporary shielding of reactor coolant piping. By applying this reduction factor to the actual exposure expended for installation of reactor coolant piping during the reporting period (approximately 19 manrem) a calculated exposure savings of about 76 manrem is obtained.

3.3 Miscellaneous Valve Refurbishment

In section 3.3 of Progress Report No. 4 for the SGRP, the refurbishment of valves removed from miscellaneous piping systems was discussed. It was shown that significant reductions in radiation exposure levels associated with the valves resulted from this refurbishment and that a dose reduction factor of 10 could be assigned to subsequent tasks requiring handling of the valves.

During the reporting period, "Installation of Blowdown and Miscellaneous Piping" required the expenditure of approximately 32 manrem. Of this total, installation of miscellaneous piping (and valves) represents about 20 manrem. The achieved dose reduction factor of 10 can thus be used to calculate an exposure savings of about 180 manrem for this sub-task.

3.4 General Techniques

A number of more general techniques and practices are listed below which have been utilized throughout the repair effort to maintain adequate control of occupational radiation exposure.

(a) Comprehensive Health Physics and training programs,

(b) the "work package" concept for task preplanning and review,

(c) the project photographic and video-tape documentation,

(d) in-containment "rest area" utilization, and

(e) periodic work area cleanup and debris removal.

While these practices cannot be related quantitatively to any specific task, they all contribute significantly to the overall ALARA program for the SGRP.

4.0 RADIOACTIVE EFFLUENTS AND SOLID WASTE

4.1 General

Radioactive liquid and gaseous effluents, and radioactively contaminated solid waste generated during the steam generator replacement project are summarized in Table 2. A discussion of each category is given below.

4.2 Airborne Releases

Airborne releases for the reporting period originated primarily from continuous ventilation of the containment during the repair activities. This is necessary to maintain a negative pressure while the equipment hatch is open. The continuous flow is processed through appropriate filter banks to minimize the concentration of airborne particulates released to the environment. Releases for October and November are seen in Table 2 to be consistent with those of the previous six months. No radioiodines or noble gases were detected and the particulates are comprised entirely of those nuclides with relatively long half-lives which would normally be expected at this stage of the repair effort.

4.3 Liquid Releases

The composition of radioactive liquid effluents released during the reporting period is relatively unchanged from that seen during the previous period. The major contributing nuclides are present at quantities which have remained consistent throughout the project. It should be noted that the concurrent outage for Surry Unit No. 1 during October (as during previous months) may have contributed to the quantities of radioactive liquids released to the discharge

canal; since a shared laundry facility is used for both units, and the disposal of laundry waste water continues to be the major source of these effluents.

4.4 Solid Radioactive Waste

The disposal of contaminated paper waste, disposable protective clothing and contamination control materials, and, to a lesser degree, structural materials and components not intended for reuse continued to comprise the major portion of the solid radioactive waste generated during the reporting period.

5.0 CONCLUSIONS

The following general conclusions are based upon the information contained within this report.

(a) Although some variations can be seen when comparing the estimated vs. actual exposure expenditures for individual tasks, the total exposure (manrem) expended to date remains below the original estimate established prior to commencement of work. This result, and the techniques described in Section 3 which have played an important part in achieving it, confirm that the ALARA concept is being effectively implemented and applied to the steam generator replacement activities.

b) Radioactive liquid effluents have exceeded the total release estimate for activity presented on page 9.A.5-5 of the SGRP report by approximately 38%. The total volume released to date, however, is only 16% higher than the estimated total. This indicates that liquid effluent concentrations are somewhat higher than originally anticipated. It has also been noted that some contributions to the liquid releases reported have occurred due to the concurrent outage for Unit No. 1. Nevertheless, the total activity released to date continues to represent less than 1% of that normally expected during station operation.

(c) Airborne releases of radioactivity remain well below the estimates provided in the SGRP report on page 9.A.8-7 and are not anticipated to reach those estimates during the remainder of the project.

(d) Solid radioactive waste generated to date has exceeded the volume and activity estimates originally set forth on page 9.A.9-2 of the SGRP report. This has been previously attributed

to the increase in personnel assigned to the SGRP, and the expected subsequent generation of higher volumes of contaminated paper waste, disposable protective clothing and contamination control materials. It should be noted, however, that a significant reduction in both the volume and activity of solid waste shipped during the months of September, October and November occurred. This reflects the reduced level of work being performed as the SGRP for Unit No. 2 nears completion.

TABLE 1

PERSONNEL RADIATION EXPOSURE SUMMARY
STEAM GENERATOR REPLACEMENT ACTIVITIES - REPORT PERIOD 10/1/79-11/30/79
SURRY POWER STATION-UNIT NO. 2

PHASE DESCRIPTION	ESTIMATED LABOR (MANHOURS)	ACTUAL LABOR EXPENDED TO - DATE (MANHOURS)	ESTIMATED EXPOSURE (MAN-REM)	ACTUAL EXPOSURE FOR REPORTING PERIOD (MAN-REM)	ACTUAL EXPOSURE EXPENDED TO - DATE (MAN-REM)	PHASE STATUS (C=COMPLETE) (I=IN PROGRESS)
			COMPLETED TASKS ONLY			
I Shutdown and Preparatory Activities	39,021	152,731	596.27	0.195	387.523	C
II Removal Activities	57,422	190,601	559.6	1.341	699.641	C
III Installation Activities	51,491	288,067	291.96	55.838	362.247	I
IV Post Installation and Startup Activities	3,020	5,730	41.11	4.623	5.896	I
V Steam Generator Storage Activities	300	3,659	35.0	0.174	5.054	C
PROJECT TOTALS (Completed Tasks Only)	151,254	640,788	1,523.94	62.171	1,460.361	

TABLE 1
PERSONNEL RADIATION EXPOSURE SUMMARY
STEAM GENERATOR REPLACEMENT ACTIVITIES - REPORT PERIOD 10/1/79-11/30/79
SURRY POWER STATION-UNIT NO. 2

PHASE DESCRIPTION	ESTIMATED LABOR (MANHOURS)	ACTUAL LABOR EXPENDED TO - DATE (MANHOURS)	ESTIMATED EXPOSURE (MAN-REM)	ACTUAL EXPOSURE FOR REPORTING PERIOD (MAN-REM)	ACTUAL EXPOSURE EXPENDED TO - DATE (MAN-REM)	PHASE STATUS (C=COMPLETE) (I=IN PROGRESS)
ALL TASKS COMMENCED AS OF 11/30/79						
I Shutdown and Preparatory Activities	39,021	152,731	596.27	0.195	387.523	C
II Removal Activities	57,422	190,601	559.6	1.341	699.641	C
III Installation Activities	74,195	417,261	448.23	124.222	794.172	I
IV Post Installation and Startup Activities	62,065	71,255	415.84	38.258	110.519	I
V Steam Generator Storage Activities	300	3,659	35.0	0.174	5.054	C
PROJECT TOTALS (All Tasks)	233,003	835,507	2,054.94	164.190	1,996.909	

TABLE 1
PERSONNEL RADIATION EXPOSURE SUMMARY
PHASE I-SHUTDOWN AND PREPARATORY ACTIVITIES
SURRY POWER STATION-UNIT NO. 2

TASK DESCRIPTION	ESTIMATED LABOR (MANHOURS)	ACTUAL LABOR EXPENDED TO - DATE (MANHOURS)	ESTIMATED EXPOSURE (MAN-REM)	ACTUAL EXPOSURE FOR REPORTING PERIOD (MAN-REM)	ACTUAL EXPOSURE EXPENDED TO - DATE (MAN-REM)	TASK STATUS (C=COMPLETE) (I=IN PROGRESS)
Erect Equipment Hatch Temporary Enclosure	264	1,073	0.4	0	0.459	C
Prepare and Load Test Polar Crane	210	2,757	1.05	0	2.883	C
Open Equipment Hatch	156	-----	0.23	-	-----	C (See Note 1)
Defueling and Fuel Storage	585	3,437	11.7	0	22.124	C
Install Reactor Vessel Cavity Cover	130	2,385	1.3	0	1.972	C
Cutting of Pressurizer Cubicle Wall	---	-----	----	-	----	(See Note 2)
Installation of Jib Cranes	1,838	13,234	9.19	0.020	14.713	C
Disassemble Manipulator Crane	58	1,501	1.74	0	2.416	C
Install Steam Generator Transport System	572	7,451	2.86	0.138	12.820	C
Removal of Biological Shield Wall	1,296	3,959	19.44	0	3.392	C
Disassemble Shroud Cooling System	150	918	3.0	0	1.520	C

TABLE 1
PERSONNEL RADIATION EXPOSURE SUMMARY
PHASE I-SHUTDOWN AND PREPARATORY ACTIVITIES
SURRY POWER STATION-UNIT NO. 2

TASK DESCRIPTION	ESTIMATED LABOR (MANHOURS)	ACTUAL LABOR EXPENDED TO - DATE (MANHOURS)	ESTIMATED EXPOSURE (MAN-REM)	ACTUAL EXPOSURE FOR REPORTING PERIOD (MAN-REM)	ACTUAL EXPOSURE EXPENDED TO - DATE (MAN-REM)	TASK STATUS (C=COMPLETE) (I=IN PROGRESS)
Cutting of Crane Wall at Hatch Opening	432	1,379	2.16	0	0.446	C
Installation of Temporary Ventilation System	50	11,455	0.05	0.026	4.210	C
Temporary Scaffolding	7,500	14,559	75	0	74.363	C
Temporary Lighting and Power	5,200	6,609	26.25	0	0.563	C
Cleanup and Decon	9,000	17,216	135	0	22.601	C
Polar Crane Operator	1,500	1,368	4.5	0	2.319	C
Shielding	3,600	21,930	270	0	143.493	C
H.P., Q.A.	6,480	31,286	32.4	0	33.584	C
ADDITIONAL TASKS						
Installation of Service Air System	-----	2,491	---	0	0.670	C
Work Platform Modification	-----	5,272	-----	0.011	0.181	C
Removal of Reactor Coolant Pump Motors	-----	1,357	-----	0	4.621	C

TABLE 1
PERSONNEL RADIATION EXPOSURE SUMMARY
PHASE I-SHUTDOWN AND PREPARATORY ACTIVITIES
SURRY POWER STATION-UNIT NO. 2

TASK DESCRIPTION	ESTIMATED LABOR (MANHOURS)	ACTUAL LABOR EXPENDED TO - DATE (MANHOURS)	ESTIMATED EXPOSURE (MAN-REM)	ACTUAL EXPOSURE FOR REPORTING PERIOD (MAN-REM)	ACTUAL EXPOSURE EXPENDED TO - DATE (MAN-REM)	TASK STATUS (C=COMPLETE) (I=IN PROGRESS)
Protection of Containment Components	------	1,094	------	0	4.054	N/A
UNASSIGNED PERSONNEL CATEGORIES						
Engineering Support	------	Not Reported	------	0	5.657	N/A
Craft Support and Security Escorts	------	"	------	0	10.000	N/A
Project Supervision and Administration	------	"	------	0	17.227	N/A
Visitors and Inspectors	------	"	------	0	1.235	N/A
Subtotal Phase I (Completed Tasks Only)	39,021	152,731	596.27	0.195	387.523	

TABLE 1
PERSONNEL RADIATION EXPOSURE SUMMARY
PHASE II - REMOVAL ACTIVITIES
SURRY POWER STATION-UNIT NO. 2

TASK DESCRIPTION	ESTIMATED LABOR (MANHOURS)	ACTUAL LABOR EXPENDED TO - DATE (MANHOURS)	ESTIMATED EXPOSURE (MAN-REM)	ACTUAL EXPOSURE FOR REPORTING PERIOD (MAN-REM)	ACTUAL EXPOSURE EXPENDED TO - DATE (MAN-REM)	TASK STATUS (C=COMPLETE) (I=IN PROGRESS)
Removal of Insulation (lower shell, RC Piping)	720	2,026	28.8	0	13.791	C
Removal of Insulation (upper shell, mainsteam and radwater piping)	864	80	12.96	0	1.364	C
Removal of Miscellaneous Piping	72	5,424	1.8	0	59.337	C
Set Up Steam Generator Girth Cut Equipment	1,152	224	28.8	0	0.229	C
Cut and Remove Steam Generator Upper Shell	330	5,079	8.25	0	11.221	C
Cutting of Reactor Coolant Piping	2,982	20,235	149.1	0	214.058	C
Cutting of Mainsteam and Feedwater Piping	1,428	2,838	7.14	0	1.132	C
Disassembly of Steam Generator Supports	792	10,650	15.84	1.341	48.412	C
Removal of Moisture Separation Equipment	396	6,050	1.98	0	6.727	C
Refurbish Steam Generator Upper Shell	9,246	21,756	46.23	0	19.819	C

TABLE 1
PERSONNEL RADIATION EXPOSURE SUMMARY
PHASE II - REMOVAL ACTIVITIES
SURRY POWER STATION-UNIT NO. 2

TASK DESCRIPTION	ESTIMATED LABOR (MANHOURS)	ACTUAL LABOR EXPENDED TO - DATE (MANHOURS)	ESTIMATED EXPOSURE (MAN-REM)	ACTUAL EXPOSURE FOR REPORTING PERIOD (MAN-REM)	ACTUAL EXPOSURE EXPENDED TO - DATE (MAN-REM)	TASK STATUS (C=COMPLETE) (I=IN PROGRESS)
Removal of Steam Generator Level Instruments and Blow-down Piping	135	2,311	4.05	0	7.671	C
Removal of Steam Generator Lower Shell	1,575	3,859	31.5	0	29.875	C
Temporary Scaffolding	7,500	11,969	75.0	0	46.464	C
Temporary Lighting and Power	5,250	6,071	26.25	0	5.910	C
Cleanup and Decon	17,000	26,731	85.0	0	83.718	C
Polar Crane Operator	1,500	1,308	4.5	0	1.038	C
H.P., Q.A.	6,480	32,999	32.4	0	50.960	C
ADDITIONAL TASKS						
Material Handling, Equip-ment Maintenance, and Miscellaneous Construction Activities	-----	30,991	-----	0	53.897	N/A
UNASSIGNED PERSONNEL CATEGORIES						
Engineering Support	-----	Not Reported	-----	0	4.858	N/A

TABLE 1
PERSONNEL RADIATION EXPOSURE SUMMARY
PHASE II - REMOVAL ACTIVITIES
SURRY POWER STATION-UNIT NO. 2

TASK DESCRIPTION	ESTIMATED LABOR (MANHOURS)	ACTUAL LABOR EXPENDED TO - DATE (MANHOURS)	ESTIMATED EXPOSURE (MAN-REM)	ACTUAL EXPOSURE FOR REPORTING PERIOD (MAN-REM)	ACTUAL EXPOSURE EXPENDED TO - DATE (MAN-REM)	TASK STATUS (C=COMPLETE) (I=IN PROGRESS)
Craft Support and Security	-----	Not Reported	-----	0	1.281	N/A
Project Supervision and Administration	-----	"	-----	0	37.579	N/A
Visitors and Inspectors	-----	"	-----	0	0.300	N/A
Subtotal Phase II (Completed Tasks Only)	57,422	190,601	559.6	1.341	699.641	

TABLE 1
PERSONNEL RADIATION EXPOSURE SUMMARY
PHASE III-INSTALLATION ACTIVITIES
SURRY POWER STATION-UNIT NO. 2

TASK DESCRIPTION	ESTIMATED LABOR (MANHOURS)	ACTUAL LABOR EXPENDED TO - DATE (MANHOURS)	ESTIMATED EXPOSURE (MAN-REM)	ACTUAL EXPOSURE FOR REPORTING PERIOD (MAN-REM)	ACTUAL EXPOSURE EXPENDED TO - DATE (MAN-REM)	TASK STATUS (C=COMPLETE) (I=IN PROGRESS)
Steam Generator Lower Shell Installation	1,926	11,723	9.63	1.918	15.744	C
Installation of Reactor Coolant Piping	6,768	90,167	67.68	18.968	326.759	I
Steam Generator Girth Weld	5,400	41,614	27.0	2.296	17.357	C
Installation of Main Steam Piping	3,735	12,946	18.68	3.214	17.299	C
Installation of Feedwater Piping	2,700	7,727	13.5	0.523	3.985	C
Installation of Blow-down and Miscellaneous Piping	1,782	21,528	17.82	32.050	83.740	I
Install Steam Generator Level Instruments	2,592	14,016	12.96	14.399	17.171	I
Installation of Insulation	11,562	3,483	57.81	2.967	4.255	I
Temporary Scaffolding	7,500	15,282	75.0	6.093	39.298	C
Temporary Lighting & Power	5,250	13,494	26.25	0.834	8.795	C

TABLE 1
PERSONNEL RADIATION EXPOSURE SUMMARY
PHASE III-INSTALLATION ACTIVITIES
SURRY POWER STATION-UNIT NO. 2

TASK DESCRIPTION	ESTIMATED LABOR (MANHOURS)	ACTUAL LABOR EXPENDED TO - DATE (MANHOURS)	ESTIMATED EXPOSURE (MAN-REM)	ACTUAL EXPOSURE FOR REPORTING PERIOD (MAN-REM)	ACTUAL EXPOSURE EXPENDED TO - DATE (MAN-REM)	TASK STATUS (C=COMPLETE) (I=IN PROGRESS)
Cleanup and Decon	17,000	58,820	85.0	18.801	96.704	C
Polar Crane Operator	1,500	3,205	4.5	0.192	1.252	C
H.P., Q.A.	6,480	84,517	32.4	6.847	55.684	C
ADDITIONAL TASKS						
Material Handling, Equipment Maintenance, and Miscellaneous Construction Activities	-----	38,739	-----	2.453	18.999	N/A
UNASSIGNED PERSONNEL CATEGORIES						
Engineering Support	-----	Not Reported	-----	1.091	5.783	N/A
Craft Support and Security	-----	"	-----	0.311	1.390	N/A
Project Supervision and Administration	-----	"	-----	11.236	79.628	N/A
Visitors and Inspectors	-----	"	-----	0.029	0.329	N/A
Subtotal Phase III (Completed Tasks Only)	51,491	288,067	291.96	55.838	362.247	

TABLE 1
PERSONNEL RADIATION EXPOSURE SUMMARY
PHASE IV - POST INSTALLATION AND STARTUP ACTIVITIES
SURRY POWER STATION-UNIT NO. 2

TASK DESCRIPTION	ESTIMATED LABOR (MANHOURS)	ACTUAL LABOR EXPENDED TO - DATE (MANHOURS)	ESTIMATED EXPOSURE (MAN-REM)	ACTUAL EXPOSURE FOR REPORTING PERIOD (MAN-REM)	ACTUAL EXPOSURE EXPENDED TO - DATE (MAN-REM)	TASK STATUS (C=COMPLETE) (I=IN PROGRESS)
Install Biological Shield Wall	3,240	557	16.2	0.079	0.186	I
Repair Crane Wall Opening	473	336	2.37	0.008	0.400	C
Repair Pressurizer Cubicle Wall	-----	-----	-----	-----	-----	(See Note 2)
Install Steam Generator Recirculation and Transfer System	9,000	36,966	90.0	7.438	67.610	I
Remove Reactor Cavity Cover	130	166	0.65	0.042	0.072	C
Install Reactor Cavity Coaming	240	773	1.2	0.692	0.692	C
Reassemble Manipulator Crane	1,176	882	23.25	0.419	0.723	C
Remove Steam Generator Transport System	425	143	2.12	0	0.187	C
Reassemble Shroud Cooling System	576	3,430	11.52	3.462	3.822	C
Hydrostatic Tests	75	1,643	0.38	2.316	2.316	I
Temporary Scaffolding	7,500	1,573	75.0	2.611	4.064	I

TABLE 1
PERSONNEL RADIATION EXPOSURE SUMMARY
PHASE IV - POST INSTALLATION AND STARTUP ACTIVITIES
SURRY POWER STATION-UNIT NO. 2

TASK DESCRIPTION	ESTIMATED LABOR (MANHOURS)	ACTUAL LABOR EXPENDED TO - DATE (MANHOURS)	ESTIMATED EXPOSURE (MAN-REM)	ACTUAL EXPOSURE FOR REPORTING PERIOD (MAN-REM)	ACTUAL EXPOSURE EXPENDED TO - DATE (MAN-REM)	TASK STATUS (C=COMPLETE) (I=IN PROGRESS)
Temporary Lighting & Power	5,250	1,311	26.25	0.357	0.638	I
Cleanup and Decon	17,000	7,048	85.0	8.057	11.611	I
Polar Crane Operator	1,500	487	4.5	0.082	0.097	I
Painting	9,000	1,405	45.0	3.282	3.282	I
H.P., Q.A.	6,480	10,767	32.4	2.933	4.427	I
ADDITIONAL TASKS						
Material Handling, Equipment Maintenance, and Miscellaneous Construction Activities	-----	3,768	-----	1.051	1.594	N/A
UNASSIGNED PERSONNEL CATEGORIES						
Engineering Support	-----	Not Reported	-----	0.468	0.618	N/A
Craft Support and Security	-----	"	-----	0.133	0.201	N/A
Project Supervision and Administration	-----	"	-----	4.815	7.957	N/A
Visitors and Inspectors	-----	"	-----	0.013	0.022	N/A
Subtotal Phase IV (Completed Tasks Only)	3,020	5,730	41.11	4.623	5.896	

TABLE 1
PERSONNEL RADIATION EXPOSURE SUMMARY
PHASE V - STEAM GENERATOR STORAGE ACTIVITIES
SURRY POWER STATION-UNIT NO. 2

TASK DESCRIPTION	ESTIMATED LABOR (MANHOURS)	ACTUAL LABOR EXPENDED TO - DATE (MANHOURS)	ESTIMATED EXPOSURE (MAN-REM)	ACTUAL EXPOSURE FOR REPORTING PERIOD (MAN-REM)	ACTUAL EXPOSURE EXPENDED TO - DATE (MAN-REM)	TASK STATUS (C=COMPLETE) (I=IN PROGRESS)
Steam Generator Storage Activities	300	3,659	35.0	0.174	5.054	C

TABLE NOTATION

1. Labor and Exposure expenditures for this task were included in other task totals. (Primarily "Defueling and Fuel Storage"). Labor and Exposure estimates are included in the Subtotal Values.

2. This task was cancelled due to equipment changes. Labor and Exposure Estimates are not included in the Subtotal values.

N/A- Not Applicable. Labor and Exposure Expenditures are included in the Subtotal Values for Phases I, II, and III. They are not included in the Subtotal Values for Phase IV (See Report Section 2.3.c).

TABLE 2

SURRY POWER STATION
STEAM GENERATOR REPLACEMENT PROJECT
REPORT OF RADIOACTIVE EFFLUENTS

YEAR: 1979

I. LIQUID RELEASES

Isotopes Released	MPC µCi/ml	UNITS Curies	AUGUST	SEPT.	OCTOBER	NOVEMBER
I-131	3×10^{-7}		*	*	*	*
I-132	8×10^{-6}		*	*	*	*
I-133	1×10^{-6}		*	*	*	*
I-134	2×10^{-5}		*	*	*	*
I-135	4×10^{-6}		*	*	*	*
Cs-134	9×10^{-6}		2.30E-3	7.00E-4	3.00E-4	1.81E-3
Cs-137	2×10^{-5}		4.00E-3	2.70E-3	1.40E-3	4.02E-3
Co-57	4×10^{-4}		2.20E-5	2.30E-6	5.00E-6	*
Co-58	9×10^{-5}		5.00E-4	1.00E-3	5.00E-4	6.02E-3
Co-60	3×10^{-5}		1.21E-2	5.20E-3	4.40E-3	4.21E-3
Mn-54	1×10^{-4}		4.90E-4	6.40E-5	3.60E-5	1.30E-4
Na-24	3×10^{-5}		*	*	*	*
Cr-51	2×10^{-3}		*	*	*	*
Fe-59	5×10^{-5}		*	*	*	*
Nb-95	1×10^{-4}		1.88E-4	4.56E-6	*	1.42E-5
Sb-124	2×10^{-5}		*	*	*	*
Sb-125	1×10^{-4}		3.60E-5	*	*	*
Zn-65	1×10^{-4}		2.67E-5	*	*	*
Zr-95	6×10^{-5}		*	*	*	*
Mo-99	4×10^{-5}		*	*	*	*
Ru-103	8×10^{-5}		1.65E-6	9.88E-7	*	*
Xe-133	3×10^{-6}		*	*	*	*
Ag-110m	3×10^{-5}		*	*	*	*
Ni-63	3×10^{-5}		9.79E-4	7.41E-3	3.22E-2	**
Fe-55	8×10^{-4}		7.12E-3	1.03E-3	1.84E-3	**
Ce-144	1×10^{-5}		2.92E-5	*	*	*
Tc-99m	3×10^{-3}		*	*	*	*
Ce-141	9×10^{-5}		4.25E-7	1.48E-6	*	*
Volume of Liquid to Discharge Canal		Liters	8.90E+5 ***	1.95E+6 ***	7.66E+5 ***	9.47E+5

* Not Detected

** Sample analysis results not yet received from service vendor. Upon receipt, analysis data will be submitted as a supplement to this report.

***Includes Radioactive Liquid Waste generated during #1 outage

TABLE 2

SURRY POWER STATION
STEAM GENERATOR REPLACEMENT PROJECT
REPORT OF RADIOACTIVE EFFLUENTS

YEAR: 1979

II. AIRBORNE RELEASES

Isotopes Released:	UNITS Curies	AUGUST	SEPT.	OCTOBER	NOVEMBER
(a) Particulates					
Cs-134		8.83E-6	1.57E-6	1.08E-6	7.36E-6
Cs-137		3.06E-5	1.88E-5	1.54E-5	2.08E-5
Cr-51		*	*	*	*
Co-58		1.38E-5	7.54E-6	2.72E-6	3.52E-6
Co-60		5.74E-5	4.83E-5	3.31E-5	4.17E-5
Mn-54		5.79E-7	*	*	*
Fe-59		*	*	*	*
(b) Halogens					
I-131		*	*	*	*
I-132		*	*	*	*
I-133		*	*	*	*
I-134		*	*	*	*
I-135		*	*	*	*
(c) Gases					
Xe-133		*	*	*	*
Xe-133m		*	*	*	*
Xe-135		*	*	*	*
Kr-85m		*	*	*	*
Kr-85		*	*	*	*
Kr-87		*	*	*	*
Kr-88		*	*	*	*
Ar-41		*	*	*	*
III. SOLID RADIOACTIVE WASTE DISPOSAL					
(a) Total Amount Solid Waste Packaged	FT^3	8.70E+3	1.66E+3	2.83E+3	1.25E+3
(b) Estimated Total Activity	Curies	4.66E+0	1.26E+0	1.10E+0	3.70E-2
(c) Date of Shipment and Disposition		Barnwell, S.C.	Barnwell, S.C.	Barnwell, S. C.	Barnwell, S. C.
		8-2-79	9-12-79	10-8-79	11-1-79
		8-10-79	9-25-79	10-9-79	
		8-17-79		10-10-79	
		8-21-79(3)			
		8-28-79(4)			

* Not Detected

TABLE 2

SURRY POWER STATION
STEAM GENERATOR REPLACEMENT PROJECT
REPORT OF RADIOACTIVE EFFLUENTS

YEAR: 1979

I. LIQUID RELEASES

Isotopes Released	MPC µCi/ml	UNITS Curies	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY
I-131	3×10^{-7}		2.76E-5	4.62E-4	6.28E-5	*	*	*
I-132	8×10^{-6}		*	*	*	*	*	*
I-133	1×10^{-6}		*	*	*	*	*	*
I-134	2×10^{-5}		*	*	*	*	*	*
I-135	4×10^{-6}		*	*	*	*	*	*
Cs-134	9×10^{-6}		3.21E-3	2.23E-3	2.43E-3	1.35E-3	2.43E-3	2.20E-3
Cs-137	2×10^{-5}		7.24E-3	5.90E-3	5.82E-3	3.97E-3	6.20E-3	2.90E-3
Co-57	4×10^{-4}		5.54E-6	1.71E-6	9.00E-5	*	*	4.00E-6
Co-58	9×10^{-5}		2.35E-2	1.15E-2	3.47E-2	7.90E-3	6.10E-3	1.60E-3
Co-60	3×10^{-5}		2.03E-2	9.09E-3	1.72E-2	6.10E-3	1.10E-2	8.50E-3
Mn-54	1×10^{-4}		1.28E-3	3.42E-4	7.32E-4	1.34E-3	3.34E-4	2.20E-4
Na-24	3×10^{-5}		*	*	*	1.10E-5	*	*
Cr-51	2×10^{-3}		5.55E-3	6.48E-4	3.40E-3	1.50E-2	2.00E-5	*
Fe-59	5×10^{-5}		*	*	1.42E-6	*	*	*
Nb-95	1×10^{-4}		1.98E-4	8.81E-5	2.52E-4	*	5.60E-5	2.70E-5
Sb-124	2×10^{-5}		*	*	2.10E-4	1.40E-4	*	*
Sb-125	1×10^{-4}		1.23E-4	*	1.63E-4	4.50E-5	*	*
Zn-65	1×10^{-4}		1.11E-5	4.06E-6	4.70E-5	2.10E-5	3.40E-6	1.30E-5
Zr-95	6×10^{-5}		7.01E-6	*	1.54E-4	5.20E-5	*	*
Mo-99	4×10^{-5}		5.92E-5	7.48E-6	2.94E-5	*	*	*
Ru-103	8×10^{-5}		*	*	*	*	1.16E-6	*
Xe-133	3×10^{-6}		9.42E-5	1.19E-4	*	*	*	*
Ag-110m	3×10^{-5}		*	2.66E-5	1.24E-5	*	*	*
Ni-63	3×10^{-5}		3.46E-3	7.22E-3	2.98E-3	3.55E-3	4.14E-3	4.57E-3
Fe-55	8×10^{-4}		1.07E-2	6.13E-2	1.25E-2	7.88E-3	1.61E-2	2.28E-3
Ce-144	1×10^{-5}		*	9.59E-6	2.15E-6	*	*	5.58E-6
Tc-99m	3×10^{-3}		*	1.35E-4	*	*	*	*
Ce-141	9×10^{-5}		*	4.41E-6	*	*	*	3.14E-6
Volume of Liquid to Discharge Canal		Liters	5.97E+5	7.76E+5 ***	9.60E+5 ***	1.11E+6 ***	1.15E+6 ***	9.93E+5 ***

*Not Detected

**Sample analysis results not yet received from service vendor. Upon receipt, analysis data will be submitted as a supplement to this report.

***Includes Radioactive Liquid Waste generated during #1 outage

TABLE 2

SURRY POWER STATION
STEAM GENERATOR REPLACEMENT PROJECT
REPORT OF RADIOACTIVE EFFLUENTS

YEAR: 1979

II. AIRBORNE RELEASES

Isotopes Released:	UNITS Curies	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY
(a) Particulates							
Cs-134		*	*	*	*	1.38E-6	1.23E-5
Cs-137		3.95E-6	1.25E-5	4.25E-6	2.03E-5	8.99E-6	3.79E-5
Cr-51		4.51E-5	*	*	*	*	*
Co-58		8.05E-5	4.13E-5	3.58E-5	6.37E-5	8.90E-6	1.73E-5
Co-60		4.17E-5	6.01E-5	4.14E-5	7.79E-5	3.33E-5	6.43E-5
Mn-54		*	*	*	*	*	7.53E-7
Fe-59		*	*	*	*	*	*
(b) Halogens							
I-131		6.88E-6	*	*	*	*	*
I-132		*	*	*	*	*	*
I-133		*	*	*	*	*	*
I-134		*	*	*	*	*	*
I-135		*	*	*	*	*	*
(c) Gases							
Xe-133		9.64E+1	3.00E+0	*	*	*	*
Xe-133m		*	*	*	*	*	*
Xe-135		1.94E+0	*	*	*	*	*
Kr-85m		*	*	*	*	*	*
Kr-85		*	*	*	*	*	*
Kr-87		*	*	*	*	*	*
Kr-88		*	*	*	*	*	*
Ar-41		*	*	*	*	*	*
III. SOLID RADIOACTIVE WASTE DISPOSAL							
(a) Total Amount Solid Waste Packaged	FT^3	1.65E+3	1.11E+4	6.92E+3	6.60E+3	9.30E+3	7.78E+3
(b) Estimated Total Activity	Curies	9.94E-1	3.16E+0	2.76E+1	7.53E+0	1.03E+1	6.98E+0
(c) Date of Shipment and Disposition		Barnwell, S.C.	Barnwell, S.C.	Barnwell, S.C.	Barnwell, S.C.	Barnwell, S.C.	Barnwell, S.C.
		2-20-79	3-6-79	3-17-79	4-6-79 (4)	5-5-79	6-1-79	7-7-79
		2-22-79	3-7-79	3-19-79	4-9-79	5-11-79	6-7-79(3)	7-10-79
		2-27-79	3-8-79	3-28-79	4-12-79 (2)	5-16-79	6-8-79	7-13-79
		2-28-79	3-13-79	3-28-79	4-14-79	5-19-79	6-13-79	7-16-79
			3-13-79	3-29-79	4-17-79	5523-79(2)	6-14-79	7-18-79(2)
			3-15-79	3-29-79	4-22-79	5-25-79(2)	6-15-79(3)	7-20-79
						5-29-79	6-22-79	7-23-79
						5-30-79(2)	6-24-79 (+)	7-28-79

*Not Detected
(+) June date of shipments continued 6-25-79, 6-26-79, 6-27-79