STEAM GENERATOR REPAIR PROGRAM

FOR THE

SURRY POWER STATION

UNIT NO. 1

RADIOLOGICAL PROGRESS REPORT - NO. 2

FOR THE PERIOD

NOVEMBER 1, 1980 THROUGH DECEMBER 31, 1980

DOCKET NO. 50-280

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VIRGINIA ELECTRIC AND POWER COMPANY

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1.0 INTRODUCTION

The Steam Generator Repair Program (SGRP) for Surry Power Station, Unit No. 1 commenced on September 14, 1980. This second progress report for the Unit No. 1 SGRP contains information on the radiological effects of the repair effort, and describes the measures taken to maintain these effects "as low as reasonably acheivable" (ALARA), during the period November 1 through December 31, 1980.

With regards to radiological effects, the major tasks completed during the reporting period involved the removal activities and some of the installation activities. These included the removal of reactor coolant piping, main steam and feed water piping and miscellaneous piping and disassembly of the steam generator supports; the cutting and removal of the upper shells and removal of the lower shells from the containment; the three new lower shells were installed in the containment and refurbishment of the old upper shells was started.

The report sections which follow provide an assessment of the occupational exposure expended, the dose reduction techniques employed and their effectiveness, and the radioactive effluents and solid waste generated during the reporting period. Throughout this progress report and those to follow for the Unit No. 1 SGRP, reference will be made wherever appropriate to the progress reports issued during the Surry, Unit No. 2 SGRP for purposes of comparison, and to identify differences in the replacement activities which have a significant effect on the radiological impact of the program.

2.0 OCCUPATIONAL RADIATION EXPOSURES

2.1 General

Occupational exposure to radiation is considered to be the major radiological effect of the SGRP. As such, this aspect of the project underwent an extensive evaluation during the planning phase to provide realistic estimates of the amounts of personnel radiation exposure (manrem) which would be required to perform each of the tasks involved. These estimates were based upon the anticipated labor requirements (manhours) and the average radiation dose rates in the work area, and 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.

Prior to commencement of the project, a program was established to assess the actual exposures received by personnel during the repair effort. This program was designed to provide data compatible with the detail and format of the exposure summary presented in Table 5.3-1 of the SGRP Report, thereby permitting valid comparisons between estimated and actual expenditures.

2.2 Evaluation of Exposure Data

The exposure assessment program referred to above is basically designed to utilize daily worker exposure data, as recorded by self-reading pocket dosimeters, in conjunction with contractor supplied, worker task data to determine task-related 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.

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 September 14, 1980 to December 31, 1980), 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 in which a majority of the tasks have been completed. This is the case for Phases I and II (Shutdown and Preparatory Activities and Removal Activities). For Phases III and IV, The Phase Subtotals do not yet include the expenditures mentioned above since a majority of the tasks have yet to be commenced and/or completed.

2.4 Conclusions and Observations

As of the end of the reporting period, the SGRP for Unit No. 1 has been in progress for approximately sixteen weeks. It is becoming apparent at this point in the outage that less exposure is being accumulated in comparison to the Unit 2 outage. This is attributable to a number of factors. Many of the workers and supervisors are the same ones that performed the work on Unit 2 so they are familiar with the work. In addition steps were taken in the preparation for the Unit 1 outage to eliminate problems encountered in Unit 2 and to stream line the procedures. A comparison of the exposure attributable to reaching the same milestone events in Unit 2 that have now been reached in Unit 1 shows that Unit 2 took about 1050 man-rem to reach the same point that Unit 1 took 792 to reach or a savings of about 238 man-rem. It also should be noted that these milestones were reached in Unit 1 about 45 days earlier than in Unit 2.

3.0 APPLICATION OF ALARA PRINCIPLES

3.1 General

This section summarizes the specific techniques and practices which were employed during this reporting period in order to maintain occupational exposures to radiation "as low as reasonably achievable" (ALARA). 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 Containment Cleanup and Decontamination

After shutdown and the removal of all fuel from the reactor, a general cleaning of the containment interior was performed to remove loose radioactive contamination in the work areas and thereby reduce the potential for airborne contamination during subsequent activities. Where appropriate, removable floor covering (plastic sheeting) has been applied to facilitate additional cleanup during the repair activities. A special work crew has been retained to continuously clean the work areas and to perform equipment decontamination. This effort will maintain optimum radiological working conditions and avoid buildups of debris.

While it is not possible to quantify the exposure savings attributable to this technique, the benefit of maintaining effective control of contamination is seen in terms of its contribution to minimizing the overall hazard associated with the SGRP.

3.3 Temporary Shielding

The use of temporary shielding resulted in significant reductions in personnel radiation exposure during the SGRP for Unit No. 2. A separate work package was devoted to the design and installation of this shielding, with particular emphasis placed on the lower steam generator cubicles where radiation levels are highest and several major removal and installation activities are performed. While the temporary shielding applied to these areas in Unit No. 2 was suc-

cessful in minimizing exposure rates for subsequent activities, the task of installing the shielding required a significant amount of exposure (approximately 143 manrem). In Unit No. 1, the benefit of this previous experience and the use of personnel with specific expertise in the installation of lead shielding has resulted in a considerable reduction in the time and exposure incurred for this task. As seen in Table 1, the shielding performed thus far during the SGRP has totaled 57 man-rem. Additional shielding will be installed during the removal and installation phases; however, the major portion of this task with respect to its exposure "cost" has been completed. Detailed radiation surveys, performed prior to and after the installation of temporary shielding, have been used to assess the effectiveness of this technique in providing net reductions in personnel exposure for two of the major removal activities commenced during the reporting period.

(a) The removal of miscellaneous piping located in the steam generator cubicles, has continued during this reporting period and has now totaled approximately 14 man-rem. Lead shielding resulted in dose reduction factors of about 5 as described in PR1 which results in a total calculated exposure savings of 56 man-rem.

(b) The cutting and removal of reactor coolant piping has resulted in the expenditure of about 77 manrem to-date. Prior to the installation of lead shielding on this pipe, contact exposure rates in the cut areas were 1200 mR/hour on the average. The application of shielding reduced these rates to an average reading of 200 mR/hour. This represents a reduction factor of 6. The exposure savings attributed to shielding for this activity thus total about 385 manrem to-date.

The assessments described above represent a major portion of the overall benefits expected to result from the application of temporary shielding techniques during the SGRP. All of the removal

activities have been completed at this time. There are however, installation activities still to be performed which will benefit from the shielding already in place. Subsequent progress reports will provide further assessments of the "benefits and costs" of this ALARA technique.

3.4 Steam Generator Water Level

Until the lower portion of the steam generator is ready to be removed from the containment, the water level on the secondary side is maintained at a level covering the tube bundle. The shielding effect provided by this water has historically resulted in an approximate 10 to 1 reduction of exposure levels for the areas of the steam generator above the channel head (Ref. SGRP Report, pages 9.A.3-2 and 9.A.3-3). This reduction factor was confirmed during the Unit No. 2 SGRP by actual survey results.

For Unit No. 1, several tasks performed on or near the upper portion of the steam generators will benefit from the high water level. These include:

(a) Removal of Insulation (upper shell, mainsteam and feedwater piping),
(b) Cut and Remove Steam Generator Upper Shell,
(c) Cutting of Mainsteam and Feedwater Piping, and
(d) Removal of Steam Generator Level Instrumentation and Blowdown Piping.

All of these tasks were completed during this reporting period with a total expenditure of about 23 man-rem. This results in a calculated savings of about 207 man-rem.

3.5 Plasma-Arc Cutting Equipment

The plasma-arc cutting of the reactor coolant piping was completed during this reporting period with a total expenditure of about 77 man-rem. This compares to the Unit 2 outage in which 214 man-rem was expended for this operation.

3.6 Temporary Containments and Ventilation

To a large degree, the inital containment cleanup and decontamination has minimized the need for extensive use of temporary containments such as tents and glove boxes to control the spread of contamination. In areas where significant cutting and grinding work must be performed on highly contaminated piping and components, however, temporary containments have been constructed and are being effectively utilized.

The most significant application of this technique has been made in the lower steam generator cubicles, where the removal of reactor coolant and miscellaneous piping is performed. In Unit No. 1, the lower cubicle for each steam generator has been totally enclosed to transform the entire room into a single containment. Portable ventilation units continuously draw air from these enclosures through appropriate filters whenever cutting or grinding operations are in progress. Personnel working inside the cubicles are required to wear respiratory protection equipment during these operations, and until the ventilation flow has effectively reduced the airborne radioactivity to acceptable levels.

Additional tent enclosures have been constructed in various locations to provide controlled work areas for pipe cutting, component refurbishment and equipment decontamination. Portable, filtered ventilation is provided to these enclosures as appropriate.

The benefits observed to-date for these ALARA techniques are threefold.

(a) The use of small glove boxes for individual pipe cuts has been eliminated. These devices require considerable time and exposure to install and remove, and during the Unit 2 SGRP were found in many cases to be counter-productive to ALARA due to this fact.

(b) The use of temporary containments, especially as applied to the lower steam generator cubicles, has largely eliminated delays and interference with work being performed in adjacent areas while cutting and grinding of contaminated piping is in progress.

(c) The overall potential for airborne contamination and problems associated with contamination control have been minimized by effective use of temporary containments and portable ventilation.

3.7 Machining of Reactor Coolant Pipe Stub Ends

A different type of machining equipment has been utilized on Unit No. 1 to weld prep the reactor coolant pipe stub ends in the steam generator cubicle. The machine utilizes micro-processor control of the machining operations with the operators console on the end of a pendant so that most of the machining operation can be controlled from a distance.

3.8 Painting of Old Steam Generators

During the Unit 2 steam generator replacement the old lower assemblies were decontaminated by wiping them down with alcohol to remove loose surface contamination. During the Unit 1 outage paint was used to fix this loose surface contamination which could be done much more rapidly than the cleaning done during Unit 2 thereby resulting in a reduction in exposure.

3.9 General Techniques and Practices

In addition to the specific dose reduction techniques described thus far, it is important to note the more general procedures and practices which have been implemented to assure adequate control of occupational radiation exposure and to maintain this exposure ALARA. These include:

(a) A comprehensive health physics program to provide adequate control and surveillance of the radiation hazards associated with each task. This program includes the use of Radiation

Work Permits (RWP's) with an individual "sign-in" system to ensure worker familiarization with the specific radiological hazards involved and proper protective measures to be taken in the performance of their work.

(b) A training program to provide adequate instruction in the biological effects of radiation exposure, radiation protection practices and applicable federal regulations, to all personnel involved in steam generator replacement activities. Training for specific tasks, using mock-ups, photographs, or "dry runs" is conducted where appropriate. Additionally, the video-tape documentation compiled during the Unit No. 2 SGRP is being utilized to provide all personnel with a general understanding of the repair program. In this way, each worker is more familiar with the sequence of events to take place and the manner in which individual tasks relate to the overall repair effort.

(c) The use of discrete "Work Packages" to assure adequate pre-planning and review of specific tasks, with special emphasis placed on minimizing the radiation exposure to personnel involved.

(d) The establishment of "rest areas" to accommodate workers during idle periods. Rest areas within the containment are located where exposure rates are low (2-3 mR/hour on the average). Additionally, for the Unit 1 replacement a "rest trailer" has been located outside the containment equipment hatch on the operating deck level where radiation levels are typically 0.1 mR/hour. These rest areas are well posted for identification and workers are encouraged to utilize these areas whenever possible to avoid unnecessary exposure.

Although quantitative assessments are not possible for these "general" techniques, all have obvious value in contributing to the overall ALARA program for the steam generator replacement project.

4.0 RADIOACTIVE EFFLUENTS AND SOLID WASTE

4.1 General

Radioactive liquid and gaseous effluents, and radioactively contaminated solid wastes generated during the SGRP for Unit No. 1 are attributable to several sources. In general, these sources can be distinguished with reasonably accuracy from those associated with concurrent operation of Unit No. 2, even though shared processing systems are utilized in some cases.

4.2 Airborne Releases

Airborne releases during the reporting period originated primarily from the continuous ventilation of the containment during the repair effort, to maintain a negative pressure while the equipment hatch is open. This continuous ventilation is processed through appropriate filter banks to minimize the concentration of airborne particulates which may result from activities inside the containment. The presence of radioactive halogens (I-131 and I-133) and noble gases (Xe-133) has been noted in the ventilation exhaust during the reporting period. These radionuclides, however, are attributed to the operation of Unit No. 2 and originated from sources within the Auxiliary Building.

4.3 Liquid Releases

The major contributor to liquid releases during this reporting period continues to be disposal of laundry waste water. Laundry wastes are expected to comprise the predominant source of liquid releases during the remainder of the repair effort, as was observed during the SGRP for Unit No. 2.

4.4 Solid Radioactive Waste

The disposal of contaminated insulation, structural material, and piping and components not intended for reuse has been the major source of solid radioactive waste for the reporting period. Contaminated paper waste, disposable protective clothing and contamination control materials also contributed to the total waste volume for this period.

The quantities of radioactive materials released in liquid and gaseous effluents, and the amounts of solid radioactive waste shipped offsite for disposal during this reporting period are summarized in Table 2.

TABLE 1
PERSONNEL RADIATION EXPOSURE SUMMARY
STEAM GENERATOR REPLACEMENT ACTIVITIES - REPORT PERIOD 11/1/80 - 12/31/80
SURRY POWER STATION - UNIT NO. 1

	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	35,107	45,825	325.82	15.460	145.888	C
II	Removal Activities	48,176	144,325	513.37	283.029	426.372	C
III	Installation Activities	0	0	0	0	0	I
IV	Post Installation and Startup Activities	0	0	0	0	0	I
V	Steam Generator Storage Activities	300	937	35	8.079	8.079	C
	PROJECT TOTALS (Completed Tasks Only)	83,583	191,087	874.19	306.568	580.339	

TABLE 1
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STEAM GENERATOR REPLACEMENT ACTIVITIES - REPORT PERIOD 11/1/80 - 12/31/80
SURRY POWER STATION - UNIT NO. 1

	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 12-31-80						
I	Shutdown and Preparatory Activities	39,021	47,774	596.27	27.494	203.397	C
II	Removal Activities	57,422	150,343	559.6	288.416	432.462	C
III	Installation Activities	74,195	56,447	448.23	123.650	129.216	I
IV	Post Installation and Startup Activities	62,650	5,919	427.54	15.924	19.065	I
V	Steam Generator Storage Activities	300	937	35	8.079	8.079	C
	PROJECT TOTALS (All Tasks)	233,588	261,420	2,066.64	463.563	792.219	

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

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	0	0.4	0	0	I
Prepare and Load Test Polar Crane	210	463	1.05	0.008	1.285	C
Open Equipment Hatch	156	-	0.23	-	-	C (See Note 1)
Defueling and Fuel Storage	585	2,863	11.7	0	23.503	C
Install Reactor Vessel Cavity Cover	130	695	1.3	0	1.813	C
Cutting of Pressurizer Cubicle Wall	-	-	-	-	-	(See Note 2)
Installation of Jib Cranes	1,838	3,307	9.19	1.479	5.246	C
Disassemble Manipulator Crane	58	629	1.74	0	1.533	C
Install Steam Generator Transport System	572	3,360	2.86	4.806	6.442	C
Removal of Biological Shield Wall	1,296	916	19.44	0.049	2.298	C

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

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)
Disassemble Shroud Cooling System	150	601	3	0.090	1.228	C
Cutting of Crane Wall at Hatch Opening	432	496	2.16	0	0.823	C
Installation of Temporary Ventilation System	50	103	0.05	0.006	0.053	I
Temporary Scaffolding	7,500	4,632	75	4.745	14.251	C
Temporary Lighting and Power	5,200	2,133	26.25	0.433	2.134	C
Cleanup and Decon	9,000	14,920	135	0	57.975	C
Polar Crane Operator	1,500	198	4.5	0	0.137	C
Shielding	3,600	1,846	270	12.028	57.456	I
H.P., Q.A.	6,480	6,884	32.4	0	9.956	C
ADDITIONAL TASKS						
Installation of Service Air System	-	627	-	0	2.198	C

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

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)
Work Platform Modification	-	1,816	-	0	0.741	C
Protection of Containment Components	-	1,285	-	1.895	6.106	N/A
UNASSIGNED PERSONNEL CATEGORIES						
Project Supervision and Administration	-	Not Reported	-	1.955	8.219	N/A
Subtotal Phase I (Completed Tasks Only)	35,107	45,825	325.82	15.460	145.888	

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

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	1,647	28.8	0	14.000	C
Removal of Insulation (upper shell, mainsteam and feedwater piping)	864	959	12.96	0.511	5.354	C
Removal of Miscellaneous Piping	72	1,288	1.8	3.715	13.896	C
Set Up Steam Generator Girth Cut Equipment	1,152	90	28.8	0.013	0.208	C
Cut and Remove Steam Generator Upper Shell	330	4,595	8.25	7.210	8.140	C
Cutting of Reactor Coolant Piping	2,982	7,181	149.1	30.801	76.682	C
Cutting of Mainsteam and Feedwater Piping	1,428	1,399	7.14	0.508	2.391	C
Disassembly of Steam Generator Supports	792	6,830	15.84	34.183	54.067	C
Removal of Moisture Separation Equipment	396	3,675	1.98	6.133	7.915	C
Refurbish Steam Generator Upper Shell	9,246	6,018	46.23	5.387	6.090	I

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

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 Blowdown Piping	135	1,472	4.05	5.361	6.389	C
Removal of Steam Generator Lower Shell	1,575	4,319	31.5	22.737	22.737	C
Temporary Scaffolding	7,500	12,436	75	28.471	37.977	C
Temporary Lighting and Power	5,250	5,133	26.25	2.598	4.299	C
Cleanup and Decon	17,000	42,217	85	76.700	85.289	C
Polar Crane Operator	1,500	2,175	4.5	2.367	2.367	C
H.P., Q.A.	6,480	25,860	32.4	22.187	32.142	C
ADDITIONAL TASKS						
Material Handling, Equipment Maintenance, and Miscellaneous Construction Activities	-	23,049	-	27.804	34.526	N/A

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

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)
UNASSIGNED PERSONNEL CATEGORIES						
Project Supervision and Administration	-	Not Reported	-	11.730	17.993	N/A
Subtotal Phase II (Completed Tasks Only)	48,176	144,325	513.37	283.029	426.372	

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

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	6,263	9.63	14.293	14.654	I
Installation of Reactor Coolant Piping	6,768	4,257	67.68	32.188	34.266	I
Steam Generator Girth Weld	5,400	4,579	27	2.577	5.704	I
Installation of Main Steam Piping	3,735	2,800	18.68	1.263	1.263	I
Installation of Feedwater Piping	2,700	661	13.5	0.184	0.184	I
Installation of Blowdown and Miscellaneous Piping	1,782	0	17.82	0	0	I
Install Steam Generator Level Instruments	2,592	0	12.96	0	0	I
Installation of Insulation	11,562	0	57.81	0	0	I
Temporary Scaffolding	7,500	3,903	75	11.863	11.863	I
Temporary Lighting & Power	5,250	1,500	26.25	1.083	1.083	I

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

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	15,883	85	32.872	32.872	I
Polar Crane Operator	1,500	932	4.5	1.014	1.014	I
H.P., Q.A.	6,480	8,132	32.4	9.509	9.509	I
ADDITIONAL TASKS						
Material Handling, Equipment Maintenance, and Miscellaneous Construction Activities	-	7,537	-	11.916	11.916	N/A
UNASSIGNED PERSONNEL CATEGORIES						
Project Supervision and Administration	-	Not Reported	-	4.888	4.888	N/A
Subtotal Phase III (Completed Tasks Only)	0	0	0	0	0	

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

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	30	16.2	0.037	0.071	I
Repair Crane Wall Opening	473	81	2.37	0.007	0.070	I
Repair Pressurizer Cubicle Wall	-	-	-	-	-	(See Note 2)
Install Steam Generator Recirculation and Transfer System	9,000	4,427	90	11.378	14.083	I
Remove Reactor Cavity Cover	130	0	0.65	0	0	I
Install Reactor Cavity Coaming	240	0	1.2	0	0	I
Reassemble Manipulator Crane	1,176	127	23.25	0.007	0.346	I
Remove Steam Generator Transport System	425	3	2.12	0	0	I
Reassemble Shroud Cooling System	576	170	11.52	0.930	0.930	I
Hydrostatic Tests	75	0	0.38	0	0	I

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

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)
Refueling	585	0	11.7	0	0	I
Temporary Scaffolding	7,500	780	75	2.372	2.372	I
Temporary Lighting and Power	5,250	301	26.25	0.216	0.216	I
Cleanup and Decon	17,000	0	85	0	0	I
Polar Crane Operator	1,500	0	4.5	0	0	I
Painting	9,000	0	45	0	0	I
H.P., Q.A.	6,480	0	32.4	0	0	I
ADDITIONAL TASKS						
Material Handling, Equipment Maintenance, and Miscellaneous Construction Activities	-	0	-	0	0	N/A

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

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)
UNASSIGNED PERSONNEL CATEGORIES						
Project Supervision and Administration	-	Not Reported	-	0.977	0.977	N/A
Subtotal Phase IV (Completed Tasks Only)	0	0	0	0	0	

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

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	937	35	8.079	8.079	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 and II. They are not included in the Subtotal Values for Phases III and IV (See Report Section 2.3.c).

TABLE 2
SURRY POWER STATION
STEAM GENERATOR REPLACEMENT PROJECT
REPORT OF RADIOACTIVE EFFLUENTS

YEAR: 1980

I. LIQUID RELEASES	UNITS	September	October	November	December				
	Curies								
Isotope: Released MPC µCi/ml					*				
I-131 3 x 10-1		5.96E-5	4.93E-5	2.25E-3	*				
I-132 8 x 10-6		*	*	*	*				
I-133 1 x 10-6		*	1.73E-6	1.32E-5	3.47E-7				
I-134 2 x 10-5		*	*	*	*				
I-135 4 x 10-6		*	*	*	*				
Cs-134 9 x 10-6		3.01E-4	8.32E-4	2.48E-2	2.58E-4				
Cs-137 2 x 10-5		1.04E-3	2.38E-3	3.35E-2	8.08E-4				
Co-57 4 x 10-4		*	*	1.89E-6	3.57E-7				
Co-58 9 x 10-5		5.73E-4	3.01E-3	1.36E-2	8.60E-4				
Co-60 3 x 10-5		1.10E-3	5.72E-3	1.81E-2	3.48E-3				
Mn-54 1 x 10-4		3.36E-5	1.11E-4	2.78E-3	4.45E-5				
Na-24 3 x 10-5		*	1.17E-3	6.29E-3	*				
Cr-51 2 x 10-3		1.99E-4	4.87E-4	1.14E-4	*				
Fe-59 5 x 10-5		*	*	*	*				
Nb-95 1 x 10-4		1.11E-5	5.68E-5	3.66E-5	1.23E-5				
Sb-124 2 x 10-5		*	*	1.20E-6	*				
Sb-125 1 x 10-4		*	3.86E-5	7.50E-7	1.44E-6				
Zn-65 1 x 10-4		*	*	2.60E-6	*				
Zr-95 6 x 10-5		*	*	*	*				
Mo-99 4 x 10-5		*	*	*	*				
Ru-103 8 x 10-5		*	1.89E-6	*	*				
Xe-133 3 x 10-6		8.66E-5	4.74E-4	1.85E-2	3.68E-6				
Xe-135 3 x 10-6		*	7.48E-5	2.41E-3	*				
Xe-133m 3 x 10-6		*	1.15E-5	*	*				
Ar-41 3 x 10-6		*	8.38E-7	*	*				
Ag-110m 3 x 10-5		*	*	*	*				
Ni-63 3 x 10-5		4.01E-5	1.41E-3	**	**				
Fe-55 8 x 10-5		1.16E-4	1.12E-2	**	**				
Ce-144 1 x 10-6		*	*	*	*				
Tc-99m 3 x 10-3		*	*	1.77E-7	*				
Ce-141 9 x 10-5		*	9.08E-7	*	*				
Volume of Liquid to Discharge Canal	Liters	6.70E+4	5.89E+5	1.16E+6	4.76E+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.

TABLE 2
SURRY POWER STATION
STEAM GENERATOR REPLACEMENT PROJECT
REPORT OF RADIOACTIVE EFFLUENTS

YEAR: 1980

II. AIRBORNE RELEASES

Isotopes Released:	UNITS	September	October	November	December
	Curies				
(a) Particulates					
Cs-134		3.12E-6	1.22E-6	*	2.73E-6
Cs-137		9.07E-6	1.76E-5	3.66E-5	2.21E-5
Cr-51		4.42E-5	1.65E-5	*	*
Co-58		2.63E-5	5.02E-5	1.65E-5	1.94E-5
Co-60		3.49E-5	5.95E-5	5.97E-5	6.27E-5
Mn-54		*	*	*	*
Fe-59		*	*	*	*
Cs-138		*	1.01E-4	*	*
Rb-88		*	5.24E-5	*	*
(b) Halogens					
I-131		1.78E-3	6.15E-4	7.90E-4	1.74E-5
I-132		4.73E-6	*	*	*
I-133		2.12E-6	2.31E-5	4.03E-5	1.31E-6
I-134		*	*	*	*
I-135		*	*	*	*
					*
(c) Gases					
Xe-133		4.44E+2	*	5.26E+1	*
Xe-133m		5.22E0	*	*	*
Xe-135		7.89E0	*	*	*
Kr-85m		3.21E-1	*	*	*
Kr-85		*	*	*	*
Kr-87		*	*	*	*
Kr-88		*	*	*	*
Ar-41		*	*	*	*
Xe-131m		5.45E+2	*	*	*
H-3		7.08E-1	2.15E-1	6.97E-2	5.62E-2

* Not Detected

TABLE 2

SURRY POWER STATION

STEAM GENERATOR REPLACEMENT PROJECT

REPORT OF RADIOACTIVE EFFLUENTS

YEAR: 1980

III. SOLID RADIOACTIVE WASTE DISPOSAL

	Units	September	October	November	December
Isotopes Released:	Curies				
(a) Total Amount of Solid Waste Packaged	FT^3	0	3.94E+3	6.30E+3	1.64E+4
(b) Estimated Total Activity	Curies	0	1.45E+0	1.82E+1	8.54E+0
(c) Date of Shipment and Disposition		0	All to Barnwell, S.C.	All to Barnwell, S.C.	All to Barnewell S.C.
			10-15-80	11-3-80	12-1-80 (2)
			10-21-80	11-4-80	12-2-80 (2)
			10-23-80	11-6-80	12-3-80 (2)
			10-28-80	11-7-80 (2)	12-4-80 (2)
			10-30-80	11-10-80	12-5-80 (2)
				11-12-80	12-8-80
				11-13-80	12-11-80(2)
				11-14-80	12-12-80
				11-18-80(2)	12-15-80
				11-19-80	12-16-80
					12-17-80
					12-18-80
					12-19-80
					12-22-80
					12-30-80(2)