STEAM GENERATOR REPAIR PROGRAM

FOR THE

SURRY POWER STATION

UNIT NO. 1

RADIOLOGICAL PROGRESS REPORT - NO. 1

FOR THE PERIOD

SEPTEMBER 14, 1980 THROUGH OCTOBER 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 initial 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 September 14 through October 31, 1980.

With regard to radiological effects, the major tasks accomplished during the reporting period involved shutdown and preparatory activities. These included: defueling, initial containment cleanup and decontamination, installation of temporary shielding, and erection of scaffolding. Several of the major removal activities which were commenced during the reporting period also contributed significantly to the radiological effects assessed in this report. Included are: removal of insulation from the steam generators and associated primary and secondary piping, removal of miscellaneous piping, cutting of reactor coolant piping and disassembly of steam generator supports.

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 October 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 Phase I (Shutdown and Preparatory Activities). For Phases II through 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 seven weeks. Due to this fact, an evaluation of the data presented in Table 1 to identify evidence of developing trends with respect to occupational exposures is felt to be premature. Should such trends develop as the repair effort for Unit No. 1 progresses, subsequent reports will describe them and attempt to determine the causes or contributing factors. Additionally, when comparisons of total manrem expenditures required to complete important tasks identify significant differences between the SGRP for Units 1 and 2, the reports will note these differences and describe the possible factors involved.

3.0 APPLICATION OF ALARA PRINCIPLES

3.1 General

This section summarizes the specific techniques and practices which were employed during the initial 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 successful 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 during the reporting period required the expenditure of about 45 manrem. 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 lower steam generator cubicles accounted for the expenditure of approximately 10 manrem during the period. Lead shielding applied directly to this piping and sheet lead "curtains" used to lower the general area radiation levels typically reduced average exposure rates of 800-1200 mR/hour to approximately 200 mR/hour for the removal task. Thus, a reduction factor of about 5 was achieved, and results in a calculated exposure savings of 40 manrem.

(b) The cutting and removal of reactor coolant piping has resulted in the expenditure of about 46 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 230 manrem to-date.

The assessments described above represent only a preliminary evaluation of the overall benefits expected to result from the application of temporary shielding techniques during the SGRP. A major portion of the removal and installation activities have yet to be performed, and will benefit significantly from the shielding already in place as well as the additional applications planned. 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.

While all of the tasks above were commenced during the reporting period, an assessment of the exposure savings attributable to steam generator water level will not be attempted until the generators are drained and surveys can be performed to determine the actual reductions achieved in Unit No. 1.

3.5 Plasma-Arc Cutting Equipment

In order to remove the steam generator lower shell from the containment, sections of the reactor coolant piping must be removed. A plasma-arc cutting torch was chosen as the means for performing these cuts. Plasma-arc has high cutting speed and produces good cut quality for subsequent pipe stub-end refurbishment. The high cutting rate was a primary factor in this choice since faster cutting means reduced exposure times. During the evaluation of this task, alternate methods such as mechanical cutting and other flame cutting techniques were considered. These alternatives were estimated to require 1 to 4 hours per cut, as compared to 15 to 20 minutes for plasma-arc.

In actuality during the Unit No. 2 SGRP, the majority of the reactor coolant pipe cuts required approximately 20 minutes with the plasma-arc torch. Similar performance has been observed in Unit No. 1; however, two improvements in the task of removing the reactor coolant pipe were made based on the Unit 2 experience. First, studies conducted after the Unit 2 SGRP indicated that the number of coolant pipe sections required to be removed in order to achieve a proper subsequent fit-up to the new steam generators could be reduced in Unit 1, if the existing pipe alignment fell within desired tolerances. Measurements taken in Unit 1 after the coolant pipe insulation was removed confirmed the desired existing alignment, and thus, only two pipe sections per generator have been removed instead of three as in Unit 2. This meant that one less cut per generator was possible. Second, the actual cutting process in Unit 2 required the plasma-arc torch to be manually propelled around a portion of its track. For Unit 1, improvements in the track system allowed the torch to be self-propelled around the entire pipe girth, thereby eliminating the need for an individual to be in close proximity with the coolant pipe during the cutting process.

The two changes described above represent additional improvements to an already proven ALARA technique by further reducing the times spent in radiation areas.

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 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 initial purging of containment following shutdown, coolant de-gassing operations during defueling, and, to a smaller degree, 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.

4.3 Liquid Releases

Small amounts of liquid wastes were generated during the initial shutdown and defueling phase from draining and sampling operations. However, the major contributor to liquid releases during this reporting period is 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 total volume of solid radioactive waste

requiring disposal as a result of the Unit 1 SGRP is expected to be somewhat lower than that observed for Unit 2. Additional waste compaction equipment (a box compactor) is being used which allows more efficient packaging of solid waste materials. Waste materials such as insulation which previously were packaged loosely in large boxes, can now be compacted in the shipping container. Wasted space is thus minimized and packaged volumes reduced.

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 9/14/80 - 10/31/80
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	18,717	25,880	206.37	103.365	103.365	I
II Removal Activities	3,084	4,564	50.70	30.907	30.907	I
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	0	0	0	0	0	I
PROJECT TOTALS (Completed Tasks Only)	21,801	30,444	257.07	134.272	134.272	

TABLE 1
PERSONNEL RADIATION EXPOSURE SUMMARY
STEAM GENERATOR REPLACEMENT ACTIVITIES - REPORT PERIOD 9/14/80 - 10/31/80
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 10-31-80				
I	Shutdown and Preparatory Activities	39,021	41,386	596.27	175.903	175.903	I
II	Removal Activities	57,422	35,487	559.6	144.046	144.046	I
III	Installation Activities	74,195	2,703	448.23	5.566	5.566	I
IV	Post Installation and Startup Activities	62,650	1,504	427.54	3.141	3.141	I
V	Steam Generator Storage Activities	300	0	35.0	0	0	I
	PROJECT TOTALS (All Tasks)	233,588	81,080	2,066.64	328.656	328.656	

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	462	1.05	1.277	1.277	C
Open Equipment Hatch	156	-	0.23	-	-	C (See Note 1)
Defueling and Fuel Storage	585	2,863	11.7	23.503	23.503	C
Install Reactor Vessel Cavity Cover	130	695	1.3	1.813	1.813	C
Cutting of Pressurizer Cubicle Wall	-	-	-	-	-	(See Note 2)
Installation of Jib Cranes	1,838	2,426	9.19	3.767	3.767	I
Disassemble Manipulator Crane	58	613	1.74	1.533	1.533	C
Install Steam Generator Transport System	572	1,295	2.86	1.636	1.636	I
Removal of Biological Shield Wall	1,296	892	19.44	2.249	2.249	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	525	3.0	1.138	1.138	C
Cutting of Crane Wall at Hatch Opening	432	496	2.16	0.823	0.823	C
Installation of Temporary Ventilation System	50	53	0.05	0.047	0.047	I
Temporary Scaffolding	7,500	3,071	75	9.506	9.506	I
Temporary Lighting and Power	5,200	1,533	26.25	1.701	1.701	C
Cleanup and Decon	9,000	14,920	135	57.975	57.975	C
Polar Crane Operator	1,500	198	4.5	0.137	0.137	C
Shielding	3,600	1,150	270	45.428	45.428	I
H.P., Q.A.	6,480	6,884	32.4	9.956	9.956	I
ADDITIONAL TASKS						
Installation of Service Air System	-	627	-	2.198	2.198	I

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	-	1,802	-	0.741	0.741	C
Protection of Containment Components	-	881	-	4.211	4.211	N/A
UNASSIGNED PERSONNEL CATEGORIES						
Project Supervision and Administration	-	Not Reported	-	6.264	6.264	N/A
Visitors and Inspectors	-	"	-	0	0	N/A
Subtotal Phase I (Completed Tasks Only)	18,717	25,880	206.37	103.365	103.365	

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	14.000	14.000	C
Removal of Insulation (upper shell, mainsteam and feedwater piping)	864	870	12.96	4.843	4.843	C
Removal of Miscellaneous Piping	72	1,116	1.8	10.181	10.181	C
Set Up Steam Generator Girth Cut Equipment	1,152	35	28.8	0.195	0.195	I
Cut and Remove Steam Generator Upper Shell	330	323	8.25	0.930	0.930	I
Cutting of Reactor Coolant Piping	2,982	4,551	149.1	45.881	45.881	I
Cutting of Mainsteam and Feedwater Piping	1,428	931	7.14	1.883	1.883	C
Disassembly of Steam Generator Supports	792	2,598	15.84	19.884	19.884	I
Removal of Moisture Separation Equipment	396	541	1.98	1.782	1.782	I
Refurbish Steam Generator Upper Shell	9,246	485	46.23	0.703	0.703	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	287	4.05	1.028	1.028	I
Removal of Steam Generator Lower Shell	1,575	0	31.5	0	0	I
Temporary Scaffolding	7,500	3,070	75.0	9.506	9.506	I
Temporary Lighting and Power	5,250	1,532	26.25	1.701	1.701	I
Cleanup and Decon	17,000	5,156	85.0	8.589	8.589	I
Polar Crane Operator	1,500	0	4.5	0	0	I
H.P., Q.A.	6,480	6,884	32.4	9.955	9.955	I
ADDITIONAL TASKS						
Material Handling, Equipment Maintenance, and Miscellaneous Construction Activities	-	5,461	-	6.722	6.722	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	-	6.263	6.263	N/A
Visitors and Inspectors	-	"	-	0	0	N/A
Subtotal Phase II (Completed Tasks Only)	3,084	4,564	50.70	30.907	30.907	

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	163	9.63	0.361	0.361	I
Installation of Reactor Coolant Piping	6,768	1,027	67.68	2.078	2.078	I
Steam Generator Girth Weld	5,400	1,513	27.0	3.127	3.127	I
Installation of Main Steam Piping	3,735	0	18.68	0	0	I
Installation of Feedwater Piping	2,700	0	13.5	0	0	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	0	75.0	0	0	I
Temporary Lighting & Power	5,250	0	26.25	0	0	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	0	85.0	0	0	I
Polar Crane Operator	1,500	0	4.5	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
UNASSIGNED PERSONNEL CATEGORIES						
Project Supervision and Administration	-	Not Reported	-	0	0	N/A
Visitors and Inspectors	-	"	-	0	0	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	20	16.2	0.034	0.034	I
Repair Crane Wall Opening	473	57	2.37	0.063	0.063	I
Repair Pressurizer Cubicle Wall	-	-	-	-	-	(See Note 2)
Install Steam Generator Recirculation and Transfer System	9,000	1,315	90.0	2.705	2.705	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	112	23.25	0.339	0.339	I
Remove Steam Generator Transport System	425	0	2.12	0	0	I
Reassemble Shroud Cooling System	576	0	11.52	0	0	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	0	75.0	0	0	I
Temporary Lighting and Power	5,250	0	26.25	0	0	I
Cleanup and Decon	17,000	0	85.0	0	0	I
Polar Crane Operator	1,500	0	4.5	0	0	I
Painting	9,000	0	45.0	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	0	N/A
Visitors and Inspectors	-	"	-	0	0	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	0	35.0	0	0	I

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 Phase I. They are not included in the Subtotal Values for Phases II, 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

Isotope Released	MPC µCi/ml	UNITS	September	October
		Curies		
I-131	3×10^{-4}		5.96E-5	4.93E-5
I-132	8×10^{-6}		*	*
I-133	1×10^{-6}		*	1.73E-6
I-134	2×10^{-5}		*	*
I-135	4×10^{-6}		*	*
Cs-134	9×10^{-6}		3.01E-4	8.32E-4
Cs-137	2×10^{-5}		1.04E-3	2.38E-3
Co-57	4×10^{-4}		*	*
Co-58	9×10^{-5}		5.73E-4	3.01E-3
Co-60	3×10^{-5}		1.10E-3	5.72E-3
Mn-54	1×10^{-4}		3.36E-5	1.11E-4
Na-24	3×10^{-5}		*	1.17E-3
Cr-51	2×10^{-3}		1.99E-4	4.87E-4
Fe-59	5×10^{-5}		*	*
Nb-95	1×10^{-4}		1.11E-5	5.68E-5
Sb-124	2×10^{-5}		*	*
Sb-125	1×10^{-4}		*	3.86E-5
Zn-65	1×10^{-4}		*	*
Zr-95	6×10^{-5}		*	*
Mo-99	4×10^{-5}		*	*
Ru-103	8×10^{-5}		*	1.89E-6
Xe-133	3×10^{-6}		8.66E-5	4.74E-4
Xe-135	3×10^{-6}		*	7.48E-5
Xe-133m	3×10^{-6}		*	1.15E-5
Ar-41	3×10^{-6}		*	8.38E-7
Ag-110m	3×10^{-5}		*	*
Ni-63	3×10^{-5}		**	**
Fe-55	8×10^{-5}		**	**
Ce-144	1×10^{-6}		*	*
Tc-99m	3×10^{-3}		*	*
Ce-141	9×10^{-5}		*	9.08E-7
Volume of Liquid to Discharge Canal		Liters	6.70E+4	5.89E+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	UNITS	September	October
Isotopes Released:	Curies		
(a) Particulates			
Cs-134		3.12E-6	1.22E-6
Cs-137		9.07E-6	1.76E-5
Cr-51		4.42E-5	1.65E-5
Co-58		2.63E-5	5.02E-5
Co-60		3.49E-5	6.95E-5
Mn-54		*	*
Fe-59		*	*
Cs-138		*	1.76E-5
Rb-88		*	5.24E-5
(b) Halogens			
I-131		1.78E-3	6.15E-4
I-132		4.73E-6	*
I-133		2.12E-6	2.31E-5
I-134		*	*
I-135		*	*
(c) Gases			
Xe-133		4.44E+2	*
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
III. SOLID RADIOACTIVE WASTE DISPOSAL			
(a) Total Amount of Solid Waste Packaged	FT^3	0	3.94E+3
(b) Estimated Total Activity	Curies	0	1.448E+0
(c) Date of Shipment and Disposition		0	10-15-80 10-21-80 10-23-80 10-28-80 10-30-80

Barnwell, S.C.

* Not Detected