

# REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 8409280225 DOC. DATE: 84/07/31<sup>9 24</sup> NOTARIZED: NO DOCKET #  
 FACIL: 50-261 H. B. Robinson Plant, Unit 2, Carolina Power and Light 05000261  
 AUTH. NAME: AUTHOR AFFILIATION  
 BEATTY, G.P. Carolina Power & Light Co.  
 RECIP. NAME: RECIPIENT AFFILIATION

VARGA, S.A. Operating Reactors Branch 1

SUBJECT: "Steam Generator Repair Program Radiological Progress  
 Rept 2, May - Jul 1984." W/840924 ltr.

DISTRIBUTION CODE: A001D COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 56  
 TITLE: OR Submittal: General Distribution

NOTES:

05000261

OL: 07/31/70

RECIPIENT ID CODE/NAME	COPIES LTR ENCL	RECIPIENT ID CODE/NAME	COPIES LTR ENCL
NRR ORB1 BC 01	7 7		
INTERNAL: ADM/LFMB	1 0	ELD/HDS1	1 0
NRR/DE/MTEB	1 1	NRR/DL DIR	1 1
NRR/DL/ORAB	1 0	NRR/DSI/METB	1 1
NRR/DSI/RAB	1 1	REG FILE 04	1 1
RGN2	1 1		
EXTERNAL: ACRS 09	6 6	LPDR 03	1 1
NRC PDR 02	1 1	NSIC 05	1 1
NTIS	1 1		

TOTAL NUMBER OF COPIES REQUIRED: LTR 26 ENCL 23



**Carolina Power & Light Company**

H. B. ROBINSON STEAM ELECTRIC PLANT  
POST OFFICE BOX 790  
HARTSVILLE, SOUTH CAROLINA 29550

SEP 24 1984

Robinson File No: 3005

Serial: RSEP/84-567

Mr. Steven A. Varga, Chief  
Operating Reactors Branch No. 1  
Office of Nuclear Reactor Regulation  
Division of Licensing  
United States Nuclear Regulatory Commission  
Washington, D. C. 20555

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2  
DOCKET NO. 50-261  
LICENSE NO. DPR-23  
STEAM GENERATOR REPAIR PROGRAM PROGRESS REPORT

Dear Mr. Varga:

In accordance with Amendment No. 77 to the H. B. Robinson Unit 2 Operating License, Carolina Power and Light Company submits the second interim 90 day progress report on the Steam Generator Repair Program. This report summarizes the efforts and progress of the repair program for the period of May 1, 1984, through July 31, 1984.

Should you have any questions on this subject, please contact my staff or me.

Very truly yours,

Guy P. Beatty, Jr.  
Manager

Robinson Nuclear Project Department

DBB/ml

cc: H. Krug (NRC-HBR)  
J. P. O'Reilly (NRC-RII)

A001  
1/1

STEAM GENERATOR REPAIR PROGRAM

FOR

H.B. ROBINSON UNIT 2

RADIOLOGICAL PROGRESS REPORT 2

FOR THE PERIOD

MAY 1, 1984, THROUGH JULY 31, 1984

DOCKET 50-261

LICENSE NO. DPR-23

CAROLINA POWER & LIGHT COMPANY

8409280225 840731  
PDR ADDCK 05000261  
R PDR

A001  
11

## Table of Contents

	<u>Page</u>
1.0 INTRODUCTION.....	4
2.0 OCCUPATIONAL RADIATION EXPOSURE.....	8
2.1 General.....	8
2.2 Description of exposure data collection program.....	8
2.3 Evaluation of exposure data.....	9
2.4 Description and format of exposure data.....	10
2.5 Discussion of exposure results.....	11
3.0 APPLICATION OF DOSE REDUCTION TECHNIQUES (ALARA PRINCIPLES)....	11
3.1 General.....	11
3.2 Temporary shielding.....	12
3.3 General containment decontamination.....	14
3.4 Contamination control temporary local containments and ventilation.....	15
3.5 General ALARA techniques and practices.....	15
4.0 RADIOACTIVE EFFLUENTS AND SOLID WASTE.....	18
4.1 General.....	18
4.2 Liquid releases.....	18
4.3 Airborne releases.....	19
4.4 Solid radioactive waste.....	19
5.0 CONCLUSIONS.....	20

## Tables

<u>Table</u>		<u>Page</u>
1	Description of Major Tasks.....	22
2	Personnel Exposure Summary Per Task.....	29
3	Detailed Summary of Activity Exposures.....	35
4	Summary of Activity--Exposures Other than Steam Generator Replacement Activities.....	51
5	Summary of Radioactive Effluent Releases.....	52
6	Summary of Solid Low-Level Radioactive Waste.....	55

## 1.0 INTRODUCTION

1.1 Radiological Progress Report 2 is the second interim report submitted on the progress of the Unit 2 Steam Generator Repair Program for the H.B. Robinson Steam Electric Plant. This and the final report will provide information pertaining to the Steam Generator Repair Program as follows:

- 1.1.1 A report of predicted occupational radiation exposure and estimated occupational radiation exposure received for each major task.
- 1.1.2 A report on radiation dose reduction methods employed in accordance with the as low as reasonably achievable (ALARA) concept.
- 1.1.3 A report of liquid and airborne radioactivity released to the environment.
- 1.1.4 A report of volume and curie content of solid radioactive waste generated.

1.2 Major and subordinate tasks for the steam generator repair project are listed below. The percent complete is an estimation as of the end of this reporting period.

- 1.2.1 Construction of pedestal cranes, preparation of polar crane, and steam generator transfer platform. 100
  - Installed pedestal cranes.
  - Performed maintenance and repairs on the polar crane.
  - Installed steam generator skid beams at the equipment hatch.

1.3 Initial containment decontamination. 100

- Decontamination of the containment vessel from an elevation of 275 feet to an elevation of 228 feet including pump bays.

- 1.3.1 Concrete and structural steel removal and replacement. 100
  - Removal and replacement of concrete and structural steel including scaffolding erection.

- 1.3.2 Defueling and fuel storage. 100
  - Disassembled the reactor vessel head.

- Removed the reactor vessel head from the pressure vessel.
- Removed fuel from the pressure vessel and transferred to the spent-fuel storage area.
- Replaced the reactor vessel head.
- Performed decontamination of the refueling cavity.
- 1.3.3 Installation and removal of temporary shielding. 60
  - Install piping shields.
  - Install shadow shields.
  - Install steam generator platform shields.
  - Install steam generator channel head shielding.
- 1.3.4 Installation, maintenance, and removal of scaffolding, temporary lighting, power, and air conditioning. 80
  - Construct temporary scaffolding.
  - Install temporary lighting and power.
  - Install temporary service and breathing air.
  - Install and remove temporary air conditioning systems.
- 1.3.5 Installation, maintenance, and removal of contamination containments and temporary ventilation systems. 95
  - Install contamination control tents and associated air filtration treatment and handling equipment.
- 1.3.6 Removal of insulation. 100
  - Removed insulation from steam generators and connecting piping.
- 1.3.7 Removal of main steam piping. 100
  - Removed main steam piping.
- 1.3.8 Removal of feedwater piping. 100
  - Removed feedwater piping.
- 1.3.9 Removal of miscellaneous piping. 100
  - Removed blowdown valves.
  - Removed CVCS line.
- 1.3.10 Cutting and removal of steam generator upper assembly. 100
  - Removed manways on steam domes.
  - Prepared steam dome internals for removal.

- Cut and removed level transmitter.
- Plasma arc cut steam domes from lower assembly.
- Removed steam domes from containment.
- 1.3.11 Cutting of channel head. 100
  - Set up cutting equipment.
  - Cut divider plate.
  - Cut lower assembly from channel head.
  - Rigged and moved lower assembly to operating deck.
- 1.3.12 Weld shield covers on lower assembly at: 100
  - 1.2.14.1 Channel head.
    - Installed heaters and blankets.
    - Welded shield plate.
    - Removed blowdown nozzles and handhold covers.
    - Welded shield plugs in blowdown nozzles and handholds.
  - 1.2.14.2 Transition end.
    - Installed heaters and blankets.
    - Welded transition end shield plate.
- 1.3.13 Removal of steam generator lower assembly. 100
  - Moved lower assemblies from operating deck to equipment hatch.
  - Moved lower assemblies from containment.
- 1.3.14 Lateral support ring removal. 100
  - Cut and removed bolts.
  - Removed snubbers.
  - Spread lateral support ring.
- 1.3.15 Channel head decontamination. 100
  - Removed manway strong backs and diaphragms.
  - Set up, operated, and removed alumina grit decontamination equipment.
  - Set up, operated, and removed alumina grit solidification equipment.
  - Set up, operated, and removed spent grit handling equipment.



	PERCENT COMPLETE
1.3.16 Refurbishment of upper assembly.	100
<ul style="list-style-type: none"> <li>• Decontamination of the outside of the dome.</li> <li>• Weld prep of domes.</li> <li>• Remove and replace feedwater ring.</li> <li>• Modify moisture separator devices.</li> </ul>	
1.3.17 Installation of lower assemblies, prep, and weld channel head.	100
<ul style="list-style-type: none"> <li>• Weld prep channel head.</li> <li>• Rig and move steam generators into place.</li> <li>• Set up and remove heaters and blankets.</li> <li>• Preheat and perform girth weld.</li> </ul>	
1.3.18 Prep and weld divider plate.	100
1.3.19 Installation and welding of upper assemblies.	100
<ul style="list-style-type: none"> <li>• Rig and move upper assemblies into containment.</li> <li>• Move upper assemblies into place.</li> <li>• Set up and remove heaters and blankets.</li> <li>• Preheat and perform girth weld.</li> </ul>	
1.3.20 Lateral support ring installation.	90
<ul style="list-style-type: none"> <li>• Replace lateral support rings.</li> <li>• Replace snubbers.</li> <li>• Replace lateral support ring bolts.</li> </ul>	
1.3.21 Install main steam piping.	100
<ul style="list-style-type: none"> <li>• Replace main steam-line piping.</li> </ul>	
1.3.22 Install feedwater piping.	100
<ul style="list-style-type: none"> <li>• Replace feedwater piping.</li> </ul>	
1.3.23 Install insulation.	90
<ul style="list-style-type: none"> <li>• Install insulation on all generators.</li> </ul>	
1.3.24 Install miscellaneous piping.	85
<ul style="list-style-type: none"> <li>• Replace blowdown valves.</li> <li>• Replace CVCS line.</li> </ul>	
1.3.25 Nonmanuals, (HP, QA, engineering, supervision, administration, etc.).	90
<ul style="list-style-type: none"> <li>• Nonmanual support personnel.</li> </ul>	

- |        |  |     |
|--------|--|-----|
| 1.3.26 | Ongoing decon/cleanup and disposal of contaminated materials.  | 90  |
|        | <ul style="list-style-type: none"> <li>• Continuing decontamination during the outage.</li> <li>• Contaminated materials removal and disposal during the outage.</li> </ul>  |     |
| 1.3.27 | Miscellaneous testing/inspections.   | 25  |
|        | <ul style="list-style-type: none"> <li>• Primary system hydro.</li> <li>• Secondary system hydro.</li> </ul>   |     |
| 1.3.28 | Steam generator storage activities.  | 100 |
|        | <ul style="list-style-type: none"> <li>• Rigging and transporting steam generators to storage facility.</li> <li>• Placing steam generators into storage facility.</li> <li>• Sealing storage facility.</li> </ul>                                     |     |
| 1.3.29 | Miscellaneous (work to support the steam generator repair project not included in the above task).   | 90  |
|        | <ul style="list-style-type: none"> <li>• Radiation controlled area inspections.</li> <li>• General maintenance in the radiation controlled areas.</li> <li>• Laundry operation functions.</li> <li>• Tool and equipment issue and movement.</li> </ul> |     |

## 2.0 OCCUPATIONAL RADIATION EXPOSURE

### 2.1 General.

2.1.1 As indicated in the Radiological Progress Report 1, minimizing occupational radiation exposure is of prime importance to CP&L and continues to play a major role in the steam generator repair project. Predicted estimates of personnel exposure were presented in Table 3.4.2 of the final Steam Generator Repair Report dated January 6, 1983.

2.1.2 Man-rem expenditure continues to be assessed and the cumulative exposure is tracked for each major task.

### 2.2 Description of exposure data collection program.

- 2.2.1 To assess man-rem expenditure, exposure data continues to be collected and compared against the estimated exposure summary presented in Table 3.4.2 of the Steam Generator Repair Report.
- 2.2.2 Generally, each major task is composed of a number of subtasks controlled by a construction document called a technical procedure. Each technical procedure details the activity to be performed. The technical procedure is reviewed by health physics to incorporate ALARA recommendations. The necessary radiation work permits (RWPs) are generated prior to starting the subtask. The RWPs generated for each subtask of a major task provide a composite summary of estimated man-rem expenditure through self-reading pocket dosimetry entries. Repair work not requiring technical procedures and specific documentation is categorized into one of the major tasks and radiologically controlled with an appropriate RWP.
- 2.2.3 Radiation exposures are documented in the following manner:
  - Total exposure expended by RWP.
  - Classification of RWPs into one of the major repair tasks.
  - Comparing self-reading pocket dosimetry entries\* to ALARA estimates.

### 2.3 Evaluation of exposure data.

---

\*SRPD exposure results are used to track individual RCA entries and cumulative subtask exposure estimates. These devices have historically provided conservative estimates of individual exposure sufficient to provide assurance that administrative and legal occupational exposure limits are not exceeded.

2.3.1 The composite summary of worker exposure recorded on RWPs is totaled for all RWPs assigned to a major task. The composite self-reading pocket dosimetry exposure estimates recorded on RWPs assigned to a subtask are utilized to evaluate actual exposure expenditure as compared to exposure forecast. This method has proven to be effective and provides a conservative day-to-day estimate. This method is continuing to be utilized throughout the steam generator repair project.

#### 2.4 Description and format of exposure data.

2.4.1 Table 2 presents a summary of the occupational radiation exposure expended in man-rem from project commencement on February 1, 1984, through July 31, 1984, and compares them to the original exposure estimates. Pages 33 and 34 of Table 2 present the exposure estimates versus the estimated actual exposure in graphical form.

2.4.2 Miscellaneous items not specifically addressed but included in the man-rem expenditure are laundry operations, RC pump motor removal, and general maintenance such as equipment moved in and out and crane operations to support the repair project.

2.4.3 Table 3 presents a detailed summary by subtask of personnel exposure expended for the steam generator replacement repair project along with the original estimate for that subordinate task. The following comments are provided for clarification and should be considered when reviewing the data presented in Tables 2 and 3.

- Activity status indications are given to allow comparison of actual versus estimated man-rem expenditures.
- Activities indicated as in progress may require additional exposure prior to completion of the activity; therefore, a valid comparison at this time is not justified.

- For activities shown as complete, small amounts of additional exposure may be shown in subsequent status reports as a result of such factors as changes in procedures, work involved in activities related to support equipment, localized work area cleanup, etc.

2.4.4 Table 4 presents a summary of activities associated with plant modifications and testing not related to steam generator repair but is included in this report for informational purposes.

## 2.5 Discussion of exposure results.

2.5.1 A review of the data presented in Table 2 shows that the total occupational radiation exposure recorded for major tasks is approximately 49 percent of the original total estimate.

2.5.2 As presented in Table 2, the occupational exposure accumulated for the steam generator activities from project commencement through the second reporting period (February 1, 1984, through July 31, 1984) is 1028.457 man-rem. This value can be compared directly to the original estimates for the same completed activities which results in a projected exposure of 1926 man-rem. On-going items which were not included in the preplanning estimate for which estimated exposures are included in this report are service and breathing air system maintenance and laundry activities. The actual exposure for the second reporting period is listed in Table 3 and is 478.317 man-rem.

## 3.0 APPLICATION OF DOSE REDUCTION TECHNIQUES (ALARA PRINCIPLES)

### 3.1 General.

3.1.1 This section summarizes the techniques and practices which have been used to provide dose reductions to personnel during the steam generator repair project. Where the available data permits, the following evaluations include a quantitative assessment of the man-rem savings which can be attributed to the techniques used. Detailed information on these ALARA techniques and how they relate to the overall steam generator replacement activities can be found in the SGRR.

3.2 Temporary shielding.

3.2.1 The use of temporary shielding has resulted in significant exposure reduction throughout the reporting period. Shielding records are maintained and include locations shielded, types of shielding installed, survey data prior to and after shielding, stress analysis results, and engineering approvals of freestanding supports used.

3.2.2 Various areas throughout the containment were evaluated for shielding needs. Numerous areas where radiation sources would cause significant exposure due to high traffic or occupancy were evaluated for shielding prior to installation.

3.2.3 The working platforms around the steam generator lower girth cut were designed to support up to 3 inches of temporary lead shielding. The design objective of this shielding effort was to provide a general work area exposure rate  $\leq 20$  mR/hr. The actual work area exposure rate was approximately 10 mR/hr.

3.2.4 Major ALARA techniques which resulted in significant man-rem savings during this reporting period are:

- The steam generators' lower girth weld and divider plate weld were made by specialized welders who performed the task with minimal defects; additionally, the welding effort was completed in approximately 33 percent of the projected time.

- Shielding of the channel head, hot- and cold-leg nozzles, and the divider plate was utilized throughout the lower girth welding procedure. The preheat and postheat treatment and the welding of the lower girth weld were projected to expend 310 man-rem. Actual exposure expended was 212.215 man-rem, thus an exposure savings of 97.785 man-rem can be attributed to welders efficiency, minimal defects, and shielding methods.
- Controls for the preheat and postheat treatment equipment were located in a low-background area.
- Postheat treatment equipment was installed with the hot- and cold-leg nozzle shields in place. Additionally, the alumina grit blast decontamination of the channel head was an effective technique for man-rem reduction for this task.
- Welding of the channel head divider plate was performed after the lower girth weld heat treatment process was completed. Shielding was reinstalled in the hot- and cold-leg nozzles and the channel head prior to commencing this operation. Again, the effective shielding methods and welder efficiency resulted in expending only 40 percent of the projected man-rem for this portion of the project.
- Refurbishment of the steam generator domes, weld preparation on main steam and feedwater pipe sections, and the cleaning and inspecting of the reactor head studs was performed outside of containment in essentially background radiation areas.

3.2.5 During this reporting period, the dose accumulated due to the installation of temporary shielding was approximately 5.925 man-rem for a total expenditure of 13.075 man-rem expenditure for Reporting Periods 1 and 2. Installation and removal of shielding were predicted to utilize 60 percent of the estimated exposure for shield-

utilize 60 percent of the estimated exposure for shielding installation and 40 percent for shielding removal. The original exposure estimate for shielding installation is approximately 87 man-rem. The lower actual expenditure is attributed to the continued training of selected personnel in specialized shielding techniques and mock-up training.

### 3.3 General containment decontamination.

3.3.1 A program for ongoing general containment decontamination was initiated at the start of the repair project. The program involved an extensive decontamination of the containment from the 275-foot refueling elevation to the 228-foot elevation. Major items/components that were planned for removal during the project were also decontaminated or packaged to control the spread of contamination. In most areas of the 275-, 251-, and 228-foot elevations, loose surface contamination levels were reduced from a nominal 15000 dpm/100cm<sup>2</sup> to approximately 1000 dpm/100cm<sup>2</sup> or less. Contamination levels inside the biological shield wall are being maintained as low as practical consistent with work in progress. Where appropriate, floor covering (herculite or similar material) has been applied to minimize buildup of surface contamination and reduce cleanup time. A decontamination work force has been assigned to maintain an ongoing area decontamination effort. Surveys are taken on a routine basis to evaluate contamination levels so that timely decontamination activities can be initiated to maintain optimum radiological working conditions, avoid significant buildup, and minimize cross-contamination. As shown in Table 2, approximately 10.975 man-rem were expended to conduct the initial containment decontamination with an additional 52.233 man-rem expended to conduct ongoing decontamination activities during this reporting period. A total expenditure of 126.678 man-rem has been utilized for Reporting Periods 1 and 2.



### 3.4 Contamination control temporary local containments and ventilation.

3.4.1 To a large extent, initial containment cleanup and decontamination have minimized the need for extensive use of temporary local containment and temporary ventilation systems. However, in areas where significant welding must be performed on highly contaminated components, temporary local containments were and continue to be utilized to prevent airborne contamination in adjacent areas and minimize the spread of contamination.

3.4.2 One of the more significant applications of this technique has been in the area where the steam generator to channel head weld was made. Portable high-efficiency (HEPA) filtration units were connected to the hot or cold side manway to continuously draw air from the channel head while welding operations were in progress. The discharged filtered air from these portable units was released to the plant stack via the containment ventilation system. To further minimize the risk for potential internal deposition, personnel working in the channel head wore respiratory protection equipment.

3.4.3 Overall, the use of temporary local contamination control containments during the repair project is providing effective control of airborne contamination resulting from work activities such as cutting, grinding, and welding on contaminated components, thus minimizing delays by allowing work to continue in adjacent areas.

3.4.4 Contamination containments are also utilized to enclose various items and components removed from the containment for placement in temporary storage.

### 3.5 General ALARA techniques and practices.

3.5.1 In addition to the specific dose reduction techniques described, some of the more general practices employed to maintain control of personnel radiation exposure include the following:

- A continuous comprehensive health physics job coverage program provides control and surveillance of the radiological conditions associated with repair project tasks. This program includes the use of radiation work permits (RWPs) that address specific radiological aspects involved and the proper measures necessary to perform the work. Also, in addition to health physics personnel assigned to monitor specific tasks, health physics and ALARA personnel survey the various work areas throughout containment to ensure that sound, approved radiological work practices are being employed and to inspect for conditions which could cause significant changes in radiation exposure rates. These individuals are uniquely identified for assistance to personnel inside containment. Other health physics personnel monitoring specific activities are used strictly for that purpose and dedicate their time and attention to that specific task.
- An ongoing radiation control training program includes instruction on the effects of radiation exposure, radiation protection practices and techniques, ALARA considerations, site emergency plan, and other related instructions that assist the individual in reducing personnel exposure and implementing sound radiation protection practices.
- Training for specific tasks through the use of mock-ups, photographs, full-scale models, and "dry" runs are conducted as appropriate. The S/G channel head mock-up is used to train personnel making channel head entries. Equipment similar to that used in the actual S/G is also used in the mock-up to familiarize personnel with the technique, to test work procedures in a nonradiation environment, and to practice use of the equipment prior to entering the relatively high-exposure fields of the S/G channel head. Protective

clothing is worn during mock-up training as appropriate to simulate the working environment and to provide realistic time estimates of the task so that an estimate of the expected dose can be reverified and refined.

- The use of technical procedures serve to assure adequate preplanning and review of specific tasks with special emphasis placed on dose reduction considerations (ALARA).
- The utilization of in-containment "low-level radiation waiting areas" provide workers low-exposure rate areas during short-term idle periods. These areas are located where the exposure rates are relatively low ( $< 5$  mR/hr on the average). These low-level radiation waiting areas are well posted, and workers are encouraged to use these areas whenever possible to minimize exposure.
- The ongoing decontamination program and periodic work area cleanup techniques are used to minimize the buildup of contamination levels and to reduce the amount of decontamination required for areas/materials removed from containment throughout the repair project.
- Continuous air monitoring devices with preset alarm capabilities are used to monitor airborne activity in the containment. In addition, periodic grab samples are taken routinely in general areas as well as for specific tasks.
- A local tool crib, weld rod rooms, and a document control room have been established in the containment to minimize lengthy work group stoppage while replenishing unanticipated needs for high-use items and documents. In addition, other work and lay-down areas are located in low-exposure rate areas.

3.5.2 Quantitative assessments are difficult to develop for the strong emphasis and detailed planning involved in implementation of these "general" techniques and practices; however, they continue to contribute significantly to the overall ALARA commitment for the repair project.

#### 4.0 RADIOACTIVE EFFLUENTS AND SOLID WASTE

##### 4.1 General.

4.1.1 Radioactive effluents consisting of liquid and airborne releases and low-level solid radioactive waste produced during this reporting period are summarized in Tables 5 and 6, respectively. The radionuclides reported and activity released during this reporting period are typical of those expected for the types of work activities conducted thus far in the Steam Generator Repair Program.

##### 4.2 Liquid releases.

4.2.1 A summary of the volume and activity of liquid effluents released for the period May 1, 1984, through July 31, 1984, is provided in Table 5. Approximately 96 percent of the activity released (excluding tritium) was in the form of activated metals (e.g., Co-58, Co-60, Mn-54, and Ag-110m). The remaining activity (excluding tritium) included the following radionuclides--Cs-137 (3.1 percent), Cs-134 (1.2 percent), and no radioiodines for this reporting period. The total activity released (excluding tritium) during this reporting period is approximately 372 times lower than normal plant operations. For example, the total activity released during January while the plant was in operation was 3.24 E-01 curies as compared to 7.21 E-05, 3.08 E-04, and 2.26 E-03 curies for May, June, and July, respectively. The amount of tritium released during the reporting period was 624, 265, and 41 times lower for May, June, and July, respectively, than for January.

#### 4.3 Airborne releases.

4.3.1 A summary of the airborne effluent activity released for the period May 1, 1984, through July 31, 1984, is also provided in Table 5. There were two sources of activity released during this period mainly due to the ventilation of particulate radioactivity from the auxiliary building and containment purges. During the repair, ventilation of the containment is maintained in order to keep the containment building under a negative pressure. Prior to its release, the air from the containment is directed to HEPA filter banks in order to minimize the concentration of radioactivity released to the environment. Releases from containment are continuously monitored. There was no radioiodine or radionoble gas activity detected in airborne effluents for May, June, and July.

#### 4.4 Solid radioactive waste.

4.4.1 A summary of low-level radioactive waste (LLW) shipments is provided in Table 6. The LLW shipments during this reporting period were made to the Barnwell, South Carolina, and Richland, Washington, low-level waste disposal facility.

4.4.2 The majority of the waste volume shipped was compactable and noncompactable dry-active waste (DAW) for this reporting period. Compactable DAW is comprised of paper, plastic, cloth, sheet metal, small components or tools, and other compressible nonreusable trash which is efficiently packaged using a high-density mechanical compactor to reduce its volume. Noncompactable DAW consists of insulation, large metal components, filters, and other nonreusable materials which cannot be practically compacted.

4.4.3 The total volume of solid LLW generated due to repair activities through this reporting period (excluding the steam generator lower assemblies) is approximately

49,600 cubic feet which is 83 percent of the total 60,000 cubic feet estimated in the SGRR. It should be noted that the volume of waste shipped is greater than the accumulated volume of waste generated. This is primarily attributed to additional LLW generated from other plant modifications being conducted during the steam generator repair project. The total quantity of radioactivity shipped during this reporting period as a result of the SGRP was approximately 33 percent of the activity estimated in the SGRR. The remaining LLW generated is expected to be expeditiously shipped to a licensed burial facility.

## 5.0. CONCLUSIONS

5.1 The following conclusions are based on information contained in this report:

5.1.1 Based on the activities completed to date, the actual personnel exposure accumulated is significantly lower than the original estimated exposure (i.e., 1028.457 and 1926, respectively). With the SGRP in progress for approximately 26 weeks, the exposure accumulated to date for activities completed indicates that the planning for this project has served to provide a higher level of productivity with reduced personnel exposure. In addition, the use of temporary shielding has proven more effective than originally estimated. It is expected that this exposure trend will continue throughout the project. The final report will address any changes in exposure trends and the contributing factors applied to such changes.

5.1.2 Radioactive liquid effluents released are well within technical specification limits. The calculated activity (excluding tritium and gases) is approximately 0.09, 0.02, and 0.16 percent of 10CFR20, Table B, Column 2, limit for unidentified MPC for May, June, and July. The

tritium activity was approximately 0.0009, 0.00007, and 0.0005 percent of 10CFR20, Table B, Column 2, limit for May, June, and July, respectively.

5.1.3 Airborne releases of gaseous radioactivity attributed to repair project activities decreased to nondetectable as the project progressed. The airborne activity discharged through the entire repair effort has been maintained ALARA and well below the technical specification limits.

5.1.4 Solid low-level radioactive waste generated to date (excluding the SGLAs) for the SGRP represents approximately 83 percent of the volume estimate provided in the SGRR. The total quantity of activity shipped was significantly below the activity estimated in the SGRR.

5.2 In order to coincide with the routine preliminary radioactive effluent release reports generated at the plant site, subsequent SGRP radiological progress reports will present information based on the reporting periods used at the plant site. Therefore, the final progress report will contain information from February 1, 1984, through project completion.

TABLE 1

## Description of Major Tasks

Reporting Period February 1, 1984, through July 31, 1984

H.B. Robinson--Unit 2

TASK	TASK DESCRIPTION
1. Construction of pedestal cranes, preparation of polar crane, miscellaneous cribbing platforms, and steam generator transfer platform.	This task included work associated with installing pedestal cranes, performing maintenance, repairing and upgrading polar crane capacity, and installing skid beams and associated cribbing at the equipment hatch for the steam generator transfer.
2. Initial containment decontamination.	This task included the general area decontamination of the containment after insulation removal from the steam generators, associated piping, and equipment.
3. Concrete and structural steel removal and replacement.	This task included the work associated with removal and replacement of concrete and structural steel.
4. Defueling and fuel storage.	This task included the disassembly of the reactor vessel head, removal of the head from the reactor pressure vessel, removal of the fuel from the pressure vessel, and transferring to spent-fuel storage, reactor vessel head replacement, and decontamination of the refueling cavity.



TABLE 1 (continued)

## Description of Major Tasks

Reporting Period February 1, 1984, through July 31, 1984

H.B. Robinson--Unit 2

TASK	TASK DESCRIPTION
5. Installation and removal of shielding.	This task includes the installation and removal of temporary shielding to include piping, shadow, steam generator platform, and steam generator channel head shields.
6. Installation, maintenance, and removal of scaffolding, and temporary lighting and power.	This task includes the installation, maintenance, and removal of temporary scaffolding, lighting and power, and service and breathing air.
7. Installation, maintenance, and removal of contamination containments and temporary ventilation systems.	This task includes the installation and removal of contamination containments and associated air filtration treatment and handling equipment.
8. Removal of insulation.	This task included the removal of insulation from the steam generators and connecting piping.
9. Removal of main steam piping.	This item included the removal of the main steam piping from the steam generators and relocating the piping to a low-radiation area outside the containment for refurbishing.

TABLE 1 (continued)

## Description of Major Tasks

Reporting Period February 1, 1984, through July 31, 1984

H.B. Robinson--Unit 2

TASK	TASK DESCRIPTION
10. Removal of feedwater piping.	This item included removing the feedwater piping from the steam generators and relocating the piping to a low-radiation area outside the containment for refurbishing.
11. Removal of miscellaneous piping.	This item included the removal of blow-down valves and CVCS piping.
12. Cutting and removing steam generator upper assembly.	This item included preparing the steam dome internals for removal, cutting and removing level transmitters, removing steam dome manways, plasma arc cutting of the steam domes from the lower assemblies, and removing the steam domes from containment for refurbishing.
13. Cutting of channel head.	This task included setting up the cutting equipment and performing the separation cuts on the channel head and divider plate.

TABLE 1 (continued)

## Description of Major Tasks

Reporting Period February 1, 1984, through July 31, 1984

H.B. Robinson--Unit 2

TASK	TASK DESCRIPTION
14. Weld shield cover on lower assembly at:  a. Channel head  b. Transition end	This task included the installation of heaters and blankets on both ends of the lower assembly and welding cover plates in place. Also included was removing handhold covers and blowdown nozzles and welding shield plugs over these openings.
15. Removal of steam generator lower assembly.	This task included moving the lower assembly from the operating floor to the equipment hatch, loading the lower assembly onto the "J" frame, and moving the lower assembly from the containment to the outside loading platform.
16. Lateral support ring removal.	This task included cutting and removing the lateral support ring bolts, removing snubbers, and spreading the lateral support ring to facilitate lifting the lower assembly.
17. Channel head decontamination.	This task included removal of manway strong backs and diaphragms; the setup, operation, and removal of the aluminum grit decontamination equipment; the setup, operation, and removal of the spent grit handling equipment; and the setup, operation, and removal of the spent grit solidification system.

TABLE 1 (continued)

## Description of Major Tasks

Reporting Period February 1, 1984, through July 31, 1984

H.B. Robinson--Unit 2

TASK	TASK DESCRIPTION
18. Refurbishment of upper assembly.	This task included decontaminating the exterior of the steam domes, welding preparation of the steam domes, removing and replacing steam domes feedwater ring, and modifying moisture separator devices.
19. Installation of lower assembly prep and weld channel head.	This task included weld preparation of the channel heads, rigging and moving the new steam generators into place, setting up and removing heaters and blankets, preheating and postheating lower assemblies and channel heads, and performing girth welding.
20. Weld divider plates.	This task included preparing the divider plate welding surfaces for welding and performing the divider plate welds.
21. Installing and welding upper assembly.	This task included rigging and moving the steam generator upper assembly into containment, setting up and removing heaters and blankets, preheating and postheating upper and lower assemblies, and performing girth welding.

TABLE 1 (continued)

## Description of Major Tasks

Reporting Period February 1, 1984, through July 31, 1984

H.B. Robinson--Unit 2

TASK	TASK DESCRIPTION
22. Lateral support ring installation.	This task includes compressing the lateral support ring and installing lateral support ring bolts and snubbers.
23. Install main steam piping.	This task included moving the main steam lines into place; installing heaters and blankets; and preheating, postheating, and welding main steam-line piping.
24. Install feedwater piping.	This item included moving the feedwater piping into place; installing heaters and blankets; and preheating, postheating, and welding feedwater piping.
25. Install insulation.	This item includes installation of insulation on all steam generators and associated piping.
26. Install miscellaneous piping.	This task includes the installation of blowdown valves and CVCS piping.
27. Nonmanuals, (HP, QA, engineering, supervision, administration, etc.)	This category includes the support required throughout the repair project period for nonmanual personnel.

TABLE 1 (continued)

## Description of Major Tasks

Reporting Period February 1, 1984, through July 31, 1984

H.B. Robinson--Unit 2

TASK	TASK DESCRIPTION
28. Ongoing decon/cleanup, and disposal of contaminated material.	This task includes continuing decontamination of contaminated materials and removing and disposing through the repair project period.
29. Miscellaneous testing/inspections.	This item encompasses the surveillance requirements for primary and secondary hydrostatic testing.
30. Steam generator storage activities.	This task included rigging and transporting the steam generators to the storage facility and placing the steam generators into and sealing the storage facility.
31. Miscellaneous (work not covered in Tasks 1 through 30).	This category includes tasks such as decontaminating, inspecting, and general maintenance in areas outside containment; general maintenance inside the containment building; laundry operations; containment building inspections; moving tools and equipment into and out of the containment building; and disconnecting and shipping the reactor coolant pump motors for refurbishment.

TABLE 2

Personnel Exposure Summary Per Task  
for Steam Generator Replacement

Reporting Period February 1, 1984, through July 31, 1984

H.B. Robinson--Unit 2

TASK DESCRIPTION	PERSONNEL EXPOSURE* (MAN-REM)		% TASK COMPLETE
	ESTIMATED	ACTUAL	
1. Construction of pedestal cranes, preparation of polar crane, miscellaneous cribbing platforms, and steam generator transfer platform.	25	6.475	100
2. Initial containment decontamination.	20	10.975	100
3. Concrete and structural steel removal and replacement.	20	12.150	100
4. Defueling and fuel storage.	40	34.275	100
5. Installation and removal of shielding.	145	13.075	60
6. Installation, maintenance, and removal of scaffolding, temporary lighting, and power.	185	64.050	80

\*Actual exposures are estimated by self-reading pocket dosimeter totals.

TABLE 2 (continued)

Personnel Exposure Summary Per Task  
for Steam Generator Replacement

Reporting Period February 1, 1984, through July 31, 1984

H.B. Robinson--Unit 2

TASK DESCRIPTION	PERSONNEL EXPOSURE* (MAN-REM)		% TASK COMPLETE
	ESTIMATED	ACTUAL	
7. Installation, maintenance, and removal of contamination containments and temporary ventilation systems.	30	23.850	95
8. Removal of insulation.	85	25.250	100
9. Removal of main steam piping.	5	1.500	100
10. Removal of feedwater piping.	5	1.000	100
11. Removal of miscellaneous piping.	70	3.780	100
12. Cutting and removing steam generator upper assembly.	80	4.975	100
13. Cutting of channel head.	95	30.600	100
14. Weld shield cover on lower assembly at:			
a. Channel head	10	8.650	100
b. Transition end	10	1.975	100

\*Actual exposures are estimated by self-reading pocket dosimeter totals.



TABLE 2 (continued)

Personnel Exposure Summary Per Task  
for Steam Generator Replacement

Reporting Period February 1, 1984, through July 31, 1984

H.B. Robinson--Unit 2

TASK DESCRIPTION	PERSONNEL EXPOSURE* (MAN-REM)		% TASK COMPLETE
	ESTIMATED	ACTUAL	
15. Removal of steam generator lower assembly.	25	5.850	100
16. Lateral support ring removal.	25	13.575	100
17. Channel head decontamination.	105	74.440	100
18. Refurbishment of upper assembly.	20	1.775	100
19. Installation of lower assembly prep and weld channel head.	310	212.215	100
20. Weld divider plates.	80	32.500	100
21. Installing and welding upper assembly.	15	10.860	100
22. Lateral support ring installation.	45	1.875	90
23. Installed main steam piping.	5	0.075	100

\*Actual exposures are estimated by self-reading pocket dosimeter totals.

TABLE 2 (continued)

Personnel Exposure Summary Per Task  
for Steam Generator Replacement

Reporting Period February 1, 1984, through July 31, 1984

H.B. Robinson--Unit 2

TASK DESCRIPTION	PERSONNEL EXPOSURE* (MAN-REM)		% TASK COMPLETE
	ESTIMATED	ACTUAL	
24. Installed feedwater piping.	10	0.175	100
25. Install insulation.	100	24.550	90
26. Install miscellaneous piping.	75	7.250	85
27. Nonmanuals, (HP, QA, engineering, supervision, administration, etc.)	295	154.495	90
28. Ongoing decon/cleanup and disposal of contaminated material.	150	126.678	90
29. Miscellaneous testing/inspections.	5	1.000	50
30. Steam generator storage activities.	30	8.325	100
31. Miscellaneous	--	109.239	90
TOTAL	2120	1028.457	

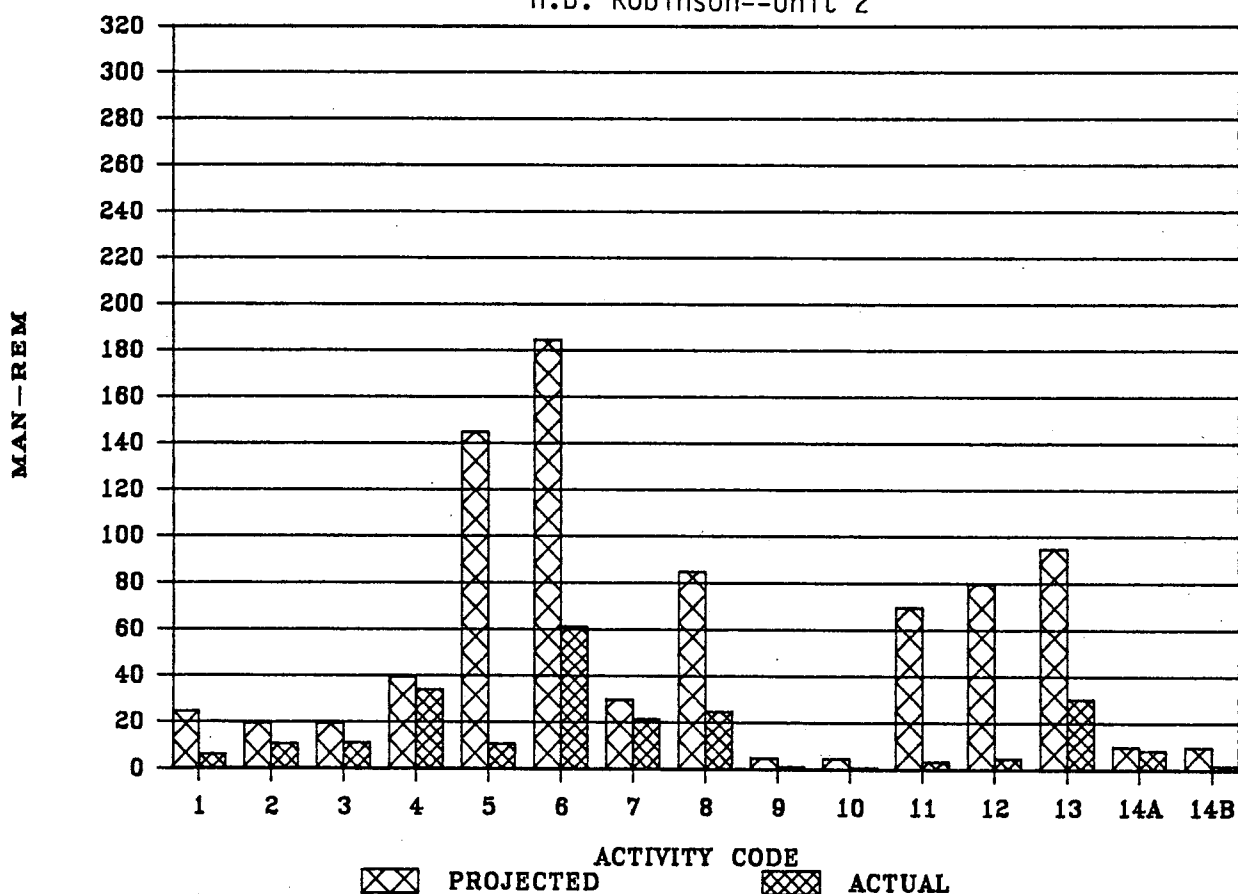
\*Actual exposures are estimated by self-reading pocket dosimeter totals.

TABLE 2 (continued)

Personnel Exposure Summary Per Task  
for Steam Generator Replacement

Reporting Period February 1, 1984, through July 31, 1984

H.B. Robinson--Unit 2



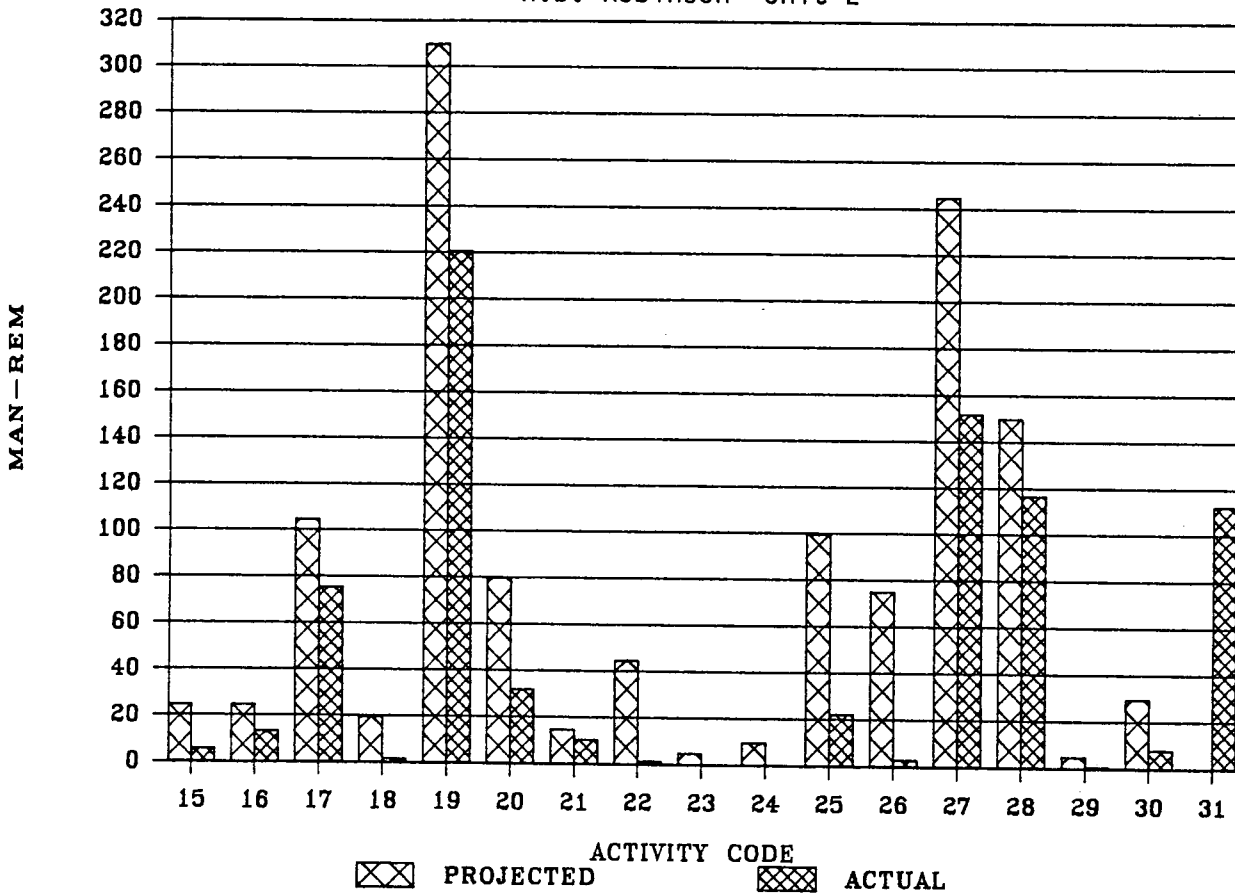
1. Construction of pedestal cranes, preparation of polar crane, misc. cribbing platforms and S/G xfer platform.
2. Initial containment decontamination.
3. Concrete and structural steel removal and replacement.
4. Defuel and fuel storage.
5. Installation and removal of shielding.
6. Installation, maint. and removal of scaffolding, temp. lighting and power.
7. Installation, maint. and removal of contaminated containments and temp. ventillation systems.
8. Removal of insulation.
9. Removal of main steam piping.
10. Removal of feedwater piping.
11. Removal of misc. piping.
12. Cutting and removal of S/G upper assembly.
13. Cutting of channel head.
- 14A. Weld shield cover on lower assembly at channel head.
- 14B. Weld shield cover on lower assembly at transition end.

Table 2 (continued)

Personnel Exposure Summary Per Task  
for Steam Generator Replacement

Reporting Period February 1, 1984, through July 31, 1984

H.B. Robinson--Unit 2



15. Removal of steam generator lower assembly.
16. Lateral support ring removal.
17. Channel head decontamination.
18. Refurbishment of upper assembly.
19. Installation of lower assembly prep and weld channel head.
20. Weld divider plates.
21. Installation and welding of upper assembly.
22. Lateral support ring installation.
23. Install mainsteam piping.
24. Install feedwater piping.
25. Install insulation.
26. Install misc. piping.
27. Nonmanuals (HP, QA, Eng., supervision, administration, etc.)
28. Ongoing decon/clean up & disposal of contaminated material.
29. Misc. testing/inspection.
30. S/G storage activities.
31. Misc. work not covered in the above tasks.

TABLE 3

Detailed Summary of Activity Exposures  
 Reporting Period May 1, 1984, to July 31, 1984  
 H.B. Robinson--Unit 2

ACTIVITY DESCRIPTION	PROJECTED EXPOSURE (Man-Rem)	ACTUAL EXPOSURE FOR REPORTING PERIOD (Man-Rem)	ACTUAL EXPOSURE EXPENDED TO DATE (Man-Rem)	ACTIVITY STATUS (C--complete) (I--in progress)
1. Construction of pedestal cranes, polar crane work, miscellaneous cribbing platforms, and steam generator transfer platforms.	25	2.875	6.475	
a. Installed pedestal cranes.		0.025	0.225	C
b. Bush hammered concrete for pedestal crane.		0	0.650	C
c. Disassembled manipulator crane.		2.200	2.725	C
d. Installed cavity platform.		0.100	2.150	C
e. Installed and removed skid beams.		0	0.175	C
f. Rewired polar crane.		0.550	0.550	C
2. Initial containment decontamination.	20	0	10.975	
a. CV--all levels.		0	6.550	C
b. CV--pump bays.		0	4.425	C

TABLE 3 (continued)

Detailed Summary of Activity Exposures  
Reporting Period May 1, 1984, to July 31, 1984  
H.B. Robinson--Unit 2

ACTIVITY DESCRIPTION	PROJECTED EXPOSURE (Man-Rem)	ACTUAL EXPOSURE FOR REPORTING PERIOD (Man-Rem)	ACTUAL EXPOSURE EXPENDED TO DATE (Man-Rem)	ACTIVITY STATUS (C--complete) (I--in progress)
3. Concrete and structural steel removal and replacement.	20	3.350	12.150	
a. "A" pump bay chip concrete.		0	4.475	C
b. Head storage area cut concrete.		0	0.150	C
c. Cut "A," "B," and "C" steam generator bioshield walls.		0	2.525	C
d. Removed structural steel above equipment hatch.		0	0.325	C
e. Cut and removed steel platform by elevator.		0	0.375	C
f. Core bore and wet cut "A," "B," and "C" steam generator bioshield walls.		0	0.950	C
g. Replaced head storage concrete.		0.650	0.650	C
h. Replaced concrete in "A" pump bay.		1.925	1.925	C
i. Replaced structural steel and paint.		0.750	0.750	C
j. Replaced biowalls on "A," "B," and "C" steam generator.		0.025	0.025	C

TABLE 3 (continued)

Detailed Summary of Activity Exposures  
Reporting Period May 1, 1984, to July 31, 1984  
H.B. Robinson--Unit 2

ACTIVITY DESCRIPTION	PROJECTED EXPOSURE (Man-Rem)	ACTUAL EXPOSURE FOR REPORTING PERIOD (Man-Rem)	ACTUAL EXPOSURE EXPENDED TO DATE (Man-Rem)	ACTIVITY STATUS (C--complete) (I--in progress)
4. Defueling and fuel storage.	40	0	34.275	
a. Changed out Detectors N-31 and N-36.		0	0.775	C
b. Decon internals lifting rig.		0	1.625	C
c. Removed missile shield, cable trays, and duct work.		0	0.700	C
d. Removed insulation, conoseals, disconnected thermocouples and detention, and removed stud bolts.		0	19.900	C
e. Changed out air motor on transfer system.		0	0.325	C
f. Repaired stud hoist.		0	0.225	C
g. Painted cavity floor.		0	0.400	C
h. Retracted flux thimbles.		0	0.225	C
i. Removed and replaced blind flange.		0	0.975	C
j. Installed cavity filter.		0	0.250	C
k. Lifted and stored reactor head.		0	3.225	C
l. Removed and replaced upper internals.		0	0.775	C
m. CV defueled.		0	0.775	C
n. SFP moved fuel and inspected.		0	0.400	C

TABLE 3 (continued)

Detailed Summary of Activity Exposures  
 Reporting Period May 1, 1984, to July 31, 1984  
 H.B. Robinson--Unit 2

ACTIVITY DESCRIPTION	PROJECTED EXPOSURE (Man-Rem)	ACTUAL EXPOSURE FOR REPORTING PERIOD (Man-Rem)	ACTUAL EXPOSURE EXPENDED TO DATE (Man-Rem)	ACTIVITY STATUS (C--complete) (I--in progress)
o. Miscellaneous CV work.		0	0.200	C
p. Miscellaneous SFP work.		0	0.200	C
q. Decon cavity.		0	3.300	C
5. Installation and removal of shielding. 145		5.925	13.075	
a. CV all areas.		5.925	12.625	I
b. Steam generator bowls.		0	0.450	C
6. Installation, maintenance, and removal 185 of scaffolding, temporary lighting, power, temporary service, and breathing air.		16.175	64.050	
a. CV installed temporary lighting.		6.525	22.275	C
b. CV installed temporary breathing air.		0.175	5.700	C
c. Erected scaffolds for lateral support work.		0	5.100	C
d. Erected channel head platforms.		5.400	15.525	C
e. Sorted and transported scaffold.		0	0.025	C



TABLE 3 (continued)

Detailed Summary of Activity Exposures  
 Reporting Period May 1, 1984, to July 31, 1984  
 H.B. Robinson--Unit 2

ACTIVITY DESCRIPTION	PROJECTED EXPOSURE (Man-Rem)	ACTUAL EXPOSURE FOR REPORTING PERIOD (Man-Rem)	ACTUAL EXPOSURE EXPENDED TO DATE (Man-Rem)	ACTIVITY STATUS (C--complete) (I--in progress)
f. Erect and remove scaffold in pump bays.		3.550	4.375	I
g. Erected and removed scaffold around steam domes.		0.525	0.775	C
h. Installed and removed scaffold for insulation removal.		0	10.275	C
7. Installation, maintenance, and removal of contamination containments and temporary ventilation systems.	30	7.325	23.850	
a. Installed stand-under HEPA filters.		0	0.025	C
b. Erect and remove duct work.		2.550	16.750	I
c. Installed air handling equipment.		4.775	7.075	C
8. Removal of insulation.	85	0	25.250	
a. Removed insulation from "A," "B," "C" steam generators.		0	19.150	C
b. Supported insulation removal on all levels of CV.		0	6.100	C

TABLE 3 (continued)

Detailed Summary of Activity Exposures  
 Reporting Period May 1, 1984, to July 31, 1984  
 H.B. Robinson--Unit 2

ACTIVITY DESCRIPTION	PROJECTED EXPOSURE (Man-Rem)	ACTUAL EXPOSURE FOR REPORTING PERIOD (Man-Rem)	ACTUAL EXPOSURE EXPENDED TO DATE (Man-Rem)	ACTIVITY STATUS (C--complete) (I--in progress)
9. Removal of main steam piping.	5	0	1.500	
a. Set up, cut, and removed main steam piping.		0	1.500	C
10. Removal of feedwater piping.	5	0	1.000	
a. Set up, cut, and removed feedwater piping.		0	1.000	C
11. Removal of miscellaneous piping.	70	0	3.780	
a. Cut and removed steam generator blowdown line valve.		0	0.580	C
b. Cut and removed CVCS line and cap.		0	1.675	C
c. Installed indication on blowdown lines.		0	1.525	C
12. Cutting and removal of steam generator upper assemblies.	80	0	4.975	

TABLE 3 (continued)

Detailed Summary of Activity Exposures  
Reporting Period May 1, 1984, to July 31, 1984  
H.B. Robinson--Unit 2

ACTIVITY DESCRIPTION	PROJECTED EXPOSURE (Man-Rem)	ACTUAL EXPOSURE FOR REPORTING PERIOD (Man-Rem)	ACTUAL EXPOSURE EXPENDED TO DATE (Man-Rem)	ACTIVITY STATUS (C--complete) (I--in progress)
a. Removed level transmitter valves on "A," "B," and "C" steam generator steam domes.		0	0.025	C
b. Cleaned transition weld on "A," "B," and "C" steam generators.		0	0.400	C
c. Removed steam generator secondary manways.		0	0.050	C
d. Buffed and MT lugs.		0	0.100	C
e. Installed and removed heater blankets.		0	1.125	C
f. Cut, welded, and ground steam generator transition welds.		0	0.925	C
g. Cut steam generator wrappers and removed steam domes.		0	2.350	C
13. Cutting of channel heads.	95	0	30.600	
a. Removed sample tubing.		0	1.550	C
b. Set up and cut channel heads.		0	15.525	C
c. Cut divider plates.		0	4.450	C

TABLE 3 (continued)

Detailed Summary of Activity Exposures  
Reporting Period May 1, 1984, to July 31, 1984  
H.B. Robinson--Unit 2

ACTIVITY DESCRIPTION	PROJECTED EXPOSURE (Man-Rem)	ACTUAL EXPOSURE FOR REPORTING PERIOD (Man-Rem)	ACTUAL EXPOSURE EXPENDED TO DATE (Man-Rem)	ACTIVITY STATUS (C--complete) (I--in progress)
d. Plunge cut, severance cut, and attached boot.		0	8.125	C
e. Painted outside area of steam generators.		0	0.950	C
14. Weld shield covers on lower assemblies.				
a. Channel head.	10	0	8.650	
1. Installed heater blankets.		0	3.200	C
2. Drained steam generators and welded nozzle plugs.		0	3.775	C
3. Buffed channel head weld.		0	1.675	C
b. Transition end.	10	0	1.975	
1. Ground and welded shield plate on top of generators.		0	1.975	C
15. Removal of steam generator lower assemblies.	25	0	5.850	
a. Installed shims on support legs.		0	0.550	C

TABLE 3 (continued)

Detailed Summary of Activity Exposures  
 Reporting Period May 1, 1984, to July 31, 1984  
 H.B. Robinson--Unit 2

ACTIVITY DESCRIPTION	PROJECTED EXPOSURE (Man-Rem)	ACTUAL EXPOSURE FOR REPORTING PERIOD (Man-Rem)	ACTUAL EXPOSURE EXPENDED TO DATE (Man-Rem)	ACTIVITY STATUS (C--complete) (I--in progress)
b. Rigged steam generators out of CV.		0	5.300	C
16. Lateral support ring removal.	25	0.075	13.575	
a. Cut and removed bolts to remove snubbers and spread ring.		0.075	13.400	C
b. Removed tubing.		0	0.175	C
17. Channel head decontamination.	105	0.400	75.440	
a. Assembled, disassembled, and operated Westinghouse decon equipment.		0	35.315	C
b. Assembled and disassembled spent grit system and solidified spent grit.		0	0.400	C
c. Removed strong backs and diaphragms from steam generator manways.		0	2.075	C

TABLE 3 (continued)

Detailed Summary of Activity Exposures  
 Reporting Period May 1, 1984, to July 31, 1984  
 H.B. Robinson--Unit 2

ACTIVITY DESCRIPTION	PROJECTED EXPOSURE (Man-Rem)	ACTUAL EXPOSURE FOR REPORTING PERIOD (Man-Rem)	ACTUAL EXPOSURE EXPENDED TO DATE (Man-Rem)	ACTIVITY STATUS (C--complete) (I--in progress)
d. Installed, maintained, and removed grits fixture, nozzle seats, and manway flanges.		0	37.250	C
e. Removed nozzle plugs and seal plugs from "C" hot leg.		0.400	0.400	C
18. Refurbishment of upper assemblies.	20	0.850	1.775	
a. Removed swirl vanes.		0	0.300	C
b. Reworked steam domes.		0.500	1.075	C
c. Radiography steam domes.		0.200	0.250	C
d. Reworked swirl vanes.		0.150	0.150	C
19. Installation of lower assemblies, prep, and weld channel head, preheat, and postheat.	310	193.965	212.215	
a. Cleaned steam generator channel heads, removed nozzle seats, inspected loop seals.		0	5.825	C

TABLE 3 (continued)

Detailed Summary of Activity Exposures  
 Reporting Period May 1, 1984, to July 31, 1984  
 H.B. Robinson--Unit 2

ACTIVITY DESCRIPTION	PROJECTED EXPOSURE (Man-Rem)	ACTUAL EXPOSURE FOR REPORTING PERIOD (Man-Rem)	ACTUAL EXPOSURE EXPENDED TO DATE (Man-Rem)	ACTIVITY STATUS (C--complete) (I--in progress)
b. Cut and machine snipped windows, cut out divider plate manways, installed heater blankets out- side on channel head and prep welded surface.		19.635	31.910	C
c. Rigged steam generators into CV.		0.100	0.250	C
d. Welded and inspected steam generator power girth.		73.355	73.355	C
e. Postwelded heat treatment steam generator lower girth weld.		68.275	68.275	C
f. Cleaned steam generator tubes.		23.050	23.050	C
g. Removed loop seals, cleaned and inspected the hot- and cold-leg piping.		9.475	9.475	C
h. Removed broken screws in manway diaphragm holes.		0.075	0.075	C
20. Welded divider plates.	80	32.500	32.500	C

TABLE 3 (continued)

Detailed Summary of Activity Exposures  
 Reporting Period May 1, 1984, to July 31, 1984  
 H.B. Robinson--Unit 2

ACTIVITY DESCRIPTION		PROJECTED EXPOSURE (Man-Rem)	ACTUAL EXPOSURE FOR REPORTING PERIOD (Man-Rem)	ACTUAL EXPOSURE EXPENDED TO DATE (Man-Rem)	ACTIVITY STATUS (C--complete) (I--in progress)
a. Welded divider plates and snipped holes.			32.500	32.500	C
21.	Installing and welding of upper assemblies, preheating, and postheating.	15	10.860	10.860	
	a. Rigged steam generator domes into CV and set.		0.075	0.075	C
	b. Welded steam generator upper girth and instrument lines, inspected, and postwelded heat treat weld.		10.785	10.785	C
22.	Lateral support ring installation.	45	1.875	1.875	
	a. Install lateral support ring.		1.875	1.875	I
23.	Install main steam piping.	5	0.075	0.075	
	a. Install, weld, and inspect main steam piping.		0.075	0.075	I
24.	Install feedwater piping.	10	0.175	0.175	



TABLE 3 (continued)

Detailed Summary of Activity Exposures  
 Reporting Period May 1, 1984, to July 31, 1984  
 H.B. Robinson--Unit 2

ACTIVITY DESCRIPTION	PROJECTED EXPOSURE (Man-Rem)	ACTUAL EXPOSURE FOR REPORTING PERIOD (Man-Rem)	ACTUAL EXPOSURE EXPENDED TO DATE (Man-Rem)	ACTIVITY STATUS (C--complete) (I--in progress)
a. Installed, welded, and inspected feedwater piping.		0.175	0.175	C
25. Install insulation.	100	24.550	24.550	
a. Install insulation in pump bays.		2.250	2.250	I
b. Install insulation on steam domes, feedwater, and main steam lines.		22.300	22.300	I
26. Install miscellaneous piping.	75	7.250	7.250	
a. Install CVCS lines.		7.025	7.025	I
b. Installed instrument tubing lines on steam generators.		0.225	0.225	C
27. Nonmanual (HP, QA, engineering, supervision, etc.)	295	60.595	154.720	
a. CV all levels HP surveillance.		49.470	106.720	I
b. CV pump bays HP surveillance.		0	19.675	I

TABLE 3 (continued)

Detailed Summary of Activity Exposures  
 Reporting Period May 1, 1984, to July 31, 1984  
 H.B. Robinson--Unit 2

ACTIVITY DESCRIPTION	PROJECTED EXPOSURE (Man-Rem)	ACTUAL EXPOSURE FOR REPORTING PERIOD (Man-Rem)	ACTUAL EXPOSURE EXPENDED TO DATE (Man-Rem)	ACTIVITY STATUS (C--complete) (I--in progress)
c. Inspections and surveillance.		11.125	28.100	I
28. Ongoing decon/cleanup and disposal of contaminated materials.	150	52.233	126.678	
a. Decon, cleanup, and trash removal.		50.358	122.003	I
b. Trash compaction, solidi- fication, and shipments.		1.626	4.425	I
c. Decon small tools.		0.250	0.250	I
29. Miscellaneous testing/inspections.	5	1.000	1.000	I
a. Secondary hydro.		1.000	1.000	C
30. Steam generator storage activities.	30	1.100	8.325	
a. Rigged and transported steam generator to tomb, placed in tank, and closed tomb doors.		1.100	8.325	C

TABLE 3 (continued)

Detailed Summary of Activity Exposures  
 Reporting Period May 1, 1984, to July 31, 1984  
 H.B. Robinson--Unit 2

ACTIVITY DESCRIPTION	PROJECTED EXPOSURE (Man-Rem)	ACTUAL EXPOSURE FOR REPORTING PERIOD (Man-Rem)	ACTUAL EXPOSURE EXPENDED TO DATE (Man-Rem)	ACTIVITY STATUS (C--complete) (I--in progress)
31. Miscellaneous work not covered in the above task.		55.164	109.239	
a. Decon respirator.		0.900	1.625	I
b. General maintenance in areas outside the containment build- ing.		6.230	10.930	I
c. General maintenance in the containment building.		25.230	59.205	I
d. Sort and clean laundry.		0.195	0.870	I
e. Containment building hands-on inspection.		22.059	29.934	I
f. Containment building issue tools.		0.525	0.700	I
g. Moved equipment into cavity.		0	2.075	C
h. Remove equipment from con- tainment building.		0.100	2.975	I

TABLE 3 (continued)

Detailed Summary of Activity Exposures  
Reporting Period May 1, 1984, to July 31, 1984  
H.B. Robinson--Unit 2

ACTIVITY DESCRIPTION	PROJECTED EXPOSURE (Man-Rem)	ACTUAL EXPOSURE FOR REPORTING PERIOD (Man-Rem)	ACTUAL EXPOSURE EXPENDED TO DATE (Man-Rem)	ACTIVITY STATUS
				(C--complete) (I--in progress)
i. Disconnected and removed reactor coolant pump motors from containment and shipped.		0	1.000	C
TOTALS	2120	478.317	1028.457	

TABLE 4

Summary of Activity--Exposures Other Than  
 Steam Generator Replacement Activities  
 Reporting Period May 1, 1984, to July 31, 1984  
 H.B. Robinson--Unit 2

ACTIVITY DESCRIPTION	PROJECTED EXPOSURE (Man-Rem)	ACTUAL EXPOSURE FOR REPORTING PERIOD (Man-Rem)	ACTUAL EXPOSURE EXPENDED TO DATE (Man-Rem)	ACTIVITY STATUS (C--complete) (I--in progress)
1. Steam generator eddy current inspection prior to commencing SGR activities.		0	35.650	C
2. In-service inspection including removal of insulation, prep welds, and seismic design verification.		30.013	117.788	I
3. Plant modifications other than steam generator replacement.		435.601	451.361	I
4. Miscellaneous inspection, coverage, and work not covered in the above item or the steam generator replace- ment activities.		83.715	184.315	I
TOTAL		549.329	789.114	

TABLE 5

## Summary of Radioactive Effluent Releases

Reporting Period May 1, 1984, through July 31, 1984

H.B. Robinson--Unit 2

LIQUID EFFLUENT RELEASES				RADIOACTIVITY RELEASED IN LIQUID EFFLUENTS (CURIES)	
RADIONUCLIDE	MAY	JUNE	JULY	TOTAL ACTIVITY RELEASED THIS REPORTING PERIOD	TOTAL RELEASED DURING S/G REPAIR TO DATE
Ag-110m	1.40 E-05	6.14 E-06	8.85 E-05	1.09 E-04	3.82 E-04
Co-58	6.87 E-06	1.50 E-05	1.73 E-04	1.95 E-04	2.76 E-03
Co-60	1.99 E-05	2.76 E-04	1.88 E-03	2.18 E-03	9.28 E-03
Cs-134	*	1.76 E-06	2.84 E-05	3.02 E-05	7.96 E-04
Cs-136	*	*	*	*	*
Cs-137	4.49 E-07	5.24 E-06	7.50 E-05	8.07 E-05	1.33 E-03
I-131	*	*	*	*	2.26 E-04
I-133	*	*	*	*	*
Sb-124	*	*	*	*	1.12 E-03
Mn-54	*	4.10 E-06	1.96 E-05	2.37 E-05	1.02 E-04
Others**	9.28 E-07	*	*	9.28 E-07	2.91 E-04
TOTAL	4.21 E-05	3.08 E-04	2.26 E-03	2.61 E-03	1.63 E-02
Tritium Released (curies)	1.26 E-02	2.97 E-02	1.92 E-01	2.34 E-01	3.30 E-00
Liquid Effluent Volume Released (liters)	8.66 E+04	1.64 E+05	2.51 E+05	VOLUME RELEASED THIS REPORTING PERIOD 5.02 E+05	VOLUME RELEASED DURING S/G REPAIR TO DATE 1.23 E+06

\*Not detectable.

\*\*Others include Na-24, Nb-95, Cr-51, F-18, Te-132, Nb-97.

TABLE 5 (continued)

## Summary of Radioactive Effluent Releases

Reporting Period May 1, 1984, through July 31, 1984

H.B. Robinson--Unit 2

AIRBORNE RELEASES		RADIOACTIVITY RELEASED IN AIRBORNE EFFLUENTS (CURIES)			TOTAL ACTIVITY RELEASED THIS REPORTING PERIOD	TOTAL RELEASED DURING S/G REPAIR TO DATE
A. NOBLE GASES						
RADIONUCLIDE	MAY	JUNE	JULY			
Ar-41	*	*	*	*	*	
Kr-85	*	*	*			4.96 E-02
Kr-85m	*	*	*	*	*	
Kr-88	*	*	*	*	*	
Xe-131m	*	*	*			2.04 E-02
Xe-133	*	*	*			8.07 E+00
Xe-133m	*	*	*			3.44 E-03
Xe-135	*	*	*	*	*	
Xe-135m	*	*	*	*	*	
TOTAL	0	0	0	0	0	8.15 E+00
TRITIUM	1.24 E-02	2.23 E-01	1.04 E-01		3.39 E-01	8.97 E-01
B. HALOGENS						
I-131	*	*	*	*	*	1.52 E-04
I-133	*	*	*	*	*	*
TOTAL	0	0	0		0	1.52 E-04

\*Not detectable.

TABLE 5 (continued)

## Summary of Radioactive Effluent Releases

Reporting Period May 1, 1984, through July 31, 1984

H.B. Robinson--Unit 2

AIRBORNE RELEASES		RADIOACTIVITY RELEASED IN AIRBORNE EFFLUENTS (CURIES)			TOTAL ACTIVITY RELEASED THIS REPORTING PERIOD	TOTAL RELEASED DURING S/G REPAIR TO DATE
C. PARTICULATES						
RADIONUCLIDE	MAY	JUNE	JULY			
Ba-140	*	*	*		*	*
Co-57	*	*	*		*	*
Co-58	*	*	*		*	8.83 E-08
Co-60	*	*	*		*	4.41 E-06
Cr-51	*	*	*		*	*
Cs-134	*	*	*		*	*
Cs-136	*	*	*		*	*
Cs-137	*	*	*		*	*
I-131	*	*	*		*	*
La-140	*	*	*		*	*
Mn-54	*	*	*		*	*
Nb-95	*	*	*		*	*
Ru-103	*	*	*		*	*
TOTAL	0	0	0		0	4.50 E-06

\*Not detectable.



TABLE 6

## Summary of Solid Low-Level Radioactive Waste

Reporting Period May 1, 1984, through July 31, 1984

H.B. Robinson--Unit 2

## I. SOLID LOW-LEVEL RADIOACTIVE WASTE GENERATED FROM STEAM GENERATOR REPAIR

WASTE FORM	VOLUME LLW* IN CU FT FOR REPORTING PERIOD	VOLUME LLW IN CU FT TO DATE
Compacted Dry-Active Waste	8869	14319
Noncompacted Dry-Active Waste	13965	32080
Resin and Filter Media	0	240
Channel Head Decontamination Waste	0	595
Miscellaneous (Evaporator Bottoms)	0	2317
Totals	22834	49551

## II. SOLID LOW-LEVEL REPAIR ACTIVITY WASTE SHIPPED

REPORTING PERIOD DATE	VOLUME LLW* SHIPPED FOR REPORTING PERIOD	ESTIMATED ACTIVITY** CURIES
May 1, 1984--July 31, 1984	34844	52.742

\*LLW low-level (radioactive) waste.

\*\*Predominant radionuclides  $^{137}\text{Cs}$ ,  $^{60}\text{Co}$ ,  $^{58}\text{Co}$ ,  $^{51}\text{Cr}$ ,  $^{55}\text{Fe}$ ,  $^{95}\text{Nb}$ .