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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 third and final 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 February 1, 1984, through October 31, 1984.

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

Very truly yours,

RGMorgan for

Guy P. Beatty, Jr.
Manager
Robinson Nuclear Project Department

DBB/tk

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

A001

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STEAM GENERATOR REPAIR PROGRAM

FOR

H.B. ROBINSON UNIT 2

FINAL RADIOLOGICAL PROGRESS REPORT 3

FOR THE PERIOD

FEBRUARY 1, 1984, THROUGH OCTOBER 31, 1984

DOCKET 50-261

LICENSE NO. DPR-23

CAROLINA POWER & LIGHT COMPANY

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1.0 INTRODUCTION

1.1 The final Radiological Progress Report 3 is the last report submitted on the Unit 2 Steam Generator Repair Program for the H.B. Robinson Steam Electric Plant. This final report provides 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.

1.2.1 Construction of pedestal cranes, preparation of polar crane, and steam generator transfer platform.

- Installed pedestal cranes.
- Performed maintenance and repairs on the polar crane.
- Installed steam generator skid beams at the equipment hatch.

1.2.2 Initial containment decontamination.

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

1.2.3 Concrete and structural steel removal and replacement.

- Removed and replaced the concrete and structural steel including scaffolding erection.

1.2.4 Defueling and fuel storage.

- 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.

1.2.5 Installation and removal of temporary shielding.

- Installed piping shields.
- Installed shadow shields.
- Installed steam generator platform shields.
- Installed steam generator channel head shielding.

1.2.6 Installation, maintenance, and removal of scaffolding, temporary lighting, power, and air conditioning.

- Constructed and removed temporary scaffolding.
- Installed and removed temporary lighting and power.
- Installed and removed temporary service and breathing air.
- Installed and removed temporary air conditioning systems.

1.2.7 Installation, maintenance, and removal of contamination containments and temporary ventilation systems.

- Installed and removed contamination control tents and associated air filtration treatment and handling equipment.

1.2.8 Removal of insulation.

- Removed insulation from steam generators and connecting piping.

1.2.9 Removal of main steam piping.

- Removed main steam piping.

1.2.10 Removal of feedwater piping.

- Removed feedwater piping.

1.2.11 Removal of miscellaneous piping.

- Removed blowdown valves.
- Removed CVCS line.

1.2.12 Cutting and removal of steam generator upper assembly.

- 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.

1.2.13 Cutting of channel head.

- Set up cutting equipment.
- Cut divider plate.
- Cut lower assembly from channel head.
- Rigged and moved lower assembly to operating deck.

1.2.14 Weld shield covers on lower assembly at:

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.

1.2.15 Removal of steam generator lower assembly.

- Moved lower assemblies from operating deck to equipment hatch.
- Moved lower assemblies from containment.

1.2.16 Lateral support ring removal.

- Cut and removed bolts.
- Removed snubbers.
- Spread lateral support ring.

1.2.17 Channel head decontamination.

- Removed manway strong backs and diaphrams.
- 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.

1.2.18 Refurbishment of upper assembly.

- Decontamination of the outside of the dome.

- Weld prepped domes.
- Removed and replaced feedwater ring.
- Modified moisture separator devices.

1.2.19 Installation of lower assemblies, prep, and weld channel head.

- Weld prepped channel head.
- Rigged and moved steam generators into place.
- Set up and removed heaters and blankets.
- Preheated and performed girth weld.

1.2.20 Prep and weld divider plate.

1.2.21 Installation and welding of upper assemblies.

- Rigged and moved upper assemblies into containment.
- Moved upper assemblies into place.
- Set up and removed heaters and blankets.
- Preheated and performed girth weld.

1.2.22 Lateral support ring installation.

- Replaced lateral support rings.
- Replaced snubbers.
- Replaced lateral support ring bolts.

1.2.23 Install main steam piping.

- Replaced main steam-line piping.

1.2.24 Install feedwater piping.

- Replaced feedwater piping.

1.2.25 Install insulation.

- Installed insulation on all generators.

1.2.26 Install miscellaneous piping.

- Replaced blowdown valves.
- Replaced CVCS line.

1.2.27 Nonmanuals, (HP, QA, engineering, supervision, administration, etc.).

- Nonmanual support personnel.

1.2.28 Ongoing decon/cleanup and disposal of contaminated materials.

- Decontamination during the outage.
- Contaminated materials removed and disposed of during the outage.

1.2.29 Miscellaneous testing/inspections.

- Primary system hydro.
- Secondary system hydro.

1.2.30 Steam generator storage activities.

- Rigged and transported steam generators to storage facility.
- Placed steam generators into storage facility.
- Sealed storage facility.

1.2.31 Miscellaneous (work to support the steam generator repair project not included in the above task).

- Radiation controlled area inspections.
- General maintenance in the radiation controlled areas.
- Laundry operation functions.
- Tool and equipment issue and movement.

2.0 OCCUPATIONAL RADIATION EXPOSURE

2.1 General.

2.1.1 During the Steam Generator Repair Project, the minimization of occupational radiation exposure was of prime importance to CP&L. 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 was assessed and the cumulative exposure was tracked for each major task.

2.2 Description of exposure data collection program.

2.2.1 To assess man-rem expenditure, exposure data was 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 was composed of a number of subtasks controlled by a construction document called a technical procedure. Each technical procedure detailed the activity to be performed. The technical procedure was reviewed by health physics to incorporate ALARA recommendations. The necessary radiation work permits

(RWPs) were generated prior to starting the subtask. The RWPs generated for each subtask of a major task provided a composite summary of estimated man-rem expenditure through self-reading pocket dosimetry entries. Repair work not requiring technical procedures and specific documentation was categorized into one of the major tasks and radiologically controlled with an appropriate RWP.

2.2.3 Radiation exposures were 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.

2.3.1 The composite summary of worker exposure recorded on RWPs was totaled for all RWPs assigned to a major task. The composite self-reading pocket dosimetry exposure estimates recorded on RWPs assigned to a subtask were utilized to evaluate actual exposure expenditure as compared to exposure forecast. This method proved to be effective and provided a conservative day-to-day estimate. This method was 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 completion and compares them to the original exposure estimates. Pages 30 and

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*SRPD exposure results were 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.

31 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 repair project along with the original estimate for that subordinate task.

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 was approximately 57 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 completion (February 1, 1984, through October 31, 1984) was 1207 man-rem. This value can be compared directly to the original estimates which resulted in a projected exposure of 2120 man-rem. 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, reactor coolant pump motor removal and replacement, assembly and disassembly of reactor head for hydro, removal and replacement of the control rod drive shafts, and laundry activities. The actual exposure for the third reporting period is listed in Table 3 and is 178 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 were 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 resulted in significant exposure reduction during the repair project. Shielding records were maintained and included 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. Various components of the steam generator channel head grit blast system were also shielded to reduce exposure rates in the local work area prior to commencement of this activity. The grit blast controls and feed system were remotely located in low-exposure rate areas.

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 the repair project were:

- Most of the insulation was removed before the intense containment decontamination effort without the need to erect numerous local protective containments.
- 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 outside of containment in essentially background radiation areas.
- Steam generator channel head divider plate cuts were performed with a remotely operated robotic arm.
- The steam generator channel heads were deconned using an alumina grit blast decontamination method which yielded decontamination factors $\geq$ 12.
- Steam generator channel head weld preparation was performed utilizing a computerized automated machining device, therefore, greatly reducing manpower requirements in this relatively high-exposure rate area. The weld bevel was machined such that the majority of the welding effort was performed outside of the channel head.
- 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 219.890 man-rem, thus an exposure savings of 90.110 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.

3.2.5 During this reporting period, the dose accumulated due to the removal of temporary shielding was approximately 4.700 man-rem. A total expenditure of 17.775 man-rem was utilized for shielding installation and removal during the repair project. Installation and removal of shielding were predicted to utilize 60 percent of the estimated exposure for shielding installation and 40 percent for shielding removal. The original exposure estimate for shielding installation and removal was approximately 145 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^2 to approximately 1000 dpm/100cm^2 or less. Contamination levels inside the biological shield wall were maintained as low as practical consistent with work in progress. Where appropriate, floor covering (herculite or similar material) was applied to minimize buildup of surface contamination and reduce cleanup time. A decontamination work force was assigned to maintain an ongoing area decontamination effort. Surveys were taken on a routine basis to evaluate contamination levels so that timely decontamination activities could 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 10.950 man-rem expended to conduct ongoing decontamination activities during this reporting period. A total expenditure of 149.300 man-rem has been utilized for decontamination throughout the repair project.

3.3.2 The refueling cavity was also decontaminated to reduce exposure rates and minimize potential airborne activity during the storage of components in the cavity; 3.3 man-rem were accumulated to complete this activity.

3.3.3 Although it is difficult to quantify the exposure savings attributable to this technique, the practice of maintaining effective control of contamination, thereby reducing the potential for airborne contamination and eliminating the need for respiratory protection devices, is recognized as extremely beneficial in reducing exposure.

3.4 Steam generator (S/G) water level.

3.4.1 For shielding purposes, the water level in the secondary side was maintained such that the majority of the tube bundle was covered during the steam generator assembly's girth cuts. General area exposure rates were four to

five times lower with this water shield. The following tasks benefited from the effect of maintaining a high water level in the S/G secondary.

- Installation of scaffolding in preparation for insulation removal.
- Steam generator steam dome removal.
- Installation of the shielding platform.
- Eighty percent precision machine cut of the steam generator channel heads.
- Expansion of the lateral support rings.
- Removal of the steam generator instrumentation lines.

3.4.2 The exposure expended for these tasks was approximately 51 man-rem. Without the benefit of water shielding, the exposure expended would have been approximately 225 man-rem, thus a dose savings of approximately 174 man-rem.

3.5 Contamination control temporary local containments and ventilation.

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

3.5.2 The more significant applications of this technique was 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 cutting, grinding, and 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 during welding operations.

3.5.3 Overall, the use of temporary local contamination control containments during the repair project provided 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.

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

3.6 Concrete cutting operations.

3.6.1 Several concrete cutting operations were performed. The type of concrete cutting equipment selected had a minimum potential for causing airborne contamination and spreading concrete dust throughout the containment because the cutting tools utilized water-cooled blades. The runoff water used for cooling the blades was collected, reused, and then processed through the radwaste system. The use of this equipment eliminated the need for containments--hence an exposure savings was realized together with a reduced amount of solid waste generated. The exposure attributed to concrete cutting and removal activities was approximately 3.625 man-rem as compared to the estimate of approximately 20 man-rem.

3.7 General ALARA techniques and practices.

3.7.1 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 provided control and surveillance of the radiological conditions associated with repair project tasks. This program included 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 surveyed the various work areas throughout containment to ensure that sound, approved radiological work practices were employed and to inspect for conditions which could cause significant changes in radiation exposure rates. These individuals were uniquely identified for assistance to personnel inside containment. Other health physics personnel monitoring specific activities were used strictly for that purpose and dedicated their time and attention to that specific task.

- An ongoing radiation control training program included 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 were conducted as appropriate. The S/G channel head mock-up was used to train personnel making channel head entries. Equipment similar to that used in the actual S/G was 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 was 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 could be reverified and refined.
- The use of technical procedures served 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" provided workers low-exposure rate areas during short-term idle periods. These areas were located where the exposure rates were relatively low (< 5 mR/hr on the average). These low-level radiation waiting areas were well posted, and workers were encouraged to use these areas whenever possible to minimize exposure.
- The ongoing decontamination program and periodic work area cleanup techniques were 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 were used to monitor airborne activity in the containment. In addition, periodic grab samples were taken routinely in general areas as well as for specific tasks.
- A local tool crib, weld rod rooms, and a document control room was 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 were located in low-exposure rate areas.

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.

4.2 Liquid releases.

4.2.1 A summary of the volume and activity of liquid effluents released for the period August 1, 1984, through October 31, 1984, is provided in Table 5. Approximately

69 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 (24.3 percent), Cs-134 (16 percent), and no radioiodines for this reporting period. The total activity released (excluding tritium) during this reporting period is approximately 24.9 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 9.13 E-4, 1.65 E-2, and 2.16 E-2 curies for August, September, and October, respectively. The amount of tritium released during the reporting period was 159, 11.2, and 14.2 times lower for August, September, and October, respectively, than for January.

4.3 Airborne releases.

4.3.1 A summary of the airborne effluent activity released for the period August 1, 1984, through October 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 activity detected in airborne effluents for August, September, and October. There were 0 curies of airborne radiogases and 7.72 E-7, 5.62 E-6, and 2.03 E-6 curies of radioparticulates detected in airborne effluents for August, September, and October, respectively. This is compared to 4.11 E+1, 7.19 E-5, and 6.12 E-7 curies for

radiogases, radioiodines, and radioparticulates, respectively in January 1984.

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 facilities.

4.4.2 The majority of the waste volume shipped was compactible and noncompactible dry-active waste (DAW) for this reporting period. Compactible 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. Noncompactible 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 (excluding the steam generator lower assemblies) is approximately 63,783 cubic feet which is 106 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 24 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 The actual personnel exposure accumulated is significantly lower than the original estimated exposure (i.e., 1207 and 2120, respectively). The exposure accumulated indicates that the planning for this project 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.

5.1.2 Radioactive liquid effluents released are well within technical specification limits. The calculated activity (excluding tritium and gases) is approximately 6.71 E-2, 4.11 E-1, and 3.46 E-1 percent of 10CFR20, Table B, Column 2, limit for unidentified MPC for August, September, and October, respectively. The tritium activity was approximately 1.21 E-4, 5.83 E-4, and 2.96 E-4 percent of 10CFR20, Table B, Column 2, limit for August, September, and October, respectively.

5.1.3 Airborne releases of gaseous radioactivity attributed to repair project activities was 0 curies for this reporting period. The airborne activity discharged through the entire repair effort has been maintained ALARA and 0 percent of the technical specification limits for August, September, and October.

5.1.4 Solid low-level radioactive waste generated to date (excluding the SGLAs) for the SGRP represents approximately 106 percent of the volume estimate provided in the SGRR. The total quantity of activity shipped was significantly below the activity estimated in the SGRR.

TABLE 1

Description of Major Tasks

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

H.B. Robinson--Unit 2

TASK	TASK DESCRIPTION
5. Installation and removal of shielding.	This task included 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 included 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 included 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 October 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 blowdown 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 October 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 diaphrams; 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 October 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 October 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 steamline 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 included installation of insulation on all steam generators and associated piping.
26.	Install miscellaneous piping.	This task included the installation of blowdown valves and CVCS piping.
27.	Nonmanuals, (HP, QA, engineering, supervision, administration, etc.)	This category included the support required throughout the repair project period for nonmanual personnel.

TABLE 1 (continued)

Description of Major Tasks

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

H.B. Robinson--Unit 2

TASK	TASK DESCRIPTION
28. Ongoing decon/cleanup and disposal of contaminated material.	This task included continuing decontamination of contaminated materials and removing and disposing through the repair project period.
29. Miscellaneous testing/ inspections.	This item encompassed 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. Miscellanous (work not covered in Tasks 1 through 30).	This category included 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; disconnecting and shipping the reactor coolant pump motors for refurbishment; assembling and disassembling the reactor head for the primary hydro; and removing and replacing the control rod drive shafts.

TABLE 2

Personnel Exposure Summary Per Task
for Steam Generator Replacement

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

H.B. Robinson--Unit 2

TASK DESCRIPTION	PERSONNEL EXPOSURE* (MAN-REM) ESTIMATED	ACTUAL
1. Construction of pedestal cranes, preparation of polar crane, miscellaneous cribbing platforms, and steam generator transfer platform.	25	7.125
2. Initial containment decontamination.	20	10.975
3. Concrete and structural steel removal and replacement.	20	13.045
4. Defueling and fuel storage.	40	34.275
5. Installation and removal of shielding.	145	17.775
6. Installation, maintenance, and removal of scaffolding, temporary lighting, and power.	185	68.460

*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 October 31, 1984

H.B. Robinson--Unit 2

TASK DESCRIPTION	PERSONNEL EXPOSURE* (MAN-REM) ESTIMATED	ACTUAL
7. Installation, maintenance, and removal of contamination containments and temporary ventilation systems.	30	23.950
8. Removal of insulation.	85	25.250
9. Removal of main steam piping.	5	1.500
10. Removal of feedwater piping.	5	1.000
11. Removal of miscellaneous piping.	70	3.780
12. Cutting and removing steam generator upper assembly.	80	4.975
13. Cutting of channel head.	95	30.600
14. Weld shield cover on lower assembly at:		
a. Channel head	10	8.650
b. Transition end	10	1.975

*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 October 31, 1984

H.B. Robinson--Unit 2

TASK DESCRIPTION	PERSONNEL EXPOSURE* (MAN-REM) ESTIMATED	ACTUAL
15. Removal of steam generator lower assembly.	25	5.850
16. Lateral support ring removal.	25	13.575
17. Channel head decontamination.	105	75.440
18. Refurbishment of upper assembly.	20	1.775
19. Installation of lower assembly prep and weld channel head.	310	219.890
20. Weld divider plates.	80	32.500
21. Installing and welding upper assembly.	15	10.860
22. Lateral support ring installation.	45	3.635
23. Installed main steam piping.	5	0.075

*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 October 31, 1984

H.B. Robinson--Unit 2

	TASK DESCRIPTION	PERSONNEL EXPOSURE* (MAN-REM) ESTIMATED	ACTUAL
24.	Installed feedwater piping.	10	0.200
25.	Install insulation.	100	80.880
26.	Install miscellaneous piping.	75	18.945
27.	Nonmanuals, (HP, QA, engineering, supervision, administration, etc.)	295	166.875
28.	Ongoing decon/cleanup and disposal of contaminated material.	150	138.310
29.	Miscellaneous testing/inspections.	5	1.250
30.	Steam generator storage activities.	30	8.325
31.	Miscellaneous	--	175.100
	TOTAL	2120	1206.820

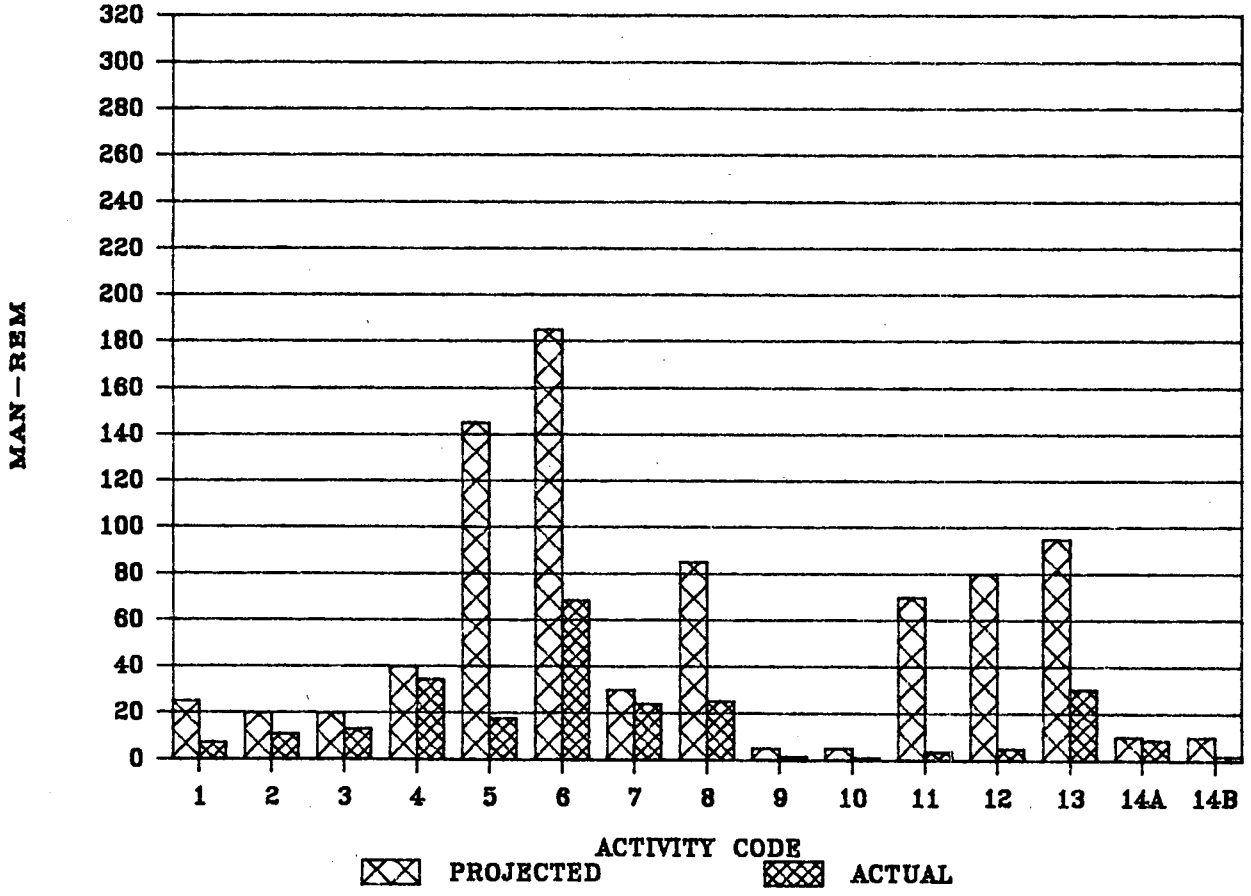
*Actual exposures are estimated by self-reading pocket dosimeter totals.

TABLE 2 (continued)

Personnel Exposure Summary Per Task
for Steam Generator Replacement

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

H.B. Robinson--Unit 2



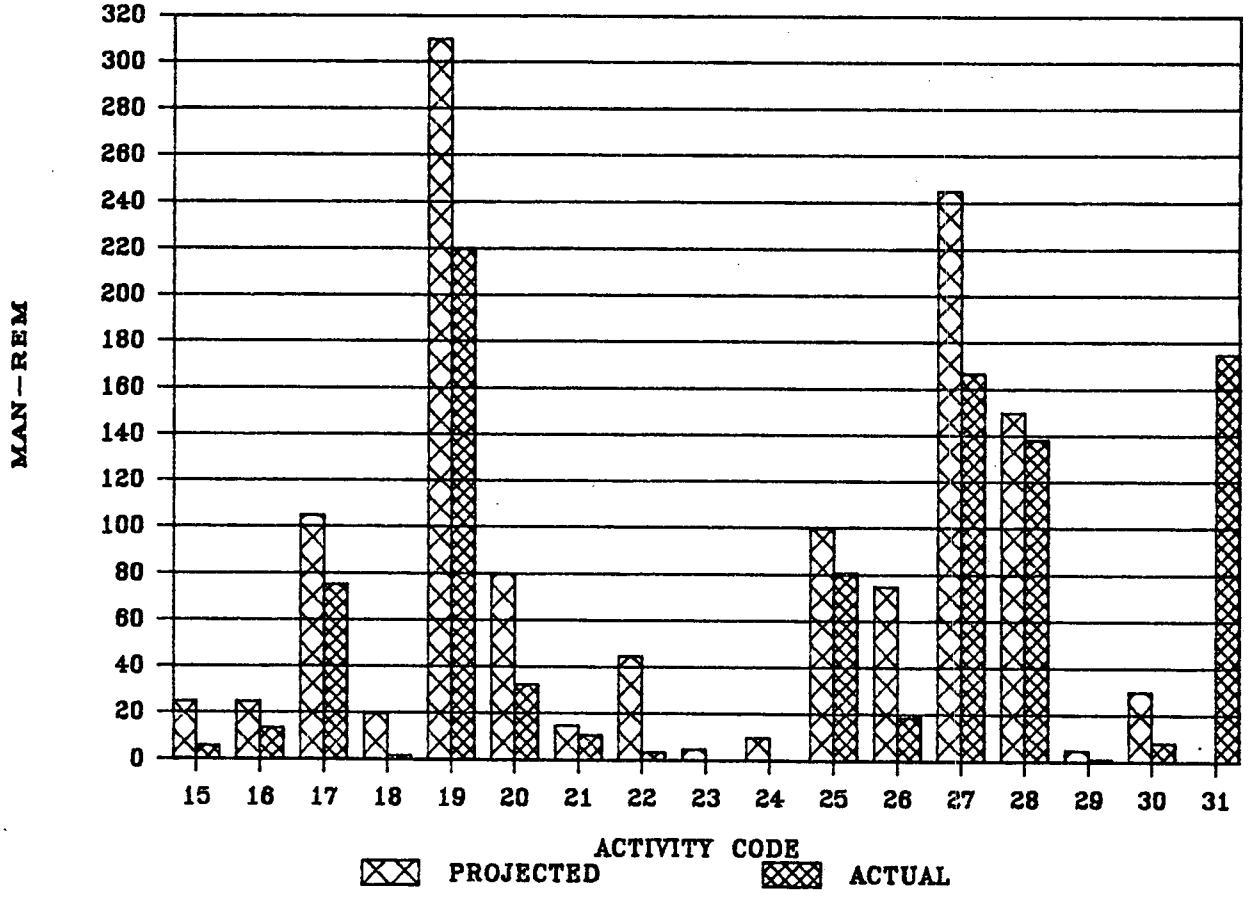
1. Construction of pedestal cranes, preparation of polar crane, misc. cribbing platforms and S/G xfer platform.
2. Initial containment decontamination.
3. Concrete and structual steel removal and replacement.
4. Defuel and fuel storage.
5. Installation and removal of shielding.
6. Installation, maint. 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 October 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 August 1, 1984, to October 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)
1. Construction of pedestal cranes, polar crane work, miscellaneous cribbing platforms, and steam generator transfer platforms.	25	0.650	7.125
a. Installed pedestal cranes.		0	0.225
b. Bush hammered concrete for pedestal crane.		0	0.650
c. Disassembled manipulator crane.		0	2.725
d. Installed cavity platform.		0	2.150
e. Installed and removed skid beams.		0	0.175
f. Rewired polar crane.		0	0.550
g. Assembled manipulator crane		0.650	0.650
2. Initial containment decontamination.	20	0	10.975
a. CV--all levels.		0	6.550
b. CV--pump bays.		0	4.425

TABLE 3 (continued)

Detailed Summary of Activity Exposures
Reporting Period August 1, 1984, to October 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)
3.	Concrete and structural steel removal and replacement.	20	0.895	13.045
	a. "A" pump bay chipped concrete.		0	4.475
	b. Head storage area cut concrete.		0	0.150
	c. Cut "A," "B," and "C" steam generator bioshield walls.		0	2.525
	d. Removed structural steel above equipment hatch.		0	0.325
	e. Cut and removed steel platform by elevator.		0.025	0.400
	f. Core bored and wet cut "A," "B," and "C" steam generator bioshield walls.		0	0.950
	g. Replaced head storage concrete.		0	0.650
	h. Replaced concrete in "A" pump bay.		0.075	2.000
	i. Replaced structural steel and paint.		0	0.750
	j. Replaced biowalls on "A," "B," and "C" steam generator.		0.795	0.820

TABLE 3 (continued)

Detailed Summary of Activity Exposures
Reporting Period August 1, 1984, to October 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)
4. Defueling and fuel storage.	40	0	34.275
a. Changed out Detectors N-31 and N-36.		0	0.775
b. Deconned internals lifting rig.		0	1.625
c. Removed missile shield, cable trays, and duct work.		0	0.700
d. Removed insulation, conoseals, disconnected thermocouples and detentioned, and removed stud bolts.		0	19.900
e. Changed out air motor on transfer system.		0	0.325
f. Repaired stud hoist.		0	0.225
g. Painted cavity floor.		0	0.400
h. Retracted flux thimbles.		0	0.225
i. Removed and replaced blind flange.		0	0.975
j. Installed cavity filter.		0	0.250
k. Lifted and stored reactor head.		0	3.225
l. Removed and replaced upper internals.		0	0.775
m. CV defueled.		0	0.775
n. SFP moved fuel and inspected.		0	0.400

TABLE 3 (continued)

Detailed Summary of Activity Exposures
Reporting Period August 1, 1984, to October 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)
o. Miscellaneous CV work.		0	0.200
p. Miscellaneous SFP work.		0	0.200
q. Deconned cavity.		0	3.300
5. Installation and removal of shielding.	145	4.700	17.775
a. CV all areas.		4.700	17.325
b. Steam generator bowls.		0	0.450
6. Installation, maintenance, and removal of scaffolding, temporary lighting, power, temporary service, and breathing air.	185	4.410	68.460
a. CV installed temporary lighting.		0	22.275
b. CV installed temporary breathing air.		0	5.700
c. Erected scaffolds for lateral support work.		0	5.100
d. Erected channel head platforms.		0	15.525
e. Sorted and transported scaffold.		0	0.025

TABLE 3 (continued)

Detailed Summary of Activity Exposures
Reporting Period August 1, 1984, to October 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)
f. Erected and removed scaffold in pump bays.		0.025	4.400
g. Erected and removed scaffold around steam domes.		0	0.775
h. Installed and removed scaffold for insulation removal.		0	10.275
i. Removed temporary lighting.		3.420	3.420
j. Removed scaffold.		0.965	0.965
7. Installation, maintenance, and removal of contamination containments and temporary ventilation systems.	30	0.100	23.950
a. Installed stand-under HEPA filters.		0	0.025
b. Erected and removed duct work.		0.050	16.800
c. Installed air handling equipment.		0.050	7.125
8. Removal of insulation.	85	0	25.250
a. Removed insulation from "A," "B," "C" steam generators.		0	19.150

TABLE 3 (continued)

Detailed Summary of Activity Exposures
Reporting Period August 1, 1984, to October 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)
	b. Supported insulation removal on all levels of CV.		0	6.100
9.	Removal of main steam piping.	5	0	1.500
	a. Set up, cut, and removed main steam piping.		0	1.500
10.	Removal of feedwater piping.	5	0	1.000
	a. Set up, cut, and removed feedwater piping.		0	1.000
11.	Removal of miscellaneous piping.	70	0	3.780
	a. Cut and removed steam generator blowdown line valve.		0	0.580
	b. Cut and removed CVCS line and cap.		0	1.675
	c. Installed indication on blowdown lines.		0	1.525
12.	Cutting and removal of steam generator upper assemblies.	80	0	4.975

TABLE 3 (continued)

Detailed Summary of Activity Exposures
Reporting Period August 1, 1984, to October 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)
a. Removed level transmitter valves on "A," "B," and "C" steam generator steam domes.		0	0.025
b. Cleaned transition weld on "A," "B," and "C" steam generators.		0	0.400
c. Removed steam generator secondary manways.		0	0.050
d. Buffed and MT lugs.		0	0.100
e. Installed and removed heater blankets.		0	1.125
f. Cut, welded, and ground steam generator transition welds.		0	0.925
g. Cut steam generator wrappers and removed steam domes.		0	2.350
13. Cutting of channel heads.	95	0	30.600
a. Removed sample tubing.		0	1.550
b. Set up and cut channel heads.		0	15.525
c. Cut divider plates.		0	4.450

TABLE 3 (continued)

Detailed Summary of Activity Exposures
Reporting Period August 1, 1984, to October 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)
d. Plunged cut, severanced cut, and attached boot.		0	8.125
e. Painted outside area of steam generators.		0	0.950
14. Weld shield covers on lower assemblies.			
a. Channel head.	10	0	8.650
1. Installed heater blankets.		0	3.200
2. Drained steam generators and welded nozzle plugs.		0	3.775
3. Buffed channel head weld.		0	1.675
b. Transition end.	10	0	1.975
1. Ground and welded shield plate on top of generators.		0	1.975
15. Removal of steam generator lower assemblies.	25	0	5.850
a. Installed shims on support legs.		0	0.550

TABLE 3 (continued)

Detailed Summary of Activity Exposures
Reporting Period August 1, 1984, to October 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)
b. Rigged steam generators out of CV.		0	5.300
16. Lateral support ring removal.	25	0	13.575
a. Cut and removed bolts to remove snubbers and spread ring.		0	13.400
b. Removed tubing.		0	0.175
17. Channel head decontamination.	105	0	75.440
a. Assembled, disassembled, and operated Westinghouse decon equipment.		0	35.315
b. Assembled and disassembled spent grit system and solidified spent grit.		0	0.400
c. Removed strong backs and diaphrams from steam generator manways.		0	2.075

TABLE 3 (continued)

Detailed Summary of Activity Exposures
Reporting Period August 1, 1984, to October 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)
	d. Installed, maintained, and removed grits fixture, nozzle seats, and manway flanges.		0	37.250
	e. Removed nozzle plugs and seal plugs from "C" hot leg.		0	0.400
18.	Refurbishment of upper assemblies.	20	0	1.775
	a. Removed swirl vanes.		0	0.300
	b. Reworked steam domes.		0	1.075
	c. Radiographed steam domes.		0	0.250
	d. Reworked swirl vanes.		0	0.150
19.	Installation of lower assemblies, prep, and weld channel head, preheat, and postheat.	310	7.675	219.890
	a. Cleaned steam generator channel heads, removed nozzle seats, inspected loop seals.		0	5.825

TABLE 3 (continued)

Detailed Summary of Activity Exposures
Reporting Period August 1, 1984, to October 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)
b. Cut and machine snipped windows, cut out divider plate manways, installed heater blankets outside on channel head and prep welded surface.		0	31.910
c. Rigged steam generators into CV.		0	0.250
d. Welded and inspected steam generator power girth.		2.750	76.105
e. Postwelded heat treatment steam generator lower girth weld.		0	68.275
f. Cleaned steam generator tubes.		0	23.050
g. Removed loop seals, cleaned and inspected the hot- and cold-leg piping.		0	9.475
h. Removed broken screws in manway diaphragm holes.		0	0.075
i. Installed manways.		4.925	4.925
20. Welded divider plates.	80	0	32.500

TABLE 3 (continued)

Detailed Summary of Activity Exposures
Reporting Period August 1, 1984, to October 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)
a. Welded divider plates and snipped holes.		0	32.500
21. Installing and welding of upper assemblies, preheating, and postheating.	15	0	10.860
a. Rigged steam generator domes into CV and set.		0	0.075
b. Welded steam generator upper girth and instrument lines, inspected, and postwelded heat treat weld.		0	10.785
22. Lateral support ring installation.	45	1.760	3.635
a. Installed lateral support ring.		1.760	3.635
23. Install main steam piping.	5	0	0.075
a. Installed, welded, and inspected main steam piping.		0	0.075
24. Install feedwater piping.	10	0.025	0.200

TABLE 3 (continued)

Detailed Summary of Activity Exposures
Reporting Period August 1, 1984, to October 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)
a. Installed, welded, and inspected feedwater piping.		0.025	0.200
25. Install insulation.	100	56.330	80.880
a. Installed insulation in pump bays.		56.330	58.580
b. Installed insulation on steam domes, feedwater, and main steam lines.		0	22.300
26. Install miscellaneous piping.	75	11.700	18.945
a. Installed CVCS lines.		3.800	10.825
b. Installed instrument tubing lines on steam generators.		7.900	8.120
27. Nonmanual (HP, QA, engineering, supervision, etc.)	295	12.380	166.875
a. CV all levels HP surveillance.		12.380	119.100
b. CV pump bays HP surveillance.		0	19.675

TABLE 3 (continued)

Detailed Summary of Activity Exposures
Reporting Period August 1, 1984, to October 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)
	c. Inspections and surveillance.		0	28.100
28.	Ongoing decon/cleanup and disposal of contaminated materials.	150	11.635	138.310
	a. Deconned, cleaned up, and removed trash.		10.950	132.950
	b. Compacted, solidified, and shipped trash.		0.640	5.065
	c. Deconned small tools.		0.045	0.295
29.	Miscellaneous testing/inspections.	5	0.250	1.250
	a. Secondary hydro.		0	1.000
	b. Primary hydro.		0.250	0.250
30.	Steam generator storage activities.	30	0	8.325
	a. Rigged and transported steam generator to tomb, placed in tank, and closed tomb doors.		0	8.325

TABLE 3 (continued)

Detailed Summary of Activity Exposures
Reporting Period August 1, 1984, to October 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)
31. Miscellaneous work not covered in the above task.		65.785	175.100
a. Deconned respirator.		0	1.625
b. General maintenance in areas outside the containment building.		0.010	10.940
c. General maintenance in the containment building.		1.505	60.710
d. Sorted and cleaned laundry.		0.090	0.960
e. Containment building hands-on inspection.		0.240	30.175
f. Containment building issue tools.		1.040	1.740
g. Moved equipment into cavity.		0	2.075
h. Removed equipment from containment building.		0	2.975

TABLE 3 (continued)

Detailed Summary of Activity Exposures
Reporting Period August 1, 1984, to October 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)
i. Disconnected and removed reactor coolant pump motors from containment and shipped.		0	1.000
j. Installed reactor coolant pump motors.		9.400	9.400
k. Removed equipment from cavity.		3.300	3.300
l. Removed and replaced control rod drive shafts.		3.400	3.400
m. Assembled reactor vessel head for hydro.		46.800	46.800
TOTALS	2120	178.295	1206.820

TABLE 4

Summary of Activity--Exposures Other Than
Steam Generator Replacement Activities
Reporting Period August 1, 1984, to October 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)
1.	Steam generator eddy current inspection prior to commencing SGR activities.		0	35.650
2.	In-service inspection including removal of insulation, prep welds, and seismic design verification.		19.275	137.063
3.	Plant modifications other than steam generator replacement.		652.295	1103.656
4.	Miscellaneous inspection, coverage, and work not covered in the above item or the steam generator replacement activities.		162.068	346.383
5.	Refueling activities.		88.866	88.866
	TOTAL		922.504	1711.618

TABLE 5

Summary of Radioactive Effluent Releases

Reporting Period August 1, 1984, through October 31, 1984

H.B. Robinson--Unit 2

LIQUID EFFLUENT RELEASES	RADIOACTIVITY RELEASED IN LIQUID EFFLUENTS (CURIES)				
RADIONUCLIDE	AUGUST	SEPTEMBER	OCTOBER	TOTAL ACTIVITY RELEASED THIS REPORTING PERIOD	TOTAL RELEASED DURING S/G REPAIR TO DATE
Ag-110m	2.11 E-06	1.07 E-03	4.36 E-04	1.51 E-03	1.89 E-03
Co-58	5.98 E-05	1.62 E-04	5.11 E-04	7.33 E-04	3.49 E-03
Co-60	7.96 E-04	6.79 E-03	1.44 E-03	9.03 E-03	1.83 E-02
Cs-134	1.26 E-05	3.37 E-03	2.34 E-03	5.72 E-03	6.52 E-03
Cs-136	*	*	*	*	*
Cs-137	3.88 E-05	4.99 E-03	3.63 E-03	8.66 E-03	9.99 E-03
I-131	*	*	*	*	2.26 E-04
I-133	*	*	*	*	*
Sb-124	*	*	*	*	1.12 E-03
Mn-54	3.24 E-06	1.22 E-04	2.90 E-04	4.15 E-04	5.17 E-04
Others**	*	4.42 E-05	*	4.42 E-05	3.35 E-04
TOTAL	9.13 E-04	1.65 E-02	2.16 E-02	2.61 E-02	4.24 E-02
Tritium Released (curies)	4.93 E-02	7.01 E-01	5.55 E-01	1.31 E•00	4.61 E•00
Liquid Effluent Volume Released (liters)	1.64 E+05	7.19 E+05	6.28 E+05	VOLUME RELEASED THIS REPORTING PERIOD 1.51 E+06	VOLUME RELEASED DURING S/G REPAIR TO DATE 2.74 E+06

*Not detectable.

**Others include Co-57, Nb-95, Sn-113.

TABLE 3 (continued)

Summary of Radioactive Effluent Releases

Reporting Period August 1, 1984, through October 31, 1984

H.B. Robinson--Unit 2

AIRBORNE RELEASES	RADIOACTIVITY RELEASED IN AIRBORNE EFFLUENTS (CURIES)				
A. NOBLE GASES RADIONUCLIDE	AUGUST	SEPTEMBER	OCTOBER	TOTAL ACTIVITY RELEASED THIS REPORTING PERIOD	TOTAL RELEASED DURING S/G REPAIR TO DATE
Ar-41	*	*	*	*	*
Kr-85	*	*	*		4.96 E-02
Kr-85m	*	*	*	*	*
Kr-88	*	*	*	*	*
Xe-131m	*	*	*		2.04 E-02
Xe-133	*	*	*	*	8.08 E•00
Xe-133m	*	*	*		3.44 E-03
Xe-135	*	*	*	*	*
Xe-135m	*	*	*	*	*
TOTAL	0	0	0	0	8.15 E•00
TRITIUM	1.51 E-01	1.48 E-01	4.27 E-01	7.26 E-01	1.62 E•00
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 August 1, 1984, through October 31, 1984

H.B. Robinson--Unit 2

AIRBORNE RELEASES	RADIOACTIVITY RELEASED IN AIRBORNE EFFLUENTS (CURIES)				
C. PARTICULATES RADIONUCLIDE	AUGUST	SEPTEMBER	OCTOBER	TOTAL ACTIVITY RELEASED THIS REPORTING PERIOD	TOTAL RELEASED DURING S/G REPAIR TO DATE
Ba-140	*	*	*	*	*
Co-57	*	*	*	*	*
Co-58	*	*	*	*	8.83 E-08
Co-60	7.72 E-07	5.06 E-06	1.83 E-06	7.66 E-06	1.21 E-05
Cr-51	*	*	*	*	*
Cs-134	*	*	*	*	*
Cs-136	*	*	*	*	*
Cs-137	*	5.62 E-07	1.99 E-07	7.61 E-07	7.61 E-07
I-131	*	*	*	*	*
La-140	*	*	*	*	*
Mn-54	*	*	*	*	*
Nb-95	*	*	*	*	*
Ru-103	*	*	*	*	*
TOTAL	7.72 E-07	5.62 E-06	2.03 E-06	8.42 E-06	1.29 E-05

*Not detectable.

TABLE 6

Summary of Solid Low-Level Radioactive Waste

Reporting Period August 1, 1984, through October 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	7502	21821
Noncompacted Dry-Active Waste	6730	38810
Resin and Filter Media	0	240
Channel Head Decontamination Waste	0	595
Miscellaneous (Evaporator Bottoms)	0	2317
Totals	14232	63783

II. SOLID LOW-LEVEL REPAIR ACTIVITY WASTE SHIPPED

REPORTING PERIOD DATE	VOLUME LLW* SHIPPED FOR REPORTING PERIOD	ESTIMATED ACTIVITY** CURIES
August 1, 1984--October 31, 1984	26541	48.756

*LLW low-level (radioactive) waste.

**Predominant radionuclides ^{137}Cs, ^{60}Co, ^{58}Co, ^{51}Cr, ^{55}Fe, ^{134}Cs.