STEAM GENERATOR REPAIR PROGRAM

FOR

TURKEY POINT UNIT 4

RADIOLOGICAL PROGRESS REPORT - NO. 1

FOR THE PERIOD

OCTOBER 10, 1982 THROUGH DECEMBER 2, 1982

DOCKET NO. 50-251

LICENSE NO. DPR-41

FLORIDA POWER AND LIGHT COMPANY

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TABLES

1.0 INTRODUCTION

Radiological Progress Report No. 1 is the first of a series of radiological progress reports to be generated during the Unit No. 4 Steam Generator Repair Program (SGRP). It should be noted that five radiological progress reports were submitted for the Unit No. 3 SGRP. This report and succeeding reports will include the following information relative to the repair program:

a. An assessment and summary of the occupational exposure and labor expended for each reporting period (throughout the project).

b. An evaluation of the effectiveness of dose reduction techniques (ALARA principles).

c. An estimate of the radioactivity released in liquid and airborne effluents.

d. An estimate of the solid radioactive waste generated including volume and radioactive content.

Significant project tasks performed during this reporting period included:

1. Removal of miscellaneous piping, structural and component interferences.
2. Installation of steam generator transfer bridge.
3. Refueling cavity decontamination.
4. Installation of containment pedestal cranes.
5. Removal of steam generator insulation.
6. Installation of steam generator grit blast equipment inside containment.
7. Installation of refueling cavity temporary cover.
8. Initial containment decontamination.
9. Removal of concrete - 30'6 and 58' Elevation.
10. Removal of miscellaneous steel.
11. Steam generator secondary moisture separator components removal.
12. 80% precision machine cut of steam generator channel heads.
13. Preparation of new Steam Generator Lower Assemblies (SGLA's).

Several on-going activities also performed during this period included: installation of temporary scaffolding, cleanup and decontamination, installation of temporary shielding, installation of temporary electrical power and lighting services, health physics support and project supervision.

2.0 OCCUPATIONAL RADIATION EXPOSURE

2.1 General

Occupational exposure to radiation may be considered the major radiological impact of the SGRP. Thus, significant importance has been placed upon providing an accurate assessment of the collective radiation exposure which is expended in performing each of the tasks involved. Estimates of these exposures were presented in summary form in Table 3.3-2 of the report entitled "Steam Generator Repair Report" March 1980 Revision 7.

Additional information presented in this progress report is related to the "Steam Generator Repair Report" (SGRR) through revision 7, related license amendments and licensee (FPL) affidavits submitted during the ASLB hearings.

2.2 Description of Exposure Data Collection Program

To assess the occupational exposure reported a program has been designed which provides data that is compatible with the detail and format of the estimated exposure summary presented in Table 3.3.-2 of the SGRR. The data collected permits a valid comparison between the estimated exposure for the major tasks indicated and the actual exposures recorded by self-reading pocket dosimeters. A description of the thirteen (13) major tasks is indicated in Table 1.

In general, these tasks are composed of a number of specific activities identified and controlled by a construction generated document called a process sheet: Each process sheet details the activity to be performed. The process sheet is reviewed by Health Physics to incorporate ALARA recommendations who then generate the Radiation Work Permit(s) necessary prior to starting work. The Radiation Work Permits (RWP) are utilized to "track" the exposures expended for all activities within the major tasks described in Table 1. Each RWP issued is categorized into one of these major tasks. In all cases, repair project activities (those specified by process sheets and those not requiring specific documentation with process sheets) are controlled with an appropriate RWP.

The exposure data base is extensive and requires the use of a versatile computer system. The system in operation includes, but is not limited to, the following capabilities:

1. Exposure history by Radiation Work Permit, work group classification and individual basis.

2. Classifying RWP controlled activities into one of the SGRP major task groups.

3. Providing a valid comparison of estimated and reported exposure for each major task.

4. An up-to-date, real-time exposure readout for each individual at the Radiation Controlled Area (RCA) control points.

5. Log-in and log-out capability at each RCA Control Point data terminal.

6. Direct Health Physics Shift Supervisor access via computer terminal to initiate/terminate exposure extensions, initiate/terminate RWP's, review individual exposures and verify various H.P. training requirement status.

The person-hours accrued for each specific activity were tabulated by reviewing the actual time expended in the radiation field under each specific RWP. This information was obtained from access/egress containment control points.

System upgrades and changes will be made as necessary to provide information that may be required by applicable regulatory and/or licensing requirements. Should the computer system be inoperative for any reason, exposures are recorded on appropriate log sheets and entered into the computer system when it is returned to service.

2.3 Evaluation of Exposure Data

In general, the system described in 2.2. utilizes worker exposure data as recorded by self-reading pocket dosimeter, in conjunction with contractor supplied task exposure estimates to evaluate current person-rem expenditures.* The use of this system to categorize and determine exposures for individuals facilitates the process of compiling a reliable assessment of the collective exposure expended during the project. The real-time personnel reporting feature at the RCA Control Points allows the individual and Health Physics to have an up-to-the-minute exposure history of each individual. To date this system has proven to be very effective in processing the day-to-day transactions entered and is expected to continue to demonstrate reliability throughout the repair project.

2.4 Description and Format of Exposure Data

Table 2 presents a summary of the occupational radiation exposure expended in person-rem and the labor expended in the radiation field in person-hours during this reporting period (i.e., from project commencement on 10 October 1982 to 2 December 1982). Also included are the original estimated expenditures. The following comments are provided for clarification and should be considered when reviewing the data presented in Table 2.

a. Several activities performed during the repair effort which were not described in Table 1 have been appropriately placed into one of the major task categories in Table 2 and accordingly accounted for.

b. Exposures received by certain pre-identified personnel (e.g. health physics, QC/QA, etc.) performing functions not directly attributable to any one task are listed separately in Item 7.

*Self-reading pocket dosimeter results are used since exposure information is immediately available upon exit from the RCA and accordingly recorded in the computer data base. Since thermoluminescent dosimeters (TLD's) are processed primarily on a monthly basis this information could not be readily incorporated into the exposure expended for each specific activity. Historically, SRPD results are higher than TLD results primarily due to drift (caused by factors such as heat and humidity, and initial charging). Therefore, accumulated dose is reported conservatively.

c. Information detailing exposures reported for specific activities within a major task is contained in the data base. This information is utilized to "track" exposure for the time period of interest.

d. Task items indicating no accumulated exposures have not commenced during this reporting period.

Table 3A presents a detailed summary of the preparatory activity personnel exposure expended during this reporting period. This included both the labor and exposure expenditures and the original estimated expenditures. Table 4 presents a general summary of both labor and personnel exposure expended for each phase of the repair project along with their original estimated expenditures. The following comments are provided for clarification and should be considered when reviewing the data presented in Tables 3A and 4.

a. Activity status indications are given to allow comparison of actual versus estimated person-rem expenditures.

b. 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.

c. For completed activities it should be noted that small amounts of additional exposure and labor may appear sometime after completion is indicated, as a result of such factors as: field changes to procedures, work involving activity related to support equipment, localized work area cleanup, etc.

d. Some activities were not estimated in the SGRR and have no estimated labor and exposure values indicated. These activities are controlled by RWP's which have an exposure estimate for the activity for purposes of exposure "tracking".

2.5 Discussion of Exposure Results

A review of the data presented in Table 2 shows that the total occupational radiation exposure recorded for all major tasks is approximately 17% of the original total estimate. The exposure expended to date is primarily attributed to repair project preparatory activities.

As presented in Table 3A the total occupational exposure accumulated for preparatory activities completed during this reporting period is 219.35 person-rem. This value can be compared directly to the original estimate for the same completed activities which result in a projected dose of 265.37 person-rem. Of special note in Table 3A, several activities were scheduled during this phase which were not taken into account during the original preplanning. These include reactor cavity decontamination, reactor cavity liner plate inspection, disassembly of the manipulator crane and removal of reactor coolant pump motors (items 2, 3, 8 and 10 respectively). Although no exposure or labor estimates for these activities are given in Table 3A, exposure estimates are entered in the RWP for these activities. The occupational exposure associated with these activites has been taken into account resulting in the accumulated person-rem still below the original estimate for completed activities.

It should be noted that Table 3A describes several activities not listed in Table 3A of the Unit No. 3 SGRP Radiological Progress Reports. These activities were removed from some of the general activities described and listed to provide additional labor and exposure information. Additional activities will also be listed in Tables 3B, 3C & 3D of future progress reports. These additional activities may result in differences in labor and exposure estimates for some of the phase activities listed in Unit No. 4 SGRP progress reports when compared with similar activities previously reported in the Unit No. 3 SGRP progress reports; however, the total labor and exposure estimates for each phase remain unchanged.

Also of interest is item 23, "Miscellaneous Activities." This category primarily includes nonmanual labor inside containment. During subsequent reports preparatory phase activities will be updated along with detailed information for removal, installation, and miscellaneous phases.

The information for all preparatory activities in progress or completed as listed in Table 3A are summarized in Table 4. With only a small amount of preparatory phase work remaining, the total exposure for the preparatory phase activities is expected to be approximately 230 person-rem as compared to the estimate of 283 person-rem. Scaffolding activities, the removal and disposal of contaminated materials, crane operation and maintenance, and non-manual labor activities resulted in accumulated exposures significantly higher than originally estimated (See item 16, 21, 22 and 23 of Table 3A). The higher exposure for these activities is attributed to the significant amount of preparatory phase work completed during this report period in higher radiation fields due to in service inspection (ISI) work in progress. Some removal phase activities were also in progress during this period as shown in Table 4 (131.76 person-rem accumulated). The activities associated with this phase will be presented in subsequent reports.

Table 2 includes all exposure expended through December 2, 1982 (including both preparatory and removal activities). Table 2 will continue to be used for accumulation of all personnel exposure up to the end of each reporting period.

3.0 APPLICATION OF DOSE REDUCTION TECHNIQUES (ALARA PRINCIPLES)

3.1 General

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

3.2 Temporary Shielding

The use of temporary shielding is expected to result in significant exposure reduction throughout the project. 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 free-standing supports used.

Various areas throughout the containment were evaluated as to shielding needs. Those areas where items or components 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.

As of this reporting period the dose accumulated related to the installation of temporary shielding is approximately 11 person-rem. The original exposure estimate is approximately 2.4 person-rem (see table 3A). The increase in actual exposure expended is attributed to the increased amount of temporary shielding installed inside containment, primarily in the high occupancy/traffic areas mentioned above. Even though there is an increase in the actual exposure expended for this particular activity this should result in significant decreases in exposure for the various activities to be performed in these reduced general area radiation fields. Subsequent progress reports will provide further assessments of the effects of this dose reduction technique as applied to the repair project for specific activities.

3.3 General Containment Decontamination

A program for on-going general containment decontamination was initiated at the start of the repair project. The initial program involved an extensive decontamination of the containment from the refueling elevation 58' to the 14' elevation. Major items/components that were planned for removal during the project were also decontaminated. In most areas of the 58' elevation and 30'6 elevation, loose surface contamination levels were reduced to approximately 1000 dpm/100cm^2. Contamination levels on the 14' elevation inside the biological shield will be maintained as low as practical consistent with work in progress. Where appropriate, floor covering (herculite or similar material) has been applied to facilitate cleanup. A decontamination work force has been retained to maintain an ongoing decontamination effort. Surveys are taken on a routine basis to evaluate contamination levels so that decontamination activities can be initiated as soon as practical to maintain optimum radiological working conditions, avoid significant build-up and minimize cross-contamination. As noted in Table 3A approximately 18 person-rem was expended to conduct the initial containment decontamination with an additional 6 person-rem expended to conduct ongoing decontamination activities during this reporing period.

The refueling cavity was also decontaminated to reduce exposure rates and minimize potential airborne activity during the storage of components in the cavity. 1.3 person-rem was accumulated to complete this activity.

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

Until the lower steam generator assembly girth cut is completed, the water level in the secondary side is being maintained at a level such that the tube bundle is covered. Experience has shown that general area exposure rates are 4-5 times lower with this water shield. The following tasks have benefited from the effect of maintaining a high water level in the S/G secondary:

a. Removal of miscellaneous piping from S/G cubicles.

b. Installation of scaffolding in preparation of insulation removal.

c. S/G secondary moisture separator components removal.

d. Removal of insulation on S/G shell assembly between 30'6 and 58' elevations.

e. 80% precision machine cut of S/G Channel Heads.

The exposure expended for these tasks to date is approximately 85 person-rem. Without the benefit of water shielding the exposure expended would have been approximately 425 person-rem. Thus a dose savings of approximately 340 person-rem was realized. The following tasks are yet to be performed and will also have the benefit of water shielding:

a. Removal of steam generator instrumentation lines.

b. Layout cut of upper shell and set up of cutting equipment.

c. Preparation for removal of S/G upper assembly.

d. Cutting and removal of upper S/G assemblies.

An assessment of the dose savings attributable to maintaining a high steam generator water level will be made in subsequent reports after all associated tasks that derived the benefit of the shielding are completed.

3.5 Contamination Control Envelopes and Ventilation

To a large extent, initial containment cleanup and decontamination has minimized the need for extensive use of temporary containment enclosures. However, in areas where significant cutting and grinding work must be performed on highly contaminated components, contamination control envelopes will be utilized to prevent airborne contamination in adjacent areas and minimize the spread of contamination.

One of the more significant applications of this technique has been applied to the area where the steam generator channel head severance cuts will be made. These areas will be enclosed to make the entire room a single containment. Portable high efficiency (HEPA) filtration units will continuously draw air from these envelopes while cutting and grinding operations are in progress. The discharged filtered air from these portable units will be discharged to the containment ventilation system via the plant stack which is monitored continuously. Personnel working in these contamination control envelopes will be required to wear respiratory protection equipment during those operations that have the potential for causing airborne activity. The exhaust ventilation flow has been designed to maintain a negative pressure in the enclosure.

Enclosures were used during removal of insulation from the steam generator shell. The major portion of insulation removed did not create an airborne problem; however, the enclosures did serve to prevent the spread of fine insulation particles (nonradiological) throughout the containment. The insulation removed was handled such that it could be readily surveyed in an area outside containment. This was done to minimize radioactive waste generated since a preliminary survey of the S/G insulation indicated that most of the material was noncontaminated. The only insulation that contained a significant degree of contamination was that around the lower section of the S/G's.

In addition to the containment ventilation system a secondary exhaust system has been placed in operation to provide further air exchange in the containment and assure that a negative pressure is maintained with the equipment and personnel hatches open. This system contains a bank of roughing and HEPA filters. The exhausted air is continuously monitored for radioactivity. Refer to the SGRR for a detailed discussion on this system.

Overall, the use of contamination control envelopes during the repair project is expected to minimize delays by allowing work to continue in adjacent areas while cutting and grinding on contaminated components are being conducted and provide effective control of any airborne contamination resulting from such operations.

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

3.6 Concrete Cutting Operations

Concrete cutting operations were completed during this reporting period. It should be noted that the type of concrete cutting equipment selected had a minimum potential for causing airborne contamination and spreading concrete dust throughout the containment since the cutting tools utilized water-cooled blades. The run-off water used for cooling the blades was collected and sampled prior to and during discharge. The activity attributed to the release of the run-off water (9.32 E-05 Curies) is included in the liquid release activity for this reporting period and represents less than 0.2% of the total liquid effluent activity released. The use of this equipment eliminated the need for containments, hence an exposure savings was realized together with a reduced amount of waste generated. The exposure attributed to concrete cutting and removal activities was approximately 39 person-rem as compared to the estimate of approximately 52 person-rem (item 17 of Table 3A).

3.7 General Techniques and Practices

In addition to the specific dose reduction techniques described, it is important to note some of the more general practices employed to maintain adequate control of personnel radiation exposure. These practices, include the following;

a. A comprehensive Health Physics program to provide adequate control and surveillance of the radiological conditions associated with repair project

tasks. This program includes the use of Radiation Work Permits (RWP's) that address specific radiological aspects involved and the proper measures necessary to perform the work. Health Physics pre-briefings with work crews and others involved in specific activities are conducted for tasks that are considered to have the potential for a major radiological concern. These briefings clarify the technique and areas of concern that apply to the operation. In this manner, potential problems can be identified and solved prior to the actual task performance. Also, in addition to Health Physics personnel assigned to monitor specific tasks, Health Physics personnel survey the various work areas throughout containment to ensure that sound approved radiological work practices are being employed and inspect for conditions which could cause significant changes in radiation exposure rates. These individual 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.

b. An extensive training program that provides adequate 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. This training also includes the use of respiratory protection devices and their limitations. A test booth monitoring goodness of fit (facial seal) is utilized to determine the workers ability to wear such a device. Respirator physical exams are also given as part of the respiratory protection training. Training for specific tasks through the use of mockups, photographs, full scale models and "dry" runs are conducted as appropriate. The S/G channel head mockup is used to train personnel making channel head entries. Equipment similar to that used in the actual S/G is also used at the mockup to familiarize personnel with the technique and use of the equipment prior to entering the relatively high exposure fields of the S/G channel head. Protective clothing and respiratory protection devices are worn during mockup 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 incorporated into the pre-planning.

c. The use of repair project process sheets which serve to assure adequate pre-planning and review of specific tasks with special emphasis placed on dose reduction considerations (ALARA).

d. The utilization of in-containment "low level radiation waiting areas" to provide workers low exposure rate areas during short term idle periods. These areas are located where the exposure rates are relatively low (<5mr/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.

e. The installation of portable area radiation monitors with local readout and preset alarm capabilities. These monitors are stand-mounted and readily visible to the worker providing them with on the spot continuous exposure rate information.

f. Ongoing decontamination program and periodic work clean-up to minimize the build-up of contamination levels and reduce the amount of decontamination required for materials/items removed from containment throughout the repair project.

g. The use of continuous air sampling devices with preset alarm capabilities to monitor airborne activity in the containment. In addition periodic grab samples are taken routinely in general areas as well as for specific tasks.

h. Use of in-containment tool cribs and weld rod room to support repair work.

i. In the preplanning phase spacial layout considerations were taken into account to effectively take advantage of existing facility shielding. The decision to perform the channel-head cut rather than the pipe cut reduces the need for extensive shielding and occupancy times in the 14' elevation where relatively higher general area radiation levels exist.

j. Installation of a cooler system in Reactor Containment Building (RCB) to improve worker comfort. Although this system was not designed to cool the entire RCB, it should significantly improve worker comfort especially on the 58' elevation where a large majority of the work is scheduled.

k. A communications system strictly for health physics use was installed in the vicinity of each S/G enclosure to allow direct communication with the Health Physics Shift Supervisor. This system enables the health physics technician to maintain continuous communication with the shift supervisor thereby minimizing delays (and person-rem expended) on the job.

l. Multi-badging for evaluation of personnel exposure for those tasks performed in relatively complex radiation fields.

Quantitative assessments are difficult to develop for these "general" techniques and practices, but contribute significantly to the overall ALARA commitment for the repair project. An update on these techniques and practices will be discussed in future reports.

4.0 RADIOACTIVE EFFLUENTS AND SOLID WASTE

4.1 General

Radioactive effluents, consisting of liquid and airborne releases, and low level solid radioactive waste produced during this reporting period for Unit 4 are summarized in Tables 5 and 6 respectively. The radioactive waste disposal and monitoring systems at Turkey Point are shared by both Units 3 and 4. The allocations for both units have been taken into account to provide reasonably accurate estimates of the amount and content of radioactive effluents and solid wastes generated specifically by Unit 4. The radionuclides reported and activity released during this reporting period are typical of those expected for the scheduled Unit 4 Refueling Shutdown. It is expected that the radionuclides detected and activity released as the SGRP progresses will be similar to the data reported during the Unit 3 SGRP.

4.2 Liquid Releases

A summary of the volume and activity of liquid effluents released from Unit No. 4 for the period 10 October 1982 through 1 December 1982 is provided in Table 5. Approximately 70% of the volume of liquid released was from laundry operations, the remaining volume was due primarily to the shutdown. Approximately 24% of the activity released (excluding tritium) was in the form of activated metals (e.g. Co-58,Co-60, Mn-54, Ag-110m). The remaining activity (excluding tritium) included the following radionuclides: Cs-137 (22%), Cs-134 (12%), Cs-136 (0.4%) and radioiodines (41%). The total activity released (excluding tritium) during this reporting period is less than 10% of the activity projected to be released for Unit No. 4 during the repair project (refer to Table 5.2-7 of the SGRR). The amount of tritium which has been released to date is approximately 25% of the amount that was estimated (Table 5.2-7 of the SGRR).. During the remainder of the repair, laundry effluents are expected to comprise the predominate source of liquid effluents.

4.3 Airborne Releases

A summary of the airborne effluent activity released from Unit No. 4 for the period 10 October 1982 through 1 December 1982 is also provided in Table 5. The predominant source of the activity (99.99%) released during this period was due to the initial ventilation of noble gases from the containment following shutdown. In addition, the majority of halogen gases released during October came from this operation. Although the release occurred during this reporting period, the initial venting of containment is not considered a steam generator repair activity. The release of noble and halogen gases will not contribute significantly to the activity released in airborne effluents during the remainder of the steam generator repair. The major contributors to the release of airborne radioactivity from Unit 4 will be particulates released during ventilation of the containment. During the repair, ventilation of the containment is maintained in order to keep the containment building under a negative pressure at all times. Prior to its release, the air from the containment is directed to filter banks and monitored in order to minimize the concentration of radioactivity released to the environment. Based upon the above, the total activity released from Unit 4 in airborne effluents due to the steam generator repair is conservatively estimated to be 3.5 E-03 Curies or approximately 8% of the airborne activity estimated to be released due to the Unit 4 steam generator repair (refer to Table 5.2-3 of the SGRR).

4.4 Solid Radioactive Waste

A summary of low level radioactive waste (LLW) shipments from Unit 4 during the reporting period is provided in Table 6. The amount of LLW which had been packaged but not shipped prior to the close of the period is also provided. The LLW shipments during this reporting period were made to both the Barnwell, South Carolina and Richland, Washington Low-Level Waste Disposal Facilities.

A significant amount of LLW shipped was in the form of insulation and lagging materials which had been removed from piping and equipment within the Unit 4 containment. The majority of the remaining waste volume shipped was compactable and non-compactable dry active waste. Compactable dry active waste is comprised of paper, plastic, cloth, sheet metal, small components or tools and other compressible non-reusable trash which is efficiently packaged using a high density mechanical compactor to reduce its volume. Non-compactable dry active waste consists of larger metal components, filters and other non-reusable materials which cannot be practically compacted.

The total volume of solid LLW generated due to repair project activities through this reporting period (excluding the SGLA's) is approximately 47% of the total volume estimated in the Gould Affidavit dated June 12, 1981. It should be noted that the volume of waste shipped is less than the accumulated volume of waste generated. This can be primarily attributed to additional volume reduction techniques used prior to shipment, which are not accounted for when initially generated. The total quantity of radioactivity shipped during this reporting period as a result of the Unit 4 SGRP was less than 1% of the activity estimated in the SGRR. The remaining LLW generated is expected to be expeditiously shipped to a licensed burial facility.

The program to segregate waste through the use of distinct color packaging to specifically identify radioactive material has been in effect since the Unit 3 repair project. Experience has shown that this system reduces the amount of radioactive waste generated by segregating the clean waste from containers specifically identified for disposal of radioactive waste. These programs together with the use of the high density compactor help to reduce the total volume of radioactive waste both generated and shipped.

5.0 CONCLUSIONS AND OBSERVATIONS

The following general conclusions and observations are based upon information contained in this report:

a. Based on the preparatory and removal activities completed to date, the actual personnel exposure accumulated is significantly lower than the original estimated exposure (i.e. 294.80 and 344.84 respectively). With the Unit 4 SGRP in progress for approximately eight weeks, the exposure accumulated to date for activities completed indicates that the planning for this project together with the experience gained from the Unit 3 SGRP have served to provide a higher level of productivity with reduced personnel exposure. It is expected that this exposure trend will continue throughout the project. Subsequent reports will attempt to describe any changes in exposure trends and the contributing factors applied to such changes.

b. Radioactive liquid effluents released are well within the total estimate projected to be released in Table 5.2-7 of the repair report. The calculated activity (excluding tritium) is less than 10% while the tritium activity is approximately 25% of the total estimated activity in the SGRR.

c. Airborne releases of radioactivity attributed to repair project activities are below the estimates provided in the SGRR. The activity associated with airborne releases for repair project activities is expected to decrease as the project progresses. The airborne activity discharged through the entire repair effort is not expected to exceed the estimate indicated in the SGRR.

d. Solid low level radioactive waste generated to date (excluding the SGLA's) for the Unit No. 4 SGRP represents approximately 47% of the estimate provided in the Gould Affidavit dated June 14, 1981. Some conservatism is employed in assigning the volume of waste generated to the Unit 4 SGRP even though some of the work was not directly related to the repair project. The total quantity of radioactivity shipped was significantly below the activity estimated in the SGRR.

In order to coincide with the routine monthly 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, progress report number 2 will contain information from December 2, 1982 through February 2, 1983.

TABLE 1

DESCRIPTION OF MAJOR TASKS

TASK	TASK DESCRIPTION
1. Concrete and structural steel removal and placement.	1. This task includes all work associated with removal/replacement of concrete and structural steel. Removal items include: Erection of scaffolding to remove piping and electrical components, cut/removal of the concrete shield wall above EL 58' and the floor slab at EL 58', the concrete shield wall below EL 58', and removal of structural steel. Replacement items include: Installation of rebar and cadweld splices, erection of form work and shoring, concrete placement, and installation of structural steel.
2. Construction of pedestal cranes, preparation of polar crane, miscellaneous cribbing platforms, S/G transfer bridge.	2. This task includes installation/removal of the pedestal crane foundations, assembly and erection of cranes and the polar crane trolley, and disassembly and removal of cranes and the polar crane trolley.
3. Removal, modification and reinstallation of S/G upper assemblies and major piping.	3. Items included in this task are: Erection/ removal of scaffolding from El 58' to El 93', removal/installation of insulation and piping, upper assembly girth cut, cutting internal pipe and structural members inside the S/G, upper assembly modifications, and the upper assembly girth weld.
4. Construction of temporary facilities and support services.	4. The major exposure items in this task are: Routing of welding leads, installation of temporary power for small tools and lighting in the area near the S/G (most will be inside the secondary shield wall between El 14' and El 30'6"), and maintenance of temporary power and lighting for the entire outage.
5. General decontamination and disposal of contaminated materials/cleanup.	5. This task includes general area decontamination of the containment prior to commencement of major work, continuous containment decontamination for the entire outage, and removal and disposal of contaminated material for the entire outage.

TABLE 1 (continued)

DESCRIPTION OF MAJOR TASKS

TASK		TASK DESCRIPTION	
6.	Removal and reinstallation of miscellaneous piping, equipment and insulation.	6.	This task includes removal of insulation from the steam generator and main steam and feedwater piping, installation of insulation on the new steam generators, and removal/installation of miscellaneous items.
7.	Non-manuals (e.g., QC, Engineers, HPs).	7.	The non-manual category includes health physics, quality control, and engineering personnel, visitors, and Bechtel personnel required for the entire outage.
8.	Decontamination of the channel head.	8.	Included in this task are mechanical grit blast decontamination of the channel head, and installation of inflatable plugs in the reactor coolant piping.
9.	Cut channel head and remove old S/G lower assembly.	9.	This task includes installation of tenting and temporary shielding, cutting the transition cone, and channel head, and rigging and removal of the lower assembly to the containment equipment hatch.
10.	Weld shield cover on lower assembly; a. At channel head b. At transition end	10.	The only item in this task is welding of steel plates at each end of the steam generator to provide shielding and to prevent leakage.
11.	Cut and remove old divider plate, weld new divider plate.	11.	The divider plate was detached from the tubesheet as part of Task 9. Removal and placement of the divider plate to the channel head is included in this task.
12.	Install new S/G, weld channel head.	12.	This task includes erection/removal of scaffolding, rigging and moving the new steam generator, installation/removal of hydroplugs, channel head welding and grinding, and removal of the inflatable plugs in the reactor coolant pipes.
13.	Placement of steam generator in storage.	13.	This task includes transporting of the S/G from the containment equipment hatch into the storage compound and construction of a roof once the S/G's are in the compound.

TABLE 2

PERSONNEL EXPOSURE SUMMARY - PER TASK

REPORTING PERIOD 10 OCTOBER 1982 TO 2 DECEMBER 1982

TURKEY POINT - UNIT 4

	TASK DESCRIPTION	LABOR EXPENDED IN RADIATION FIELD (PERSON-HOURS) ESTIMATED	ACTUAL	PERSONNEL EXPOSURE[a] (PERSON-REM) ESTIMATED	ACTUAL
1.	Concrete and structural steel removal and replacement.	13,660	7,244	88	46.00
2.	Construction of pedestal cranes, preparation of polar crane, miscellaneous cribbing platforms, and steam generator transfer bridge.	10,280	1,868	32	4.62
3.	Removal, modification and reinstallation of steam generator upper assemblies and major piping.	24,600	8,693	256	55.03
4.	Construction of temporary facilities and support services	19,120	10,839	215	32.01
5.	General decontamination and disposal of contaminated materials/cleanup.	42,310	13,069	201	65.79
6.	Removal and reinstallation of miscellaneous piping equipment and insulation.	8,850	9,013	125	73.15
7.	Non-manuals (e.g. QC, Engineers, Health Physics).	68,540	7,207	436	35.57
8.	Decontamination of the channel head.	1,840	728	214	8.17
9.	Cut channel head and remove old steam generator lower assembly.	3,240	2,904	166	29.13
10.	Weld shield cover on lower assembly:				
	a. at channel head	760	0.00	40	0.00
	b. at transition end	530	25	53	0.03

TABLE 2 (continued)

PERSONNEL EXPOSURE SUMMARY - PER TASK

REPORTING PERIOD 10 OCTOBER 1982 TO 2 DECEMBER 1982

TURKEY POINT - UNIT 4

	TASK DESCRIPTION	LABOR EXPENDED IN RADIATION FIELD (PERSON-HOURS) ESTIMATED	ACTUAL	PERSONNEL EXPOSURE[a] (PERSON-REM) ESTIMATED	ACTUAL
11.[b]	Cut and remove old divider plate, weld new divider plate.	2,640	0.00	29	0.00
12.	Install new steam generator weld channel head.	11,000	2,825	204	2.83
13.[b]	Placement of steam generator in storage.	225	0.00	25	0.00
	TOTAL	207,595	64,415	2,084	352.33
	Estimated Range			1730-2480	

[a] Actual exposures are estimated by self-reading pocket dosimeter totals.

[b] Task not started during this reporting period.

TABLE 3A
SUMMARY OF PREPARATORY ACTIVITY EXPOSURES
REPORTING PERIOD 10 OCTOBER 1982 to 2 DECEMBER 1982
TURKEY POINT - UNIT 4

	ACTIVITY DESCRIPTION	ESTIMATED LABOR (PERSON-HOURS)	ACTUAL LABOR EXPENDED TO DATE (PERSON-HOURS)	ESTIMATED EXPOSURE (PERSON-REM)	ACTUAL EXPOSURE FOR REPORTING PERIOD (PERSON-REM)	ACTUAL EXPOSURE EXPENDED TO-DATE (PERSON-REM)	ACTIVITY STATUS (C-COMPLETE) (I-IN PROGRESS)
1.	Initial Containment Decontamination	4,816	3,276	45.00	18.39	18.39	C
2.	Reactor Cavity Decontamination	0	129	0.00	1.28	1.28	C
3.	Reactor Cavity Liner Plate Inspection	0	0	0.00	0.00	0.00	I
4.	Install S/G Transfer Bridge	960	126	1.21	0.29	0.29	C
5.	Remove Emergency Containment Coolers	140	71	1.68	0.24	0.24	C
6.	Remove CRDM Coolers and Fans	67	213	0.28	1.34	1.34	C
7.	Rerate Polar Crane and Load Test	4,571	1,466	9.49	2.95	2.95	C
8.	Disassemble Manipulator Crane and Store	0	117	0.00	0.80	0.80	C
9.	Install Cherry Pickers	2,430	264	6.06	1.35	1.35	C
10.	Remove Reactor Coolant Pump Motors.	0	390	0.00	2.59	2.59	C

TABLE 3A (Continued)
SUMMARY OF PREPARATORY ACTIVITY EXPOSURES
REPORTING PERIOD 10 OCTOBER 1982 TO 2 DECEMBER 1982
TURKEY POINT - UNIT 4

	ACTIVITY DESCRIPTION	ESTIMATED LABOR (PERSON-HOURS)	ACTUAL LABOR EXPENDED TO DATE (PERSON-HOURS)	ESTIMATED EXPOSURE (PERSON-REM)	ACTUAL EXPOSURE FOR REPORTING PERIOD (PERSON-REM)	ACTUAL EXPOSURE EXPENDED TO-DATE (PERSON-REM)	ACTIVITY STATUS (C-COMPLETE) (I-IN PROGRESS)
11.	Disconnect/Remove Permanent Electrical Equipment and Cables	430	304	1.93	0.79	0.79	C
12.	Install Temporary Power, Lighting and Electical Items.	1,148	4,458	49.50	18.55	18.55	C
13.	Remove Miscellaneous Steel	580	3,073	6.21	7.10	7.10	C
14.	Install/Maintain S/G Temporary Containments and Ventilation	1,008	384	17.63	1.22	1.22	I
15.	Install Temporary Shielding	120	1,193	2.38	11.27	11.27	C
16.	Install Scaffolding-all levels.	1,440	5,203	3.31	34.19	34.19	C
17.	Cut and remove concrete 30'6 and 58' Elevation	5,334	4,171	52.30	38.91	38.91	C
18.	Project non-manual support.	6,927	7,207	60.00	35.57	35.57	C
19.	On-going Decontamination Activities	1,204	1,092	8.19	6.13	6.13	C

TABLE 3A (Continued)
SUMMARY OF PREPARATORY ACTIVITY EXPOSURES
REPORTING PERIOD 10 OCTOBER 1982 TO 2 DECEMBER 1982
TURKEY POINT - UNIT 4

	ACTIVITY DESCRIPTION	ESTIMATED LABOR (PERSON-HOURS)	ACTUAL LABOR EXPENDED TO DATE (PERSON-HOURS)	ESTIMATED EXPOSURE (PERSON-REM)	ACTUAL EXPOSURE FOR REPORTING PERIOD (PERSON-REM)	ACTUAL EXPOSURE EXPENDED TO-DATE (PERSON-REM)	ACTIVITY STATUS (C-COMPLETE) (I-IN PROGRESS)
20.	Containment Tool and Weld Rod Room Support	1,232	506	7.55	0.35	0.35	C
21.	Remove/dispose of contaminated Materials	900	3,009	7.41	18.64	18.64	C
22.	Crane operation/maintenance	685	3,722	1.36	7.63	7.63	C
23.	Miscellaneous Activities	1,000	7,490	1.51	10.99	10.99	C
	PHASE ACTIVITY TOTALS	34,992	47,864	283	220.57	220.57	
	TOTAL - PHASE I (Completed Tasks Only)	33,984	47,480	265.37	219.35	219.35	

TABLE 4
PERSONNEL EXPOSURE SUMMARY PER PHASE
REPORTING PERIOD 10 OCTOBER 1982 TO 2 DECEMBER 1982
TURKEY POINT - UNIT 4

PHASE DESCRIPTION	ESTIMATED LABOR EXPENDED TO-DATE (PERSON-HOURS)	ACTUAL LABOR EXPENDED TO-DATE (PERSON-HOURS)	TOTAL ESTIMATED EXPOSURE (PERSON-REM)	ESTIMATED EXPOSURE EXPENDED TO-DATE (PERSON-REM)	ACTUAL EXPOSURE FOR REPORTING PERIOD (PERSON-REM)	ACTUAL EXPOSURE EXPENDED TO-DATE (PERSON-REM)	PHASE STATUS (C-COMPLETE) (I-IN PROGRESS) (NS-NOT STARTED)
Preparation	34,992	47,864	283	265.37	220.57	220.57	I
Removal	10,918	16,551	1,016	186.62	131.76	131.76	I
Installation	0	0	644	0	0	0	NS
Miscellaneous[a]	0	0	141	0	0	0	NS
Project Totals (Completed Phases Only)	NA[b]	NA	NA	NA	NA	NA	NA

[a]Miscellaneous (post-installation) - includes cleanup, storage and miscellaneous preparations prior to start-up.

[b]NA - not applicable at this time.

TABLE 5
SUMMARY OF RADIOACTIVE EFFLUENT RELEASES
REPORTING PERIOD 10 OCTOBER 1982 TO 2 DECEMBER 1982
TURKEY POINT - UNIT 4

1982

I. LIQUID EFFLUENT RELEASES	RADIOACTIVITY RELEASED IN LIQUID EFFLUENTS (CURIES)			
RADIONUCLIDE	OCTOBER 10/10-11/3	NOVEMBER 11/4-12/1	TOTAL ACTIVITY RELEASED THIS REPORTING PERIOD	TOTAL RELEASED DURING S/G REPAIR TO DATE
Ag-110m	1.30E-04	*	1.30E-04	1.30E-04
Co-58	3.62E-03	1.95E-03	5.57E-03	5.57E-03
Co-60	4.45E-03	1.69E-03	6.14E-03	6.14E-03
Cs-134	4.11E-03	1.92E-03	6.03E-03	6.03E-03
Cs-136	1.90E-04	-	1.90E-04	1.90E-04
Cs-137	7.27E-03	3.59E-03	1.09E-02	1.09E-02
I-131	1.69E-02	5.07E-04	1.74E-02	1.74E-02
I-133	2.50E-03	*	2.50E-03	2.50E-03
I-135	2.60E-04	*	2.60E-04	2.60E-04
Mn-54	7.06E-05	*	7.06E-05	7.06E-05
TOTAL	3.95E-02	9.66E-03	4.92E-02	4.92E-02
Tritium Released (Curies)	1.55+01	3.15E+01	4.70E+01	4.70E+01
			VOLUME RELEASED THIS REPORTING PERIOD	VOLUME RELEASED DURING S/G REPAIR TO DATE
Liquid Effluent Volume Released (Liters)	1.97E+06	1.33E+06	3.30E+06	3.30E+06

*Not detectable

TABLE 5 (Continued)
SUMMARY OF RADIOACTIVE EFFLUENT RELEASES
REPORTING PERIOD 10 OCTOBER 1982 TO 2 DECEMBER 1982
TURKEY POINT - UNIT 4

1982

I. AIRBORNE RELEASES	RADIOACTIVITY RELEASED IN AIRBORNE EFFLUENTS (CURIES)			
A. NOBLE GASES RADIONUCLIDE	OCTOBER 10/10-11/3	NOVEMBER 11/4-12/1	TOTAL ACTIVITY RELEASED THIS REPORTING PERIOD	TOTAL RELEASED DURING S/G REPAIR TO DATE
Ar-41	3.52E-01	*	3.52E-01	3.52E-01
Kr-85	4.09E-01	*	4.09E-01	4.09E-01
Kr-85m	2.23E-01	*	2.23E-01	2.23E-01
Kr-88	1.39E-01	*	1.39E-01	1.39E-01
Xe-131m	1.37E+00	*	1.37E+00	1.37E+00
Xe-133	8.62E+02	*	8.62E+02	8.62E+02
Xe-133m	3.59E+00		3.89E+00	3.89E+00
Xe-135	6.59E+00	*	6.59E+00	6.59E+00
H-3	2.65E-02	*	2.65E-02	2.65E-02
TOTAL	8.75E+02	*	8.75E+02	8.75E+02
TRITIUM	2.65E-02	*	2.65E-02	2.65E-02
B. HALOGENS				
Br-82	1.90E-04	*	1.90E-04	1.90E-04
I-131	2.60E-02	2.40E-03	2.84E-02	2.84E-02
I-133	5.30E-03	3.20E-04	5.62E-03	5.62E-03
TOTAL	3.15E-02	2.72E-03	3.42E-02	3.42E-02

*Not Detectable

TABLE 5 (Continued)
SUMMARY OF RADIOACTIVE EFFLUENT RELEASES
REPORTING PERIOD 10 OCTOBER 1982 TO 2 DECEMBER 1982
TURKEY POINT - UNIT 4

1982

I. AIRBORNE RELEASES	RADIOACTIVITY RELEASED IN AIRBORNE EFFLUENTS (CURIES)			
C. PARTICULATES RADIONUCLIDE	OCTOBER 10/10-11/3	NOVEMBER 11/4-12/1	TOTAL ACTIVITY RELEASED THIS REPORTING PERIOD	TOTAL RELEASED DURING S/G REPAIR TO DATE
Ba-140	2.00E-05	*	2.00E-05	2.00E-05
Co-57	3.50E-07	*	3.50E-07	3.50E-07
Co-58	2.20E-04	4.20E-05	2.62E-04	2.62E-04
Co-60	4.80E-05	2.20E-05	7.00E-05	7.00E-05
Cr-51	1.20E-05	*	1.20E-05	1.20E-05
Cs-134	2.60E-05	7.10E-05	9.70E-05	9.70E-05
Cs-136	9.40E-06	2.60E-05	3.54E-05	3.54E-05
Cs-137	4.90E-05	1.30E-04	1.79E-04	1.79E-04
I-131	5.40E-05	1.90E-05	7.30E-05	7.30E-05
La-140	1.40E-05	*	1.40E-05	1.40E-05
Mn-54	1.20E-05	2.40E-06	1.44E-05	1.44E-05
Nb-95	3.10E-06	*	3.10E-06	3.10E-06
Ru-103	3.00E-06	*	3.80E-06	3.80E-06
TOTAL	4.72E-04	3.12E-04	7.84E-04	7.84E-04

*Not Detectable

TABLE 6

SUMMARY OF SOLID LOW-LEVEL RADIOACTIVE WASTE

REPORTING PERIOD 10 OCTOBER 1982 TO 2 DECEMBER 1982

TURKEY POINT - UNIT 4

I. SOLID LOW-LEVEL RADIOACTIVE WASTE GENERATED FROM U-4 S/G REPAIR

WASTE FORM	VOLUME LLW[a] IN CU-FT FOR REPORTING PERIOD	VOLUME LLW IN CU-FT TO DATE
Compacted Dry Active Waste	8,883	8,883
Non-Compacted Dry Active Waste	1,225	1,225
Resin and Filter Media	520	520
Channel Head Decontamination Waste	0	0
Miscellaneous	0	0
Totals	10,628	10,628

II. SOLID LOW-LEVEL REPAIR ACTIVITY WASTE SHIPPED

REPORTING PERIOD DATES	VOLUME LLW[a] SHIPPED IN CU-FT	ESTIMATED ACTIVITY[b] CURIES
10 October 82 - 2 December 82	7,191	0.332

[a] LLW Low-level (radioactive) waste.

[b] Predominant radionuclides ^{137}Cs, ^{60}Co, ^{58}Co.