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 RECIP. NAME: NOVAK, T.M. RECIPIENT AFFILIATION: Assistant Director for Operating Reactors

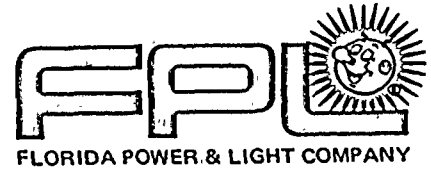
SUBJECT: Forwards response to NRC 800729 request for addl info on radiological evaluation for draft ELS re steam generator repair.

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August 8, 1980  
L-80-265

Office of Nuclear Reactor Regulation  
Attention: Mr. Thomas M. Novak, Asst. Director  
for Operating Reactors  
Division of Licensing  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Mr. Novak:

Re: Turkey Point Units 3 & 4  
Docket Nos. 50-250 & 50-251  
Steam Generator Repair

Attached you will find Florida Power and Light Company's response to the Request for Additional Information regarding the radiological evaluation (for the draft EIS) for the Turkey Point steam generator repair. These questions were transmitted by your letter of July 29, 1980 to Dr. Robert E. Uhrig. As agreed in our conversation with Marshall Grotenhuis of Operating Reactors - Branch I on July 10, 1980, no response is necessary to question 331-8.

Please notify us if further information is required.

Very truly yours,

*J. A. De Mastry*  
*for*

Robert E. Uhrig  
Vice President

REU/LFR/ra

cc: Harold F. Reis  
Norman A. Coll  
S.G. Brain  
H.N. Paduano/H.F. Story

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## RADIOLOGICAL ASSESSMENT

### Question

331.1

Describe how you will incorporate the following provisions of Regulatory Guide 8.8, Revision 3, June 1978, in the steam generator replacement project.

#### C.2 Facility and Equipment Design Features sections.

- a. all subsections
- b. (2), (3), (5), (7), (8), (10).
- c. (2), (3)
- d. (1), (2), (4), (6)
- e. all subsections
- f. (1), (2), (3)
- g. all subsections
- h. (8)
- i. (11), (15)
- j. shielding by maintaining the steam generator water level when possible.

### Response

- a. (1) The areas that may provide a potential dose to personnel large enough to cause acute biological effects and that could be received in a short period of time, such as inside the steam generator channel heads, will be controlled by a specific Radiation Work Permit (RWP) and the direct observation of health physics personnel. When the source is removed by decontamination, subsequent access to the source will be controlled by temporary shielding and health physics control.
- a. (2) Standard Operating procedures such as HP-2, HP-21, and HP-41 have been provided to the NRC staff.
- a. (3) Special platforms or walkways are planned for the steam generator repair to permit prompt accessibility for workers.
- b. (2) The controlled entrance point for steam generator work is planned for the 30' 6" containment building level. This location provides distance, shielding, and a larger working area as compared to working from the 14' elevation. If reactor coolant pumps and piping contribute significantly to the area dose rate, temporary shields will be installed.
- b. (3) See b (2).
- b (5) See b (2).
- b (7) Not applicable for steam generators.
- b. (8) See b (2).
- b.(10) Drain lines and piping will be temporary for the changeout. These lines will be temporarily shielded or routed through infrequently occupied areas. Air will be continuously monitored for airborne contamination when there is an airborne potential.
- c. (2) Control equipment will be located in the lowest radiation zone practical.
- c. (3) Not applicable to this project.

- d. (1) Tenting will be used to prevent the spread of airborne contamination.
- d. (2) Exposures to radioactive material that is collected in ventilation and radwaste treatment systems as a result of the steam generator repair will be controlled with temporary shielding and access control as necessary.
- d. (4) Auxiliary ventilation systems are routinely used for steam generator work.
- d. (6) See answer to a (2).
- e. (1) & (2) Material considerations were incorporated in the design of the new steam generators.
- e. (3) Chemistry Control is monitored and carefully maintained in accordance with Technical Specifications and NSSS recommendations during operation.
- e. (4) & (5) Not applicable to this project.
- f. (1) - (3) These principles will be applied to temporary systems required for the project where applicable. No new permanent piping systems will be installed.
- g. all subsections  
Portable air monitors and air samples will be used to monitor airborne radioactive material in conjunction with the normal containment air monitors.
- h. (8) This is applicable only for the decontamination project. These considerations will be factored in to the contract for the decontamination effort.
- i. (1) These objectives are continuously under consideration by FPL and Westinghouse, and new tools and methods have been developed (e.g., mechanical plugging) to reduce exposures. The steam generator repair does not change these ongoing considerations.
- i. (15) An adequate emergency lighting system is provided in the plant.
- j. The steam generators will be filled with water to provide shielding during the secondary side cut (removal of steam dome).

#### Question

331.2

Revise section 3.3.4.2 to include a commitment to implement a bioassay program in accordance with Regulatory Guide 8.9, "Acceptable Concepts, Models, Equation, and Assumptions for a Bioassay Program," or equivalent alternative.

#### Response

A copy of procedure HP-31 has been provided to the NRC staff. This procedure includes a bioassay program which is in accordance with the intent of Regulatory Guide 8.9

### Question

331.3 Provide a copy of your analysis resulting in person-rem estimates for the mechanical and electro-polishing decontamination, cutting of the divider plate, cutting the steam generator channel head and the steam generator blowdown piping and upper dome. This should include for each:

- (1) a detailed procedure outline
- (2) the time and personnel involved in the job
- (3) dose rate estimated in the area where the job will be performed
- (4) total man-rem to complete job.

### Response

1. As discussed on page A-39-1 of Appendix A to the SGRR, detailed procedures for the various tasks associated with the repair will be developed, as required, as part of the overall design and planning effort for the job. These procedures will be written with consideration for keeping radiation exposure to personnel as low as is reasonably achievable. However, such detailed procedures are not required to estimate the man-rem associated with the repair. As discussed in Subsection 3.3.7.2, the man-rem predictions reflect the best estimates that can be made at this phase of the job, i.e., job average man-rem predictions.. However, more detailed descriptions of the tasks involved in each of the 13 items in Table 3.3-2 can be provided at this time and are included in Table 331.3-1, attached.
2. Manhours involved in major tasks associated with the repair are listed in Table 3.3-2
3. Typical job area dose rates are shown in Figures 3.3-1 through 3.3-7 and in Table 3.3-2
4. The total man-rem to complete each task using the channel head cut method is given in Table 3.3-2

TABLE 331.3-1  
Description of tasks listed in  
Table 3.3-2, Revision 7

<u>TASK</u>	<u>TASK DESCRIPTION</u>
1. Concrete and structural steel removal and replacement.	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 & removal of cranes and the polar crane trolley.
3. Removal, modification & 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 & 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 & disposal of contaminated materials/cleanup.	5. This task includes general area decontamination of the containment prior to commencement of major work, continuous containment decontaminator for the entire outage, and removal and disposal of contaminated material for the entire outage.
6. Removal & reinstallation of miscellaneous piping equipment & 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 Florida Power & Light health physics, quality control, and engineering personnel, visitors, and Bechtel personnel required for the entire outage.

TABLE 331.3-1 cont'd

<u>TASK</u>	<u>TASK DESCRIPTION</u>
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 & remove old S. G. lower assembly.	9. This task includes installation of tenting and temporary shielding, cutting 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 generators 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 hydro plugs, channel head welding and grinding, and removal of the inflatable plugs in the reactor coolant
13. Placement of steam generator in storage	13. This task includes transporting of the S/G. from the containment equipment hatch into the compound and construction of a roof once the S/G's are in the compound.

\*\* Calculations for electro-polishing decontamination will be provided if that method is chosen.

Question

331.4 Provide the basis for the decontamination factor (DF) of 12 on page 3.17.

Response

The decontamination factor of 12 is based on Westinghouse Topical Report WCAP 9398 which was submitted to the NRC by Westinghouse in a January 2, 1979 letter from T. M. Anderson to Harold R. Denton. Chapter 5 of that report reported a DF of 100 based on actual Westinghouse tests. Our DF of 12 is a conservative reduction of the Westinghouse value. Electro-polishing decontamination, a method under consideration, may be used if, among other things, it provides a comparable DF.



Question

331.5

Provide a description of your contamination control program including:

- (1) Limits for demarcation of controlled surface contamination areas and for release of equipment and facilities for unrestricted use (acceptable limits are listed in Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors," or equivalent alternative).
- (2) methods of restricting contamination to controlled surface contamination areas.
- (3) specification of skin dose evaluation criteria including action points for dose evaluation.

Response

- (1) & (2)  $\beta$ - $\gamma$  contamination that is greater than or equal to 1000 dpm/100 cm<sup>2</sup> is the definition of a controlled surface contamination area. These areas are posted and barricaded and require protective clothing for entry. Contamination greater than or equal to 10,000 dpm/100 cm<sup>2</sup> is one condition that requires a radiation work permit (RWP) and requires authorization from Health Physics and a Senior Reactor Operator via a RWP to enter the area. For release limits, see Health Physics Manual, p. 22, sec. 5.3.3.2
- (3) Skin contamination is removed with normal decontamination methods to the extent practical. Personnel with fixed skin contamination are given special instructions to aid in removing the contamination and are rechecked within about 48 hours. Residual Contamination  $\geq$  1000 cpm is converted to dose and filed in the individual's records. Subsequent surveys are made until contamination is removed.

Question

331.6 Provide a breakdown of the person-rem for the project, dividing the do se into four phases -- preparation, removal, installation and storage.

Response

The man-rem to be incurred during the steam generator repair program can be divided into the following phases

	<u>PHASE</u>	<u>Man-Rem</u>
I	Preparation	283
II	Removal	1016
III	Installation	644
IV	Clean-up	116
V	Storage	25

Question

331-7 In the event of a large volatilization accident with the decontamination solution at Turkey Point, what precautions have been taken to assure safe habitability or evacuation of the workers in the steam generator areas: (1) How will the workers in other areas be notified of such an event: (2) what protection is afforded to the workers: and (3) what procedures will be followed in the event of such an accident?

What is the estimated dose to workers for such an accident?

Response

The decontamination solutions to be used at Turkey Point consist of a mild soapy solution for the general area decontamination, and a grit-slurry solution for the steam generator decontamination. Neither of these solutions contain volatile material; hence, no specific procedures beyond those discussed on pages C-4-1 thru C-4-4 of Appendix C to the SGRR are contemplated.

Question

331.9

Describe your administrative control system to assure that worker dose will be kept within the limits of Part 20 and will be maintained ALARA.

Response

Health Physics Manual, pp. 25-29 and procedures that implement the guidelines and limits on these pages provide Administrative Control System for ensuring that worker dose will be kept within 10 CFR 20 limits.

A dose data collection system and evaluation program is used to ensure that exposures are maintained ALARA. Doses are recorded on a computer system by radiation work permit for each worker. This data is analyzed and reviewed on a regular basis to aid in work planning and ensuring exposures are maintained ALARA.

Question

331.10

Describe the new facilities for the project, including locker rooms, shower rooms, access control stations, laboratory facilities for radioactivity analyses, and decontamination facilities (for equipment and personnel).

Response

Planning of additional facilities for the project is not finalized. However, these are estimated as follows:

1. A building or trailers with  $\sim 2400 \text{ ft.}^2$  for training, orientation, and office space.
2. A building or trailer with  $\sim 1200 \text{ ft.}^2$  for respirator training and booth fit.
3. A nuclear maintenance building with  $\sim 1200 \text{ ft.}^2$  for dressing, showers, and dose control.
4. A security/TLD guardhouse for access control.
5. Additional storage facilities.

Question

331.11

Indicate in a table the radiation protection equipment that is provided during this operation to meet the anticipated needs of the operating unit (for normal and accident conditions) and the steam generator repair project. Include in the table the types of instruments, their numbers, sensitivities, and ranges. In addition, include a table specifying the quantity and types of respiratory protection equipment available.

Response

The listed instruments are approximations for planning purposes. Not listed are various miscellaneous items, which have received the same planning considerations, such as: pocket dosimeters, TLD's, air samplers, whole body counters, portable area radiation monitors, etc.

<u>INSTRUMENT</u>	<u>RANGE</u>	<u>APPROXIMATE # FOR NORMAL &amp; EMER. USE</u>	<u>APPROXIMATE ADDITIONAL #'s. FOR PROJECT</u>
Eberline Model Rm-14, w/HP-210 NP-177 probe	"frisker" 0-50,000 cpm β-γ	15	40
Eberline Model RM-15, w/HP-210 or Zns (ag) probe	"frisker" 0-500,000 cpm α-β-γ	12	5
Eberline Model 6112 - Teletector	0-1,000 R/hr β-γ	3	12
Eberline Model RN-4	0-5,000 m Rem/hr neutron	5	0
Eberline Model E-520, or similar w/HP-177 probe	0-2,000 m R/hr β-γ	19	40
Eberline Model RO-2 ionization chamber	0-5,000 m R/hr β-γ	2	5
Eberline Model RO-2a ionization chamber	0-50 R/hr β-γ	1	5
Nuclear Chicago Model 0592	0-1,000 R/hr β-γ	10	0
Eberline MS-2 or MS-3	Mini-Scaler α-β-γ	3	10
Eberline SPA-3	Various α-β-γ	2	0
Portal Monitors	N/A	4	4-8
Respirators, full-face, supplied air or canister	N/A	700	600
Hoods Supplied air	N/A	100	600
Canisters, particulate for full-face respirators	N/A	2,000	6000

Describe the organization and staffing necessary to provide the radiation protection program for the steam generator replacement. Identify by title the individuals who will be responsible for the program and describe their functional responsibilities, experience and qualifications.

### Response

The individual responsible for the H.P. program is the steam generator repair health physics supervisor. He reports to the Health Physics Supervisor and has been assigned full-time to the project since October, 1979. He has a Bachelor's degree in Electrical Engineering, Masters Degree in Health Physics, and 4 years experience, 2½ of which has been at our Turkey Point Plant. He will have approximately seven supervisory and three technical personnel, all qualified in health physics at FPL, reporting to him for the project. In addition, there will be approximately fifty junior technicians and fifty senior technicians (contract health physics technicians) assigned to the project.

### Question

331.13 Describe the reasons for the estimated increase from 1300 man-rems/unit to 2985 per unit.

### Response

The reasons for the increased man-rem estimate are summarized in Section 1.0 of the SGRR. As discussed therein, the Surry steam generator repair program showed that pipe alignment problems would be greater than we had anticipated, and that greater supervision would be needed for the repair in general. We therefore revised our man-rem estimate to account for these, and to also reflect additional information and level of detail which have been generated as our designs and calculations have undergone normal engineering evolution. It should be noted, however, that both 1300 and the 2985 man-rem estimates are for the pipe cut method of steam generator removal. FPL's preferred method at present is the channel head cut method, which results in an estimated exposure of 2084 man-rems.

To facilitate a direct comparison of the revised estimates with the previous estimate, we are providing Table 331.13-1. This table gives a breakdown of the revised man-rem estimates for the two pipe cut options, i.e., one and two cuts per pipe, and the channel head cut method in the format and categories of Table 3.3-2, Revision 2.

Table 331.13-1

ESTIMATED MAN-REM DOSE TO WORKERS  
FOR VARIOUS STEAM GENERATOR REPAIR OPTIONS

Task Description	Range of Radiation Field (rem/hr)	PREVIOUS PIPE CUT ESTIMATE 2 CUTS/PIPE		NEW PIPE CUT ESTIMATE 1 CUT/PIPE		NEW PIPE CUT ESTIMATE 2 CUTS/PIPE		CHANNEL HEAD CUT ESTIMATE (2)	
		Estimated Man Hours in Radiation Fields (hrs)	Task Man-Rem Dose (man-rem)	Estimated Man Hours in Radiation Fields (hrs)	Task Man-Rem Dose (man-rem)	Estimated Man Hours in Radiation Fields (hrs)	Task Man-Rem Dose (man-rem)	Estimated Man Hours in Radiation Fields (hrs)	Task Man-Rem Dose (man-rem)
1. Erection of scaffolding and pipe supports at the steam generators and piping to be cut	0.005-0.1	1,620	92.1	1,220	138	1,220	138	---	---
2. Removal of insulation from RCS piping and steam generator	0.005-0.1	1,500	63	8,850	125	8,850	125	8,850	125
3. SG and RCS pipe surface decontamination	0.005-0.1 (0.5 for new estimates)	1,200	61.5	1,840	96	1,840	96	1,840	214
4. Installation of steam generator support clips	0.005-0.1	1,200	40.5	---	---	---	---	---	---
5. Preparation for steam generator upper shell cut	0.005-0.1	1,350	48	24,600	256	24,600	256	24,600	256
6. Steam generator upper shell cut	0.005-0.1	2,100	45						
7. Steam generator upper internals cut and removal	0.005-0.3	1,440	102.6						
8. Preparation of RCS hot legs for cut	0.05-0.1	300	22.5	735	69	735	69	4,780 (Range of radiation field for this option is .001 - 6.0)	118
9. RCS hot leg cut	0.005-0.1	780	29.1	168	13	168	13		
10. Preparation of RCS pump legs for cut	0.05-0.1	300	22.5	735	69	735	69		
11. RCS pump leg cut	0.005-0.1	780	29.1	168	13	168	13		
12. Installation of steam generator cover plates	0.005-0.1	780	37.5	990	96	990	96	1,290	93
13. Removal of steam generator lower assemblies to storage facility	0.005-0.1	1,140	39	1,320	103	1,320	103	1,320	102
14. Installation of new lower assemblies, concrete removal and replacement, lay-down facilities erection, temporary re-location of containment equipment, other pipe cuts and welds, etc.	0.005-0.05 (0.15 for new estimates)	34,000	260	33,600	686	37,850	1155	34,940	324
15. Special crews and indirect work (e.g., scaffolding, cleanup, temporary power etc.)	0.005-0.05	23,800	209	61,430	416	61,430	416	61,430	416
16. Miscellaneous <sup>(1)</sup> (e.g., supervisory field engineering, security, QA/QC and health physics activities)	0.005-0.05 (0.2 for new estimates)	22,000	200	68,540	436	68,540	436	68,540	436
Total for repair of three steam generator lower assemblies		94,920	1301.4	204,196	2516	208,446	2985	207,590	2084
Estimated range for repair of three steam generator lower assemblies		650-1450		Not Estimated		Not Estimated		Not Estimated	

## NOTE:

- (1) Miscellaneous covers tasks which may be related to the removal as well as to the installation of the steam generators.
- (2) It should be noted that actual pipe cut and channel cut categories differ from each other; the channel cut manhour and man-rem estimates below have been put into the pipe cut category most applicable to the particular task.

Question

331.14 Your application specifies that a substantial portion of your ALARA program is written in the FPL Health Physics Manual. Provide a copy of the FPL Health Physics Manual.

Response A copy of this manual is attached hereto.



Question

331.15 Describe the cutup and handling for alternatives a, b and c in Table 3.4-3. It should include items 1-4 in question 4.

Response

The disposal estimates for the options in Table 3.403 were generated based on equivalent gross levels of detail in the job descriptions and manhours. Detailed procedures for the various tasks associated with options a, b and c were not developed since a man-rem comparison with the other options showed that options a, b, and c were not ALARA, and therefore further exploration and level of detail would not be warranted.