ATTACHMENT A

Carolina Power & Light Company

H. B. Robinson Steam Electric Plant, Unit No. 2

NUMARC Aquatic Resources Survey Responses

CAROLINA POWER & LIGHT COMPANY
H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT 2
NUMARC AQUATIC RESOURCES SURVEY

Background

On July 31, 1970 the Atomic Energy Commission (AEC) issued Carolina Power & Light Company (CP&L) a facility operating license DPR-23 for the H. B. Robinson Steam Electric Plant (SEP), Unit 2 (hereafter referred to as Unit 2). The low power level restriction was removed on September 23, 1970, and the plant was declared commercial on March 7, 1971. In April 1975, the Nuclear Regulatory Commission (formerly the AEC) issued a Final Environmental Statement (FES) recommending "continuation of Facility Operating License DPR-23 to Carolina Power and Light Company for H. B. Robinson Unit 2, Docket No. 50-261" (copy provided).

The 2,250-acre Robinson Impoundment supplies cooling water for Unit 2 and an associated coal-fired unit (Unit 1). No other facilities operate on or discharge to the impoundment. The impoundment waters are darkly stained (blackwater), acidic, and relatively low in primary productivity. The aquatic biota consists of organisms typical of blackwater systems with bluegill, largemouth bass, and warmouth as the dominant fish species. A canal (4.2 miles long) discharges heated water approximately mid-impoundment. A 316 Demonstration [P.L. 92-500; Sections 316 (a) and (b)] submitted in 1976 provided the basis for operation of the unit at maximum heat rejection with once-through cooling and an exemption from intake modifications to minimize impingement/entrainment. After the 316 Demonstration was completed, environmental monitoring studies continued to be conducted each year through the present to confirm the results of the 316 Demonstration and to identify any additional measurable impacts to the aquatic resources.

RESPONSES TO NUMARC AQUATIC RESOURCE SURVEY QUESTIONS
H.B. ROBINSON SEP, UNIT 2 (ROBINSON IMPOUNDMENT)

Several environmental reports including a 316 Demonstration document, the NRC FES, and a series of CP&L environmental monitoring reports serve as the basis for CP&L's response to the NUMARC survey for the H. B. Robinson SEP, Unit 2. These reports are referenced in responding to the following questions.

1. **Post-licensing modifications and/or changes in operations of intake and/or discharge systems may have altered the effects of the power plant on aquatic resources, or may have been made specifically to mitigate impacts that were not anticipated in the design of the plant. Describe any such modifications and/or operational changes to the condenser cooling water intake and discharge systems since the issuance of the Operating License.**

   Response:

   No intake/discharge modifications have been made since the issue of the operating license to mitigate environmental impacts. Minor changes (e.g. replacing a pump, etc.) have been made but none that have measurably altered the effects of Unit 2 on the aquatic resources.

2. **Summarize and describe (or provide documentation of) any known impacts on aquatic resources (e.g., fish kills, violations of discharge permit conditions) or National Pollutant Discharge Elimination System (NPDES) enforcement actions that have occurred since issuance of the Operating License. How have these been resolved or changed over time? (The response to this question should indicate whether impacts are ongoing or were the result of start-up problems that were subsequently resolved.)**

   Response:

   Localized impacts to fish, benthos, zooplankton, and aquatic vegetation from the heated discharge are known to occur in the impoundment. The 316 Demonstration originally described the effects of the discharge on aquatic organisms (CP&L 1976b). The extent of the thermal impact was considered limited by state (South Carolina Department of Health and Environmental Control) and federal (U. S. Environmental Protection Agency) regulatory agencies and no action was required.

   Skeletal deformities in fish, particularly bluegill, were detected during fisheries monitoring programs in the mid to late 1970's. The deformities were described in detail in CP&L (1979a). In 1979, fish population declines were noted downstream of the discharge concomitant with a increase in deformity incidence rates in bluegills (CP&L 1980). Intensive bioassay studies were begun to determine the cause of both problems and ultimately copper loading in the impoundment was found to be responsible (CP&L and LMS 1981). The copper source was determined to be corrosion/erosion of the Admiralty Brass® condenser tubes within the power plant. The tubing was replaced in 1981 eliminating the copper loading in the impoundment. Fish populations recovered after the tubing change and the skeletal deformities disappeared. The fishery has maintained a higher standing crop than the period when Admiralty Brass® tubing was in use.

No fish kills have been detected or reported in the impoundment since the issue of the operating license.

NPDES permit violations directly related to the operation of Unit 2 have been thermal in nature (exceedances of daily and monthly average temperature limits). These occurrences were reviewed with the appropriate regulatory agencies at the time, and it was understood that enforcement actions would not be taken, pending continued biological monitoring by the Company to verify that no adverse consequences occurred. Most of these exceedances occurred in 1986, during a recorded-breaking drought. The only other permit violations were indirectly associated sewage treatment plant exceedances related to difficulties in start-up of that facility in 1986.

3. **Changes to the NPDES permit during operation of the plant could indicate whether water quality parameters were determined to have no significant impacts (and were dropped from monitoring requirements) or were subsequently raised as a water quality issue. Provide a brief summary of changes (and when they occurred) to the NPDES permit for the plant since issuance of the Operating License.**

Response:

Unit 2 has had no water quality-related changes to the permit except for the addition of thermal limits following the 316 Demonstration in the mid-70's (see question 9). The original post-operating license NPDES permit required that biological studies be conducted to determine the effects of cooling water on the lake, and after those studies made the successful demonstration, the permit was modified in 1978 to incorporate thermal limits. The last permit was issued in 1983 and continued to incorporate thermal limits on the once-through cooling water at the end of the discharge canal. In the current NPDES permit renewal application, the Company has requested modification of the thermal limits to lessen the possibility of thermal permit violations (see response to question 2 for explanation). This effort is expected to have a favorable resolution because the new requested limits allow for a more natural and even rise in lake the temperatures.

4. **An examination of trends in the effects on aquatic resources monitoring can indicate whether impacts have increased, decreased, or remained relatively stable during operation. Describe and summarize (or provide documentation of) results of monitoring of water quality and aquatic biota (e.g., related to NPDES permits, Environmental Technical Specifications, site-specific monitoring required by federal or state agencies). What trends are apparent over time?**

Response:

A document that best describes long-term trends of water quality variables and aquatic organisms is the Interpretive Report (CP&L 1988). One documented trend was the response of the fish population to the increase and subsequent decline of copper input into the impoundment (described in response 2 above). Another trend described in the report is a decline in zooplankton populations beginning in the early 1980's and continuing to the present. This trend was attributed to a significant increase in predation from fish populations which were increasing during that period.

5. **Summarize types and numbers (or provide documentation) of organisms entrained and impinged by the condenser cooling water system since issuance of the Operating License. Describe any seasonal patterns associated with entrainment and impingement. How has entrainment and impingement changed over time?**

Response:

The 316 Demonstration document (CP&L 1976a) contains information on the types and numbers of fish entrained (1975-1976) and impinged (1973-1975) by the unit intake structure (Tables 4.8.1 and 4.9.2). Entrainment samples were dominated by percid larval fish (Etheostoma sp.). The only other larvae collected in the entrainment samples were small numbers of centrarchids (Lepomis sp.) and catastomids. Density was reported in number/100 m^3 in the 316 Demonstration but in subsequent years densities were reported in number/1000 m^3. Comparing densities from 1976-1980, entrainment remained relatively constant with respect to species and numbers (CP&L 1979b, 1980, and 1982). These same documents describing entrainment contain the impingement data collected from 1973-1980. Bluegill was the major species collected (> 90%) in impingement samples from 1973-1975 [316 (b) demonstration, CP&L 1976b]. Similar rates were found in 1980 (CP&L 1982). Based on a determination in 1977 by the EPA and agreed upon by regulatory agencies that entrainment and impingement was not significantly impacting the fishery, this sampling was deleted from the monitoring program in 1980.

6. Aquatic habitat enhancement or restoration efforts (e.g., anadromous fish runs) during operation may have enhanced the biological communities in the vicinity of the plant. Alternatively, degradation of habitat or water quality may have resulted in loss of biological resources near the site. Describe any changes to aquatic habitats (both enhancement and degradation) in the vicinity of the power plant since the issuance of the Operating License including those that may have resulted in different plant impacts than those initially predicted.

Response:

No aquatic habitat improvement has been required for mitigation in Robinson Impoundment; however, a few artificial reefs were installed in an attempt to increase fishing success for anglers by concentrating fish in an accessible location.

Degradation of habitat from heated water in vicinity of the discharge [described in the 316 (a) Demonstration] and by the effects from copper loading in the impoundment in the late 1970's and early 1980's were both detailed in the response to Question 2.

7. Plant operations may have had positive, negative, or no impact on the use of aquatic resources by others. Harvest by commercial or recreational fishermen may be constrained by plant operation. Alternatively commercial harvesting may be relatively large compared with fish losses caused by the plant. Describe (or provide documentation for) other nearby uses of waters affected by cooling water systems (e.g., swimming, boating, annual harvest by commercial and recreational fisheries) and how these impacts have changed since issuance of the Operating License.

Response:

Robinson Impoundment is open to the public for recreational purposes. One public access ramp and two privately owned access ramps exist on the lake. Uses include swimming, boating, water skiing, fishing and hunting. Privately owned property with houses and boat docks exist along the eastern shore of the lake. No restrictions on the recreational uses have been documented for Robinson Impoundment, but it is likely that some limit on swimming and skiing in the area of the discharge exists during the hottest months of the year (usually July and August) because of the warm water temperatures. However, the warm water likely extends the swimming and skiing season in spring and fall. Winter fishing in the vicinity of the discharge canal also occurs. No commercial fishing occurs at the Robinson Impoundment.

8. **Describe other sources of impacts on aquatic resources (e.g., industrial discharges, other power plants, agricultural runoff) that could contribute to cumulative impacts. What are the relative contributions by percent of these sources, including the contributions due to the power plant, to overall water quality degradation and losses of aquatic biota?**

Response:

The Company is not aware of any other significant industrial or agricultural input into the lake that could potentially impact aquatic resources. Monitoring Black Creek upstream of the lake has not revealed any unusually elevated water quality variables. The Sandhills National Wildlife Refuge, peach orchards, and a small winery are located within twenty miles upstream of the Robinson Impoundment but are thought to have no significant influence on the impoundment.

9. **Provide a copy of your Section 316 (a) and (b) Demonstration Report required by the Clean Waste (sic) Act. What Section 316(a) and (b) determinations have been made by the regulatory authorities?**

Response:

The 316 Demonstration (CP&L 1976b) performed in the early 1970's provided the basis for regulatory exemption (EPA 1977) from the construction and use of cooling towers [316 (a)] and intake structure modifications to limit entrainment/impingement impacts [316 (b)]. Regulatory authorities have determined that the demonstration showed that a balanced and indigenous population of fish and shellfish could be maintained in the absence of such plant modifications. A copy of the demonstration document and the EPA's Findings of Fact is provided. Entrainment and impingement sampling was deleted from the monitoring program after 1980.

DOCUMENTS CITED

CP&L. 1976a. H. B. Robinson Steam Electric Plant 316 Demonstration. Summary. Carolina Power & Light Company, Raleigh, NC.

____ 1976b. H. B. Robinson Steam Electric Plant 316 Demonstration. Volume II. Carolina Power & Light Company, Raleigh, NC.

____ 1979a. H. B. Robinson Steam Electric Plant 1976-78 environmental monitoring program results. Volume I. Summary. Carolina Power & Light Company, Raleigh, NC.

____ 1979b. H. B. Robinson Steam Electric Plant 1976-78 environmental monitoring program results. Volume II. Carolina Power & Light Company, Raleigh, NC.

____ 1980. H. B. Robinson Steam Electric Plant environmental monitoring program. 1979 annual report. Carolina Power & Light Company, Raleigh, NC.

____ 1982. H. B. Robinson Steam Electric Plant environmental monitoring program. 1980 annual report. Carolina Power & Light Company, Raleigh, NC.

____ 1988. H. B. Robinson Steam Electric Plant environmental monitoring program. Interpretive report June 1988. Carolina Power & Light Company, Raleigh, NC.

CP&L and LMS. 1981. Investigations of deformities and lowered recruitment of bluegill (Lepomis macrochirus) in Robinson Impoundment. Carolina Power & Light Company, New Hill, NC and Lawler, Matusky, and Skelly Engineers, Pearl River, NY.

ATTACHMENT 1

RESPONSES TO NUMARC QUESTIONNAIRE TO SUPPORT PART 51 RULE CHANGE

SOCIOECONOMIC QUESTIONS

Carolina Power & Light Company

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

DOCKET NO. 50-261/LICENSE NO. DPR-23

Responses Apply to Entire Site

SOCIOECONOMIC IMPACT OF H. B. ROBINSON, NO. 2

1. Estimate the number of permanent workers on-site for the most recent year for which data are available.

The number of permanent workers on-site for 1990 is 650 utility and contractors for HBR2.

2. Estimate the average number of permanent workers on-site, in 5 year increments, starting with the issuance of the plant's operating license.

1970	Estimates Not Available
1975	Estimates Not Available
1980	356 Permanent Workers
1985	709 Permanent Workers
1990	650 Permanent Workers

3. Provide for the following three cases:

   A. a typical planned outage
   B. an ISI outage
   C. the largest single outage (in terms of # of workers involved) to date.

   (1) estimate of additional workers involved
   (2) length of outage
   (3) months and year in which work occurred, and cost
   (4) exposure.

Response for 3A - Typical Planned Outage

Length: 8 Weeks

Cost: 8 Million Dollars

Dose: 350 man rem

Manpower: 1200 to 1500 temporary and permanent plant workers.

Response for 3B - ISI Outage:

Length: 170 days (February 26, 1982 through August 19, 1982.)

Cost: 15.844 Million Dollars

Dose: 1242.956 man rem

Manpower: 1195 temporary and permanent plant workers (breakdown by task is not available.)

SOCIOECONOMIC IMPACT OF HBR2 (CONT'D)

Response for 3C - Largest Single Outage - Steam Generator Replacement

Length: 349 Days (January 26, 1984 to January 9, 1985)

Cost: 144 Million Dollars

Dose: 3355.954 manrem

Manpower: 12[illegible] Temporary and Permanent Plant Workers (breakdown by principal tasks not available)

Attached is a dose breakdown by major ta[illegible]

HBR2 Exposure Breakdown
1984 Steam Generator Replacement Outage

		Actual Man-Rem
1.	Mod 713 - Steam Generator Replacement	1206.820
2.	Steam Generator Inspections	
	a. Eddy current inspection prior to steam generator replacement	35.650
	b. Eddy current inspection after steam generator replacement	8.470
3.	Health physics coverage	
	a. total exposure for outage	389.888
	b. Exposure for steam generator replacement	(119.100)
4.	Valve operation, inspections and surveillance	149.707
5.	Decon and radwaste	156.036
6.	ISI inspection and 79-14 hanger inspection walkdown	137.253
7.	Refueling work includes all head work except initial defueling	136.691
	a. Initial defueling (included in Steam Generator Replacement	(34.275)
8.	Valve Work, (removal, repair, replace and repack)	41.350
9.	I&C Work	17.490
	a. Calibration	10.830
	b. Misc. equipment replacement	2.315
	c. NIS detector replacement	0.450
	d. RTD repair	0.150
	e. Heat tracing	0.600
	f. Penetration work	0.425
	g. ILRT setup	0.900
	h. Pull cables	0.150
	i. Repair PAs	0.400
	j. Repair elevator	0.875
	k. Repair emergency lighting	0.395
10.	Insulation - (Pressurizer), and Mod 806	27.110

HBR2 Exposure Breakdown
1984 Steam Generator Replacement Outage

Continued

11.	Bellows repair (SP-587)		16.390
12.	Misc. grouting and painting	15.750	
13.	Fire watch in containment and auxiliary building		74.767
14.	Service water piping repair		97.004
15.	Seismic support repairs (Mod 492)		240.765
16.	Replace level transmitters in CV sump (Mod 525)		6.965
17.	Reactor vessel level indication system (Mod 526)		94.310
18.	Relocation of pressurizer spray valves (Mod 612)		111.305
19.	Service water pipe relocation (Mod 686)		3.370
20.	Pressurizer safety and relief valve system (Mod 729)		18.940
21.	Steam generator blowdown and wet layup system (Mod 747)		164.298
22.	Hydrogen recombiner (Mod 750)		6.720
23.	Dedicated alternate shutdown system (Mods 755 and 795)		28.200
24.	Charging system improvements (Mod 7660		21.533
25	lOOSE PARTS MONITOR (mOD 783)		23.745
26.	"C" accumulator support (Mod 816)		0.735
27.	"A" RTD bypass loop valves (Mod 827)		8.650
28.	Misc. work		44.284
	a. Filter		
	1. waste holdup tank		2.373
	2. Seal water injection		0.660
	3. Reactor coolant		1.760
	4. Spent fuel pit		0.210

HBR2 Exposure Breakdown
1984 Steam Generator Replacement Outage

	b.	Numbers 1 and 2 sumps	2.105
	c.	Boric acid evaporator	5.695
	d.	Waste evaporator	2.480
	e.	Boric acid storage tank area	1.025
	f.	HVE and HVH	1.315
	g.	Spent fuel pit (sip fuel)	1.940
	h.	Repair debris screens	1.774
	i.	Reactor coolant pumps	1.015
	j.	Misc. pumps	1.665
	k.	Pour concrete	1.825
	l.	Snubber	0.770
	m.	Waste gas compressor	0.670
	n.	Charging pump room	0.185
	o.	Painting	0.990
	p.	Fire barriers	0.670
	q,	RHR pit	0.345
	r.	Repair grating	0.025
	s.	Repair doors	0.370
	t.	Rotate pump shafts	0.035
	u.	Misc. insulation work	14.380
29.	Hands on inspection		35.434
30.	General maintenance		36.324
	TOTAL		3355.954

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT MREM	PLANT MEN	NON-PLANT MREM	NON-PLANT MEN	CONTRACT MREM	CONTRACT MEN	TOTAL MREM	TOTAL MEN	AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
A. HEAD WORK	198015										207,920	14.45
1. Remove Missile Shield	240	390	5			155	3	545	8	68		
2. Disconnect Thermocouples	625	380	5			10	1	390	6	65		
3. Install Cavity Catwalk	20	40	1	10	1	260	10	310	12	26		
4. Repair Stud Tentioners	750	25	2			20	1	45	3	15		
5. Remove Duct Work and Shroud	6480	695	8	90	3	2265	9	3050	20	153		
6. Remove Conoseals	5400	1420	6			145	3	1565	?	174		
7. Remove Stud Bolts	27000	3630	15			12,700	25	16330	40	408		
8. Remove Blind Flange	300					645	2	645	2	323		
* 9. Change NIS Detectors		1240	8	150	2			1390	10	139		
10. Check and Repair Refueling Equipment	680	120	?	10	1	290	8	420	16	26		
11. Install Instrument Ports	1000	85	2			335	2	420	4	105		
12. Pull Flux Thimbles	240	620	5			200	6	820	12	68		
13. Remove Pie Blocks	200	530	8	45	4	420	6	995	18	55		
14. Inspect Lower Internals Support		15	1	15	1	60	2	90	4	23		
15. Inspect and Repair Cavity Lights	720	320	9			365	7	685	16	43		
16. Lift Head	1600	1065	17			1045	18	2110	35	60		
17. Lift Upper Internals	960	1320	10			160	1	1480	11	135		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT MREM	PLANT MEN	NON-PLANT MREM	NON-PLANT MEN	CONTRACT MREM	CONTRACT MEN	TOTAL MREM	TOTAL MEN	AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
18. Install Numaseal		590	6			1435	9	2025	15	135		
19. Setup Cavity Filter	500	240	7			405	13	645	20	32		
20. Remove SFP Canal Gate	20	30	2			10	1	40	3	13		
21. Replace SFP Hoist Cabl	480	20	1					20	1	20		
22. Inspect RV Head Flange		350	6			860	9	1210	15	81		
23. Remove Coil Stacks	3000	830	13			1285	16	2115	29	73		
24. Remove CRDM		1920	8			8405	17	10325	25	413		
25. Remove Irradiated Vessel Sample Plug		105	5			50	2	155	7	22		
26. Remove Head Lifting Rig		105	7			110	7	215	14	15		
27. Remove Fuel	10920	2515	40	25	2	20	2	2560	44	58		
28. Clean 3rd Level Area		215	3			545	7	760	10	76		
29. Remove Section of Manipulator Crane	160	210	10			80	4	290	14	21		
30. Remove Lower Internals First Time												
a. Preparation		315	9	255	5	260	8	830	22	38		
b. Removal	2000	1515	17			665	6	2180	23	95		
c. Observation		20	1	35	2	105	4	160	7	23		
d. Attach Supports				20	1	900	13	920	14	66		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

		PREDICTED MREM	PLANT		NON-PLANT		CONTRACT		TOTAL		AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
			MREM	MEN	MREM	MEN	MREM	MEN	MREM	MEN			
31.	Install Lower Internals First Time	2000	1630	12			200	1	1830	13	141		
32.	Remove Lower Internals 2nd Time		605	6	110	1	810	13	1525	20	76		
33.	Install lower Internals 2nd Time		550	3			410	9	960	12	80		
34.	Clean Stud Bolts	2800	525	17	70	4	815	25	1410	46	31		
35.	Remove Head Insulation	32000	70	1	80	1	11310	23	11460	25	458		
36.	Remove and Replace L-11	2000	4615	25	825	2	11460	38	16900	65	260		
37.	Replace CRDM's & RPI's	6600	5485	39	230	6	9500	38	15215	93	164		
38.	Relocate Irradiated Core Samples		370	2	140	2	1215	13	1725	17	101		
39.	Repair Upender Motor	1000	525	4			400	3	925	7	132		
40.	Remove Sandplugs	800	425	5			80	1	505	6	84		
41.	Inspect Fuel	1200	470	7	495	5	1230	5	2195	17	129		
42.	Inspected Camera	180	70	3					70	3	23		
43.	Removed & Replace Flax Thimbles	6000	1205	16	175	3	885	18	2265	37	61		
44.	Repair RV Vent		205	2			1045	4	12[illegible]0	6	208		
45.	Refuel	10920	4825	54	245	10	215	7	5285	71	74		
46.	Change Cavity Filters	100	115	5	30	4	160	4	405	13	31		
47.	Install Upper Internals	720	600	8	50	[illegible]	50	3	700	[illegible]	44		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

		PREDICTED MREM	PLANT		NON-PLANT		CONTRACT		TOTAL		AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
			MREM	MEN	MREM	MEN	MREM	MEN	MREM	MEN			
48.	Install RV "O" Ring	800	170	2			270	5	440	7	63		
49.	Replace Head Insulation	24100	595	2			19570	19	20165	20	1008		
50.	Install Head	900	1305	17	1150	8	2790	22	5245	47	112		
51.	Decon Cavity	6000					7750	29	7750	29	267		
52.	Replace & Tention Stud Bolts		3565	22	5970	17	23490	34	33025	73	452		
53.	Replace Conoseals		3765	5	950	3	20	2	4735	10	474		
54.	Replace Shroud	33000	225	2	685	3	2410	12	3320	17	195		
55.	Replace Duct Work		190	3			1880	10	2070	13	159		
56.	Replace Blind Flange	600	20	1	80	2	355	2	455	5	91		
57.	Remove Cavity Filtration System	400	160	4	785	16	185	3	1130	23	49		
58.	Install Pie Blacks	200					70	5	70	5	14		
59.	Adjust Fitting in Seal Table Room	640			55	2			55	2	28		
60.	Move Head Cable Trays & Missile Shield		425	7			415	13	840	21	40		
61.	Hook Up Rod Drive Motors		380	3			790	4	1170	7	167		
62.	Install Head Cables	320	515	5			[illegible]	3	635	8	79		
63.	Install & Check Tags on CRDM's & RPI's				115	2			115	2	58		
64.	Install Head Thermocouples	1200	4210	9	175	2	1130	2	5515	13	424		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT MREM	PLANT MEN	NON-PLANT MREM	NON-PLANT MEN	CONTRACT MREM	CONTRACT MEN	TOTAL MREM	TOTAL MEN	AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
65. Install Mirrophones on CRD's		695	14			50	2	745	16	47		
66. Set Missile Shield	240	55	3			20	1	75	4	19		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT MREM	PLANT MEN	NON-PLANT MREM	NON-PLANT MEN	CONTRACT MREM	CONTRACT MEN	TOTAL MREM	TOTAL MEN	AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
B. "A" RCP											94,395	6.56
1. Unwire Motor		110	3			205	3	315	6	53		
2. Disassemble & Remove Seals and Motor		295	7	210	4	2140	23	2645	34	78		
3. Remove Flange Bolts		100	4			965	20	1065	24	44		
4. Remove & Replace Diffuser		825	7	110	2	21,425	56	22,360	65	344		
5. Change Thermal Barrier Gasket		285	5			3170	35	3455	40	95		
6. Clean and Test Bolt Hole		310	2					310	2	155		
7. Retrieve Dropped Bolt		3985	30	75	2	41,020	115	45,080	147	307		
8. Enter "A" RCP Line to Retrieve Material		1670	10					1670	10	167		
→ 9. Cut Drain Line Valve to Retrieve Material						1155	9	1155	9	128		
10. Weld "A" RCP Drain Line						2575	14	2575	14	184		
11. Set Pump		335	5			3470	26	3805	31	123		
12. Set Motor		205	5			1030	18	1235	23	54		
13. Torque Flange Bolts		530	7	10	1	7315	38	7855	46	171		
14. Wire Motor		140	1			200	2	340	3	113		
15. Clean Up		85	1	130	2	315	7	530	10	53		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT MREM	PLANT MEN	NON-PLANT MREM	NON-PLANT MEN	CONTRACT MREM	CONTRACT MEN	TOTAL MREM	TOTAL MEN	AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
											113,70?	7.90
C. "B" RCP	49,725											
1. Unwire Motor	480	90	1			350	2	440	3	147		
2. Remove RCP Motor	1210	520	6	30	1	735	8	1285	15	86		
3. Remove Seals	4290	480	9	270	2	840	17	1590	28	57		
4. Remove Main Flange		965	15	320	4	4370	17	5655	36	157		
5. Pull Diffuser & Adapter	12,000	1515	12	570	3	8800	12	10,885	27	403		
6. ISI Inspection	10,800	885	1			9460	27	10,345	28	369		
7. Disassemble & Reassemble Rotating Parts		11,040	33	1680	5	10,365	26	3,085	64	361		
8. Electro Polish Impeller & Diffuser						8,105	7	8,105	7	1158		
9. Clean & Test Bolt Holes		330	2					330	2	165		
10. Shield & Clean Rotating Parts	15,000					11,685	19	11,685	19	615		
11. Replace Diffuser & Adapter		3390	15	180	2	12,655	33	16,225	50	325		
12. Torque Flange Bolts		3565	24	50	1	3815	46	7430	71	105		
13. Set Rotating Element & Alignment	4915	705	9			6510	42	7215	51	141		
14. Wire Motor & RTD's	1120	640	5					640	5	128		
15. Insulate Pump (PPM)						6070	9	6070	9	674		
16. Inspect Motor		555	11	10	1	730	11	1295	23	56		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT		NON-PLANT		CONTRACT		TOTAL		AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
		MREM	MEN	MREM	MEN	MREM	MEN	MREM	MEN			
17. Misc. Pump Work		200	5			185	6	385	11	35		
18. Move RCP Tools in and Out of CV		140	3	30	2	140	2	310	7	44		
19. Remove Insulation						730	9	730	9	81		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT MREM	PLANT MEN	NON-PLANT MREM	NON-PLANT MEN	CONTRACT MREM	CONTRACT MEN	TOTAL MREM	TOTAL MEN	AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
0. "C" RCP											49,650	3.45
1. Unwire Motor		240	3					240	3	80		
2. Disassemble & Remove Seals & Motor		13,5	7	30	2	2110	31	3475	40	87		
3. Remove Diffuser		320	1			11,090	45	11,410	46	248		
4. Clean and Test Bolt Holes		1210	6					1210	6	202		
5. Replace Diffuser						6650	35	6650	35	190		
6. Assemble Seals, Set Coupling, Align & Wire Motor		155	2			5640	29	5795	31	187		
7. Torque Flange Bolts		1110	18			9195	63	10,305	81	127		
8. Remove Insulation						860	8	860	8	108		
9. Install Insulation						7760	14	7760	14	554		
10. Change Oil		255	2	770	8	920	5	1945	15	130		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT MREM	PLANT MEN	NON-PLANT MREM	NON-PLANT MEN	CONTRACT MREM	CONTRACT MEN	TOTAL MREM	TOTAL MEN	AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
											7,005	0.49
E. Misc. Pump Work						10	1	240	9	27		
1. Repair Flange Gasket		230	8					460	7	66		
2. Install Vibration Detectors		460	7					650	7	93		
3. Repair Thermocouples		590	4	60	3	370	7	370	7	53		
4. Install Oil Shields						145	4	145	4	36		
5. Remove Bolt Heaters						20	1	215	4	54		
6. Install Seal Leak-Off Lines		195	3	95	1	200	2	375	6	63		
7. Move RCP Shaft to HMS		80	3			1960	11	1960	11	178		
8. Remove Acid from CV		195	4			1035	35	1260	39	32		
9. Clean RCP Bolts		460	4	60	2			520	6	87		
10. Test RCP Bolts		20	2	20	2			40	4	10		
11. Balance RCP						770	6	770	6	128		
12. Set RCP Platform in Cavity												

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT		NON-PLANT		CONTRACT		TOTAL		AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
		MREM	MEN	MREM	MEN	MREM	MEN	MREM	MEN			
											165485	11.53
F. STEAM GENERATOR PRIMARY	124020											
1. Manways												
a. Remove Manways	1600	735	12			300	3	1035	15	69		
b. Replace Strongbacks		1995	14			425	7	2420	21	115		
c. Remove Strongbacks		160	1			985	3	1145	4	286		
d. Replace Manways	2400	3180	21	705	7	3140	31	7025	59	119		
e. Clean Bolts		340	8	30	2	35	2	405	12	34		
f. Move Equipment		260	5			105	5	365	10	37		
g. Insulate Manways		95	1			2615	12	2710	11	208		
2. Eddy Current Inspection												
a. Install and Remove Equipment	25300					23380	34	23380	34	688		
b. Platform Work	25420					34040	60	34040	60	567		
c. Hand Probe						2180	5	2180	5	436		
d. Tube Marking	16000					610	8	610	8	76		
e. Plug Tubes	40000					55960	44	55960	44	1272		
f. Weld Repairs	9800	1680	13			15375	33	17055	46	371		
g. Clean Bowls						3670	7	3670	7	524		

RADIATION EXPOSURE [illegible] DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT		NON-PLANT		CONTRACT		TOTAL		AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
		MREM	MEN	MREM	MEN	MREM	MEN	MREM	MEN			
h. Inspections	3000	10280	20			2640	9	12920	29	446		
i. Moving E/C Equipment	300					565	14	565	14	40		
											21480	1.49
G. STEAM GENERATOR SECONDARY	15,100											
1. Sludge Lance	12600	1145	6			9385	15	10530	21	501		
2. Remove & Replace Hand-hole Covers & TLBD's	2500	3290	21	230	4	1555	15	5075	40	127		
3. Inspections		1775	8					1775	8	222		
4. Fiberscope Inspection		210	1			495	2	705	3	235		
5. Remove & Replace Insulation for S/G Measurements		20	1			3375	18	3395	19	179		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT		NON-PLANT		CONTRACT		TOTAL		AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
		MREM	MEN	MREM	MEN	MREM	MEN	MREM	MEN			
I. HEALTH PHYSICS	119580										169,735	11.80
a. CV Coverage, Surveys, Sampling		40,750	50	70	1	83210	76	124030	127	977		
b. Aux. Bldg. Coverage Surveys & Sampling		15,030	65	540	4	29940	90	45510	159	286		
c. Instrument Calib.		215	6					215	6	36		
I. VALVE OPERATION & INSPECTION	69280										134135	9.32
1. CV												
a. Operations	24640	29245	66					29245	66	443		
b. Engineers (Plant)		14190	63					14190	63	225		
c. Others (Plant)		12605	68					12605	68	185		
d. CPSL Corporate	10000			4415	70			4415	70	63		
e. Visitors						15380	142	15380	142	108		
2. Auxiliary Building												
a. Operations	24640	30540	80					30540	80	382		
b. Engineers (Plant)		3820	49					3820	49	78		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT MREM	PLANT MEN	NON-PLANT MREM	NON-PLANT MEN	CONTRACT MREM	CONTRACT MEN	TOTAL MREM	TOTAL MEN	AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
c. Others (Plant)		9830	95					9830	95	103		
d. CP&L Corporate	10,000			4335	70			4335	70	62		
e. Visitors						9775	252	9775	252	39		
											119240	8.29
J. DECON	72,700											
1. Auxiliary Building	29500	445	18	255	8	71660	92	72360	118	613		
2. CV	43200	2090	51	825	12	43965	127	46880	190	247		
											43650	3.03
K. DRUMMING ROOM	3600											
1. Solidify Waste, Compact and prepare for shipment	3600	1530	26	125	5	40505	53	42160	84	502		
2. Solidify WHUT Sludge						985	9	985	9	109		
3. Solidify Waste from "C" Waste Evaporator Room						250	8	250	8	31		
4. Repair Compactor		10	1	20	2			30	3	10		
5. Repair Drum Hoist		65	3	130	3			195	6	33		
6 Repair High Rad Gate						30	1	30	1	30		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT		NON-PLANT		CONTRACT		TOTAL		AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
		MREM	MEN	MREM	MEN	MREM	MEN	MREM	MEN			
L. DECON RESPIRATORS						1155	5	1155	5	231	1155	0.08
M. LAUNDRY FACILITY						3830	10	3830	10	383	3830	0.27
N. VALVE WORK	47000										37185	2.58
1. Repack 200 B&C		935	2			1860	5	2795	7	399		
2. Repack CVC-113 B		20	1			20	1	40	2	20		
3. Install 203		70	4	15	1	570	3	655	8	82		
4. Repair 204B		755	8	40	3	530	8	1325	19	70		
5. Replace CVC-209		60	3			20	1	80	4	20		
6. Replace Diaphragm CVC-245		5	1	30	[illegible]			35	4	9		
7. Remove CVC-257		25	3			30	2	55	5	11		
8. Repair CVC-310A		1155	4			1630	6	2785	10	279		
9. Replace Diaphragm CVC 331		10	1					10	1	10		
10. Repair CVC-387		50	2			10	1	60	3	20		
11. Repair 516		30	1	20	1	15	1	65	3	22		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT		NON-PLANT		CONTRACT		TOTAL		AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
		MREM	MEN	MREM	MEN	MREM	MEN	MREM	MEN			
12. Repair RC-556		65	1			25	1	90	2	45		
13. Repair FC-605		20	1	40	2	245	3	305	6	51		
14. Repack 744B		125	3			90	1	215	4	54		
15. Replace 747 A & B		20	1					20	1	20		
16. Repair 754		115	1			50	2	165	3	55		
17. Replace Gasket 731		185	5					185	5	37		
18. Repair 761A		50	2	170	4	160	3	380	9	42		
19. Repair 706 & 786		435	4	185	3	260	4	880	11	80		
20. Repair 841C		30	3			10	1	40	4	10		
21. Repack 826C						35	2	35	2	18		
22. Weld 855D		40	3			10	1	[illegible]	4	13		
23. Repair 856		20	1			50	2	70	3	23		
24. Wire 863 A & B and 869		100	1			110	1	210	2	105		
25. Repair 866B		80	2	370	7			450	9	50		
26. Repair 869		[illegible]	7	130	2	320	7	970	16	61		
27. Repair 875D		400	6			345	5	745	11	68		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT MREM	PLANT MEN	NON-PLANT MREM	NON-PLANT MEN	CONTRACT MREM	CONTRACT MEN	TOTAL MREM	TOTAL MEN	AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
28. Repack 883 A, D, G & L		20	2	65	3			85	5	17		
29. Repair 891 A, B, C & D		1750	19	430	11	730	14	2910	44	66		
30. Repack 899B		10	1					10	1	10		
31. Repair 956 A, B, C, D, G & H		860	11	465	5	150	3	1475	19	78		
32. Repair 1622 & 1623		20	1			10	1	30	2	[illegible]		
33. Install 1118A		45	3					45	3	15		
34. Replace Diaphragm WD-1708		55	1			60	1	115	2	58		
35. Repair 1930		175	4	275	7	120	1	570	12	48		
36. Reassemble 1934 A & B		110	2	305	4	80	2	495	8	62		
37. Replace Diaphragm 1221 F		140	1					140	1	140		
38. Insp & Repair PORV's 455C & 456		340	11			800	8	1140	19	60		
39. Insp & Repair RHR Safeties	5000	2315	35	90	1	2715	36	5120	72	71		
40. Insp c Repair PRR Block Valves 535 & 536		1545	34	80	2	305	8	1930	44	44		
41. Repair Limitorque		20	1			20	1	40	2	20		
42. Repair Purge		1195	13	350	12	350	5	1895	30	63		
43. Misc. Valve Work		110	4	375	11	310	6	795	21	38		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT MREM	PLANT MEN	NON-PLANT MREM	NON-PLANT MEN	CONTRACT MREM	CONTRACT MEN	TOTAL MREM	TOTAL MEN	AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
44. Misc. Valve Work by Areas												
a. Charging Pump Room		80	5	10	1			90	6	15		
b. Boric Acid Storage Tank		95	4	70	3			165	7	24		
c. Sample Room		50	3	50	2	30	2	130	7	20		
d. Drumming Room						115	2	115	2	58		
e. Boron Injection Tank Room		50	5	10	1	50	4	110	10	11		
f. Pipe Alley		2010	24	1940	17	820	17	47	59	31		
g. CV		535	13	905	10	855	13	2295	36	64		
	25900	11195	54	7285	27	820	8	19300	89	217	19300	1.34
O. I&C Calibration											81405	5.66
P. ISI	94935											
1. Inspection & Hydro	74935	2331[illegible]	83	1610	16	40210	95	65130	194	336		
2. Remove & Replace Insulation	20000					14360	21	14360	21	684		
3. Disassemble, Inspect & Assemble Valve 751		11[illegible]	18			795	6	1915	24	80		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT MREM	PLANT MEN	NON-PLANT MREM	NON-PLANT MEN	CONTRACT MREM	CONTRACT MEN	TOTAL MREM	TOTAL MEN	AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
Q. Pump Work		1145	21	190	8	500	10	1835	39	47	1835	0.13
R. Manipulator & Polar Crane Inspection & Operation		8955	47	7860	15	4580	33	21395	95	225	21395	1.49
S. Yeargin Construction Work	91160										73645	5.12
											[illegible]	
1. Modify S/G Mnway Rig						450	15	450	15	30		
2. Cut Bolt on Guide Tube						400	2	400	2	200		
3. Remove and replace Valve 277		30	1			705	10	735	11	69		
4. Mod. 445 - Fire Protection Punch List	1080			10	1	1075	12	1085	23	47		
5. Mod. 515 - TMI Punch List	1200	40	1			4440	25	4480	26	172		
6. Mod 524 - TMI Punch List	1200	30	1			3050	43	3080	44	70		
7. Mod 535	645					585	4	585	4	146		
8. Mod. 502 - TMI Punch List	3600					205	2	205	-2	103		
9. Mod. 699						75	4	75	4	19		
10. Install "A" Frame on Operating Deck in C.V.						215	7	215	7	31		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT MREM	PLANT MEN	NON-PLANT MREM	NON-PLANT MEN	CONTRACT MREM	CONTRACT MEN	TOTAL MREM	TOTAL MEN	AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
11. Mod 636	18900											
a. "A" S/G Platform						3380	27	3380	27	125		
b. "B" S/G Platform						3070	18	3070	18	171		
c. "C" S/G Platform		55	3	40	1	8875	38	8970	42	214		
d. Modify S/G Blowdown Line						520	11	520	11	47		
12. Build Scaffolds		20	2	40	4	9960	47	10020	53	189		
13. Measure S/G for Replacement						2530	14	2530	14	18[illegible]		
14. Install High Mod.582 Rad Doors	6750					5430	37	5430	37	147		
15. Install Jib Crane						225	9	225	9	25		
16. Repair Door to Pipe Alley				30	2	85	5	115	7	16		
17. Cut Control Rod Mechanism						540	2	540	2	270		
18. Pull Wires						2120	19	2120	19	116		
19. Repair RV Heat Vent Pipe	7560					6350	14	6350	14	454		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

		PREDICTED MREM	PLANT		NON-PLANT		CONTRACT		TOTAL		AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
			MREM	MEN	MREM	MEN	MREM	MEN	MREM	MEN			
20.	Mod 537 Post Accident Sample Sink	4100	40	2	50	1	[illegible]470	41	7560	44	172		
21.	Mod. 604 - HVH Motor Cooler Piping						305	7	305	7	44		
22.	Mod. 650 Fire Damper				10	1	535	5	545	6	91		
23.	Install Plates on Outside Wall in SI Room						165	7	165	7	24		
24.	Repair Stairs and Grating						540	6	540	6	90		
25.	Painting Hangers						1255	7	1255	7	179		
26.	Mod. 652 - Replace FW Line Bellows		10	1	30	3	1030	22	1070	26	41		
27.	Mod. 632 - SFP, Install Bracket				10	1	95	6	105	7	15		
28.	TAR 80-018						300	8	300	8	38		
29.	Mod. 525 TMI Punch List	6750	85	4	30	2	3365	25	3480	31	112		
30.	Pipe Alley Hanger Mod						275	6	275	6	46		
31.	Mod 672 Hanger Mod				30	1	1120	15	1150	16	72		
32.	Mod Install New TLBD on "A" S/G	3000			10	1	2305	11	2315	12	193		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT MREM	PLANT MEN	NON-PLANT MREM	NON-PLANT MEN	CONTRACT MREM	CONTRACT MEN	TOTAL MREM	TOTAL MEN	AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
											7885	0.55
I. BORIC ACID EVAPORATORS	5000											
1. Rotate Spool Piece		120	5	90	6	85	4	295	15	20		
2. Repair or replace feedpumps		4490	33	10	1	1805	18	6305	52	121		
3. Repair Heat Tracing Circuit		100	1			45	3	145	4	36		
4. Valve & Gasket Repairs		575	14	70	1	495	11	1140	26	44		
											90	0.01
II. "A" WASTE EVAPORATOR												
1. Check Electrical Wiring						90	2	90	2	45		
											1675	0.12
V. "B" WASTE EVAPORATOR	1000											
1. Remove Flange & Washer Rings		40	1	40	2	90	1	170	4	43		
2. Replace Rupture Disc.		100	4					100	4	25		
3. Valve Repairs		255	6	10	1	115	3	380	10	38		
4. Unrock Drain & Sample Lines		390	7	50	4	325	5	765	16	48		
5. Sample Sink Repairs		50	2			50	2	100	4	25		
6. Repair Level Transmitter		20	1	100	3			120	4	30		
7. Repair Discharge Gauge		40	1					40	1	40		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT MREM	PLANT MEN	NON-PLANT MREM	NON-PLANT MEN	CONTRACT MREM	CONTRACT MEN	TOTAL MREM	TOTAL MEN	AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
W. RHR PIT	3000										4595	0.32
1. Remove Motor and replace Pump Seal	3000	290	7	70	3	2990	16	3350	26	129		
2. Repack Valves		270	6	420	8	380	11	1070	25	43		
3. Check Snubbers		100	4			40	2	140	6	23		
4. General Inspection						35	2	35	2	18		
X. RHR HEAT EXCHANGER	7650										10515	0.73
1. Remove and replace "A" "B" HX Gaskets	5000	4585	15	165	4	2075	14	6825	33	207		
2. Valve Repairs		1195	16	330	4	1050	11	2575	31	83		
3. Remove and Replace "B" HX Drain Valve	2650	110				830	6	940	9	104		
4. Install Caps on "A" HX Drain Valves		50	2			125	2	175	4	44		
Y. SPENT FUEL PIT											350	0.02
1. Remove, Cut and Load Irradiated Core Sample		130	8	20	1	30	1	180	10	18		
2. Repair SFP Canal Drain Pump		80	1	20	1	30	1	130	3	43		
3. Install Thimble Plug		20	1					20	1	20		
4. Change Underwater Light Bulbs		20	1					20	1	20		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT		NON-PLANT		CONTRACT		TOTAL		AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
		MREM	MEN	MREM	MEN	MREM	MEN	MREM	MEN			
2. SPENT FUEL PIT RECIRC PUMP ROOM											375	0.03
1. Replace Recirc Pump		320	9			35	2	355	11	32		
2. Check ges & lines						20	2	20	2	10		
A.A. SPENT FUEL P.f HX AREA											570	0.04
1. Replace HX Piping		330	7	140	4	100	4	570	15	38		
B.B. CV REPAIR HVH MOTOR COOLERS	840	1740	35	570	13	1430	36	3740	84	45	3740	0.26
C.C. FILTER CHANGES											3990	0.28
1. Waste Holdup Tank Filters		860	20	315	12	480	18	1655	50	33		
2. Charcoal Filters		460	12	30	3	160	8	650	23	28		
3. Seal Water Injection Filters		70	4	80	2	40	3	190	9	21		
4. RCS Filters		325	6			1170	11	1495	17	88		
D.D. PAINTING		55	2			5940	15	5995	17	353	5995	0.42
E.E. ILRT		2325	42	95	4	360	8	2780	54	51	2780	0.19
F.F. RADIOGRAPHING				180	4				4	45	180	0.01
G.G. RMS - 19 - REPAIR & CALIBRATE		315	5					315		63	315	0.02
H.H. REPAIR PRESSURIZER MANWAY LEAK		790	24	145	2	140	4	1075	30	36	1075	0.07
I.I. CV - PT 26	3000	800	14	85	3	425	5	1310	22	60	1310	0.09

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT		NON-PLANT		CONTRACT		TOTAL		AVERAGE	TOTAL	% PER
		MREM	MEN	MREM	MEN	MREM	MEN	MREM	MEN	PER JOB	CATEGORY	CATEGORY
J.J. Move Camera		110	3	135	3	15	3	260	9	29	26[illegible]	
K.K. Auxiliary Building - Lubrication		395	6	15	1			410	7	59	410	0.03
L.L. Auxiliary Building - Heat Tracing P.T.		1175	18	40	2	345	10	1560	[illegible]	5[illegible]	1560	0.11
M.M Issue & Decon Tools											11215	0.78
1. CV		180	2	10	1	8505	16	8695		458		
2. Hot Machine Shop		100	7	10	1	2410	19	2520	27	93		
N.N. Charging Pump Room											750	0.05
1. Remove & Replace Valves § 746 A & B		50	2	275	5			325	7	46		
2. Repack Valves		120	4	205	6	60	1	385	11	35		
3. Repair Recirc. Line		40	1					40	1	40		
O.O. Sump Repairs											4225	0.29
1. #1 Sump Pump Repairs & Replacement		815	21	90	5	620	16	1525	42	36		
2. #2 Sump Pump Repairs & Replacement		1200	33	470	11	760	22	24[illegible]	66	37		
3. CV Sump Repairs		240	5			30	2	270	7	39		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

		PREDICTED MREM	PLANT		NON-PLANT		CONTRACT		TOTAL		AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
			MREM	MEN	MREM	MEN	MREM	MEN	MREM	MEN			
P.P.	Miscellaneous CV Activities	5000										6095	0.42
1.	Repair Elevator		100	7			120	6	220	13	17		
2.	Repair Equipment Hatch Step				25	2			25	2	13		
3.	First Level - Torque Bolts on Yeargin Mod.				230	2			230	2	115		
4.	Repair RX Vessel High Point Venting Pipe Sup		50	2			30	1	80	3	27		
5.	Clean "C" Accumulator Manway Studs		80	3					80	3	27		
6.	Change Lights & Repair P.A.'s		250	6	150	3	715	17	1115	26	43		
7.	A, B, "C" Pump Bays & PZR - Snubber Removal		390	8	20	1	75	4	485	13	37		
8.	Repair Personnel Hatch		525	8			305	9	830	17	49		
9.	Move Equipment in & out of CV		345	6	40	2	295	12	680	20	34		
10.	Lubrication		185				10	1	195	8	24		
11.	First level -Electrical Penetration Work		215	8					215	8	27		
12.	"C" Pump Bay - Repair Step						120	1	120	1	120		
13.	First Level - Remove HASP on Gang Box						10	1	10	1	10		
14.	Third Level - Cable Splicing		80	2					80	2	40		
15.	Cavity & Sump - Hang TLD Wires		80	2	65	1	340	3	485	6	81		
16.	Third Level - Repair Stud Power Tool		20	1					20	1	20		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT MREM	PLANT MEN	NON-PLANT MREM	NON-PLANT MEN	CONTRACT MREM	CONTRACT MEN	TOTAL MREM	TOTAL MEN	AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
17. Install Eq. pment Hatch Cover		40	4			40	4	80	8	10		
18. Operate Pe sonnel Hatch						640	11	640	11	58		
19. Tighten F tting on S/G Instrument		20	2					20	2	10		
20. Fire Protection PT's		465	8			20	1	485	9	54	3000	0.21
0.0. Miscellaneous Auxiliary Building Activities	2000											
1. Chemical Drain Tank Room Build Platform		30	2					30	2	15		
2. SFP - Inspect Refueling tool		100	9	50	2	30	4	180	15	12		
3. Pipe Alley Seismic Measurements		40	2			35	1	75	3	25		
4. RHS - Repair S/G Retreiving Tool		30	1			35	3	65	4	16		
5. Cask Decon Area - Clean Crane Hook		10	1	30	3	30	1	70	5	14		
6. Cont. Warehouse - Move Equipment		450	17	55	[illegible]	535	27	1040	47	22		
7. SI Pump Room - Rotate Flange		50	2			10	1	60	3	20		
8. RWST- Remove & Reinstall Manways		60	3			20	1	80	4	20		
9. CS Hut Room - Weld Repair PVC 1049		235	5			70	2	305	7	44		
10. Whut Room - Filter Assembly Mod.		215	6			140	5	355	11	32		
11. New Fuel Building - Inspect & Unload Fuel				20	2			20	2	10		
12. Build Wooden Filter Frame				55	4	20	2	75	6	13		

RADIATION EXPOSURE BREAKDOWN DURING

H. B. ROBINSON UNIT NO. 2 REFUELING - ISI OUTAGE - 1982

	PREDICTED MREM	PLANT		NON-PLANT		CONTRACT		TOTAL		AVERAGE MREM PER JOB	MREM PER CATEGORY	% MREM PER CATEGORY
		MREM	MEN	MREM	MEN	MREM	MEN	MREM	MEN			
13. Repair Lights		255	6	20	1	370	10	645	17	38		
											1439125	100.02
TOTALS		943505										

OFFICIAL EXPOSURE CHARGED TO EACH COMPANY

Company	TLD Exposure (REM) 1st Quarter	2nd Quarter	3rd Quarter	Total
1. CP&L Plant				
a. Operations	19.708	48.366	10.808	78.882
b. Mechanics	24.424	69.307	14.188	107.919
c. I&C	7.156	19.206	12.113	38.475
d. E&RC	10.382	31.487	4.711	46.580
e. Engineers	5.728	18.766	2.925	27.419
f. QA	2.040	8.109	1.350	11.499
g. Others	0.560	5.681	0.421	6.662
PLANT TOTAL	69.998	200.922	46.516	317.436
2. CP&L Corporate				
a. Engineers	2.130	8.576	4.085	14.791
b. Mechanics	1.090	19.859	12.631	33.580
c. I&C	1.768	2.955	0.014	4.737
CORPORATE TOTAL	4.988	31.390	16.730	53.108
3. IRM				
a. H.P.'s	23.147	58.188	8.829	90.164
b. Decon	17.248	56.621	24.365	98.234
IRM TOTAL	40.395	114.809	33.194	188.398
4. Daniels	36.823	199.400	32.079	268.302
5. Westinghouse	33.389	145.170	9.414	187.973
6. Power Plant Maintenance	21.796	37.583	6.979	66.358
7. Yeargin	15.766	62.009	5.910	83.685
8. Dudley	14.546	13.901	2.059	30.506
9. Burns	2.261	4.990	0.726	7.977
10. Gilbert	1.545	1.542	0.881	3.968
11. Southern Space	0.408	1.747	0.470	2.625
12. General Electric	0.476	2.307	- -	2.783
13. Exxon	- -	1.060	- -	1.060
14. Clean Co.	- -	7.915	- -	7.915
15. NRC	0.183	0.464	0.053	0.700
16. SWEI	0.027	8.067	- -	8.094
17. J. A. Jones	0.012	1.073	- -	1.085
18. NNI	0.297	0.023	- -	0.320
19. NUS	0.101	0.111	0.020	0.232
20. Misc.	1.223	7.493	1.715	10.431
TOTAL	244.234	841.976	156.746	1,242.956

$$\% \text{ Difference} = \frac{\text{RWP Dose} - \text{Official Dose}}{\text{Official Dose}} \times 100 =$$

$$= \frac{1,442.850 - 1,242.956}{1,242.956} \times 100 = +16.08\%$$

$$\% \text{ Difference} = \frac{\text{Official Dose} - \text{Predicted Dose}}{\text{Official Dose}} \times 100 =$$

$$= \frac{1,242.956 - 943.505}{1,242.956} \times 100 = +24.09\%$$

$$\% \text{ Outage Days} = \frac{\text{Actual Outage Days} - \text{Schedule Outage Days}}{\text{Scheduled Outage Days}} \times 100$$

$$\frac{166 - 95}{95} \times 100 = +75\%$$

ATTACHMENT 5

RESPONSES TO NUMARC QUESTIONNAIRE TO SUPPORT PART 51 RULE CHANGE

SOCIOECONOMIC QUESTION # 4

Carolina Power & Light Company

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

BRUSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 & 2

SHEARON HARRIS NUCLEAR POWER PLANT

Response Applies to Entire Site at All Three Plants

QUESTION: To understand the plants fiscal importance to specific jurisdictions, for 1980, 1985, and the latest year for which data are available, estimate the entire plant's taxable assessed value and the amount of taxes paid to the state and to each local taxing jurisdiction.

RESPONSE:

	BRUNSWICK			HARRIS			ROBINSON		
	1980	1985	1989	1980	1985	1989	1980	1985	1989
TAXABLE ASSESSED VALUE	525,835,352	659,471,367	649,537,154	460,383,107	1,353,582,343	1,385,433,199	10,237,259	18,210,[illegible]	27,767,309
TAXES PAID	2,839,511	4,187,643	4,124,561	3,8[illegible]1,180	7,986,136	10,944,922	1,392,267	2,194,422	4 62,575

ATTACHMENT 4

RESPONSES TO NUMARC QUESTIONNAIRE TO SUPPORT PART 51 RULE CHANGE

WASTE MANAGEMENT QUESTIONS

Carolina Power & Light Company

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 & 2

SHEARON HARRIS NUCLEAR POWER PLANT

Responses Apply to Entire Site at All Three Plants

RESPONSE TO NUMARC SURVEY
IN SUPPORT OF 10CFR51 ANPR

A. SPENT FUEL QUESTIONS

			RNP	BNP	HNP
1.	A.	Reracking of spent fuel	Completed	Completed	N/A
	B.	Control rod repositioning	No	No	No
	C.	Above ground dry storage	Yes	No	No
	D.	Longer fuel burnup	≤60,000 MWD/MTU	≤60,000 MWD/MTU	≤60,000 MWD/MTU
	E.	Transshipment	Late 1990	Yes	Receipt Plant
2.	A.	Continue technique	No	Yes	Yes
	B.	Change or modify	Yes	No	No
3.	A.	Reracking of spent fuel			
	B.	Control rod repositioning	No	No	No
	C.	Above ground dry storage	Maybe	Maybe	No
	D.	Longer fuel burnup	≤60,000 MWD/MTU	≤60,000 MWD/MTU	≤60,000 MWD/MTU
	E.	Transshipment	Yes	Yes	Yes
4.	Techniques Adequate				
	1.	Operating license	Yes	Yes	Yes
	2.	20-year extension	No	No	No
	3.	Other plans	No	No	No
5.	Acquire additional land				
	1.	Operating license	No	No	No
	2.	20-year extension	No	No	No

6. Additional construct activity

1.	Operating license	No	No	No
2	20-year extension	Yes	Yes	Yes

7. Amplification on Question 6

Should additional at-reactor spent fuel storage be required beyond the operating license, it will most likely be provided through above ground dry storage facilities or such other means as may be technologically and economically acceptable.

B. LOW-LEVEL RADIOACTIVE WASTE MANAGEMENT QUESTIONS

1. YES ASSUMING THE COMPLETION OF A SOUTHEAST COMPACT SITE FOR LOW LEVEL WASTE BURIAL. (THIS APPLIES TO ALL THREE PLANTS)

2. COMPACTION, THEN STORAGE IN AIR ABOVE GROUND STORAGE BUILDING/FACILITY. POSSIBLE INCINERATION, THEN STORAGE IN BUILDING. (THIS APPLIES TO ALL THREE PLANTS)

3. SEE ATTACHMENT

4. SEE ATTACHMENT

5. NO

6. NA

7. YES

8. NO CONSTRUCTION ACTIVITY TO DATE. IN PRE-PLANNING STAGE.

9. NO MAJOR PLANT MODIFICATIONS OR REFURBISHMENTS THAT ARE LIKELY TO GENERATE UNUSUSAL VOLUMES OF LOW-LEVEL RADIOACTIVE WASTE PRIOR TO, OR DURING, THE RELICENSING PERIOD FOR ALL THREE PLANTS.

PROBABLY JUST RECIRCULATION SYSTEM MODIFICATIONS, BUT NONE YET ANTICIPATED.

NUMARC QUESTIONNAIRE

SPECIFIC METHODS OF RW MANAGEMENT &
% CURRENT LLRW BY VOLUME IS MANAGED BY:

[Brunswick Nuclear Project]	B.N.P.
A. COMPACTION:	< 10%
B. WASTE SEGREGATION:	50-60%
C. DECONTAMINATION OF WASTES:	0
D. WASTE SORTING: (CLEAN VS. CONTAMINATED.)	3-4% current 25-30% prior
E. OTHER MANAGEMENT PRACTICES:	61%

SPECIFIC METHODS

A. Compacts higher activity D.A.W / filters and non incinerable low activity radwaste to conserve space & reduce number of packages stored onsite.

B. Radwaste is segregated at the point of generation where practical. Clean or unnecessary packaging, bracing or containers are removed prior to entry into the power block area. Radwaste is also further segregated at the point of packaging for shipment.

C. Have onsite decon capability. Do not usually decontaminate waste products, unless it is cost justifiable. Decon priorities are on job/mod related components and tools/equipment.

D. Radwaste is sorted based on dose rates of the waste. If a waste is <= 5 Mr/hr it is sorted to remove the items that cause the waste to be > 1mR/hr. Waste that is <= 1 Mr/hr is frisked to remove any clean waste from the contaminated wastes. Radwaste from known high contamination areas are not usually frisked.

E. Strive to keep the contaminated square feet of plant space to a minimum to prevent the generation of radioactive waste/material. Have aggressive radwaste volume reduction program that attempts to eliminate generation of unnecessary radwaste and reduce the amount of radioactive material (tools & equipment) that become contaminated. All low activity dry active waste is sorted/segregated and shipped to S.E.G., Inc. for further volume reduction prior to burial.

ANTICIPATED PLANS FOR LLRW MANAGEMENT &
% OF ANTICIPATED LLRW VOLUME MANAGED BY:

	B.N.P.
A. COMPACTION:	< 10%
B. WASTE SEGREGATION:	> 70%
C. DECONTAMINATION OF WASTES:	0
D. WASTE SORTING: (CLEAN VS. CONTAMINATED.)	< 10%
E. OTHER MANAGEMENT PRACTICES:	>61%

SPECIFIC PLANS

A. Do not foresee any change in current methods.

B. Do not foresee any change to current methods.

C. Do not foresee any change to current methods. Will keep up with changes in technology and change practices as necessary.

D. Do not foresee any change to current methods. Will keep up with changes in technology and change practices as necessary. Also have to factor in the cost benefit of waste sorting/frisking. If technology changes so it is cost prohibitive to sort and frisk you may see a reduction in this area. Also, as control methods get better we should see less clean waste in the contaminated waste stream therefore eliminating the need to remove clean material.

E. Do not foresee any change to current methods. Will strive to keep plant contaminated square footage to a minimum. Also plan to keep an aggressive volume reduction program for further up front elimination of radioactive waste. Plans are to keep sending low activity radwaste to S.E.G. for reprocessing & volume reduction until current technology offers improved processing.

NUMARC QUESTIONNAIRE

SPECIFIC METHODS OF RW MANAGEMENT &
% CURRENT LLRW BY VOLUME IS MANAGED BY:

[H.B. Robinson Nuclear Project]

	R.N.P.
A. COMPACTION:	0
B. WASTE SEGREGATION:	60-75%
C. DECONTAMINATION OF WASTES:	1-5%
D. WASTE SORTING: (CLEAN VS. CONTAMINATED.)	70%
E. OTHER MANAGEMENT PRACTICES:	75%

SPECIFIC METHODS

A. No onsite compaction is done to reduce radwaste volume.

B. Radwaste is segregated at the point of generation where practical. Clean or unnecessary packaging, bracing or containers are removed prior to entry into the power block area. Radwaste is also further segregated at the point of packaging for shipment.

C. Onsite decon is job specific. Do not usually decontaminate waste products, unless it is cost justifiable. Decon priorities are on job/mod related components and tools/equipment.

D. Radwaste is sorted based on dose rates of the waste. If a waste is <= 5 Mr/hr it is sorted to remove the items that cause the waste to be > 1mR/hr. Waste that is <= 1 Mr/hr is frisked to remove any clean waste from the contaminated wastes. Radwaste from known high contamination areas are not usually frisked.

E. Strive to keep the contaminated square feet of plant space to a minimum to prevent the generation of radioactive waste/material. All low activity Dry active waste is sorted/segregated and shipped to S.E.G., Inc. for further volume reduction prior to burial.

ANTICIPATED PLANS FOR LLRW MANAGEMENT &
% OF ANTICIPATED LLRW VOLUME MANAGED BY:

	R.N.P.
A. COMPACTION:	0
B. WASTE SEGREGATION:	> 75%
C. DECONTAMINATION OF WASTES:	1-5%
D. WASTE SORTING: (CLEAN VS. CONTAMINATED.)	< 70%
E. OTHER MANAGEMENT PRACTICES:	75%

SPECIFIC PLANS

A. Do not foresee any onsite radwaste compaction for volume reduction.

B. Do not foresee any change to current methods.

C. Do not foresee any change to current methods. Will keep up with changes in technology and change practices as necessary.

D. Do not foresee any change to current methods. Will keep up with changes in technology and change practices as necessary. Also have to factor in the cost benefit of waste sorting/frisking. If technology changes so it is cost prohibitive to sort and frisk you may see a reduction in this area. Also, as control methods get better we should see less clean waste in the contaminated waste stream therefore eliminating the need to remove clean material.

E. Do not foresee any change to current methods. Will strive to keep plant contaminated square footage to a minimum. Plans are to keep sending low activity radwaste to S.E.G. for reprocessing & volume reduction until current technology offers improved processing.

NUMARC QUESTIONNAIRE

SPECIFIC METHODS OF RW MANAGEMENT &
% CURRENT LLRW BY VOLUME IS MANAGED BY:

(Harris Nuclear Project)	H.N.P.
A. COMPACTION:	0
B. WASTE SEGREGATION:	60-70%
C. DECONTAMINATION OF WASTES:	1-5%
D. WASTE SORTING: (CLEAN VS. CONTAMINATED.)	50-75%
E. OTHER MANAGEMENT PRACTICES:	80-85%

SPECIFIC METHODS

A. No onsite compaction done currently done to reduce radwaste volumes.

B. Radwaste is segregated at the point of generation as practical. Clean or unnecessary packaging, bracing or other material removed prior to entering the power block area. Radwaste is further segregated at the packaging station prior to shipment.

C. Onsite decon is job specific. Waste products are not routinely decontaminated. Decon priorities are on job/mod related equipment and tools/equipment.

D. Radwaste is sorted based on dose rates of the waste. All waste that is < .5 Mr/hr is sorted and frisked to remove clean items. Approximately 50 % or better of this level waste is finally removed as clean material. Wastes up to 2 mR/hr are sorted to remove all items > .5 mR/hr. Then the waste is frisked to recover clean material.

E. Keep contaminated square feet of plant space to a minimum to prevent generation of radioactive waste/material. All ow activity dry active waste is sorted/segregated and shipped to S.E.G., Inc. for further volume reduction prior to burial.

ANTICIPATED PLANS FOR LLRW MANAGEMENT &
% OF ANTICIPATED LLRW VOLUME MANAGED BY:

	H.N.P.
A. COMPACTION:	0
B. WASTE SEGREGATION:	>70%
C. DECONTAMINATION OF WASTES:	1-5%
D. WASTE SORTING: (CLEAN VS. CONTAMINATED.)	<75%
E. OTHER MANAGEMENT PRACTICES:	75%

SPECIFIC PLANS

A. Do not foresee any onsite radwaste compaction for volume reduction.

B. Do not foresee any change to current methods.

C. Do not foresee any change to current methods. Will keep up with changes in technology and change practices as necessary.

D. Do not foresee any change to current methods. Will keep up with changes in technology and change practices as necessary. Also have to factor in the cost benefit of waste sorting/frisking. If technology changes so it is cost prohibitive to sort and frisk, you may see a reduction in this area. also, as control methods get better we should see less clean waste in the contaminated waste stream, therefore eliminating the need to remove the clean material.

E Do not foresee any change to current methods. Will strive to keep plant contaminated square footage to a minimum. Plant are to keep sending low activity radwaste to S.E.G. for reprocessing & volume reduction until current technology offers improved processing.
