STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

RHODE ISLAND ATOMIC ENERGY COMMISSION
Rhode Island Nuclear Science Center
16 Reactor Road
Narragansett, RI 02882-1165

Mr. William B. Kennedy, Project Manager
Research and Test Reactors Branch A
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Washington, D.C. 20555-0001

January 19, 2010

Re: Letter dated November 24, 2009
Docket No. 50-193

Dear Mr. Kennedy:

This is the third and final part of our response to your request for additional information concerning our plans for decommissioning the facility at the end of its useful life, ref item 3 parts a, b and c of the your letter. It should be noted that it is our expectation that the Reactor and the Center will safely operate for the duration of the extended license. As you are aware, the Reactor underwent a successful LEU upgrade in 1993 and during that process, significant safety analyses were performed to justify the redesign. During the intervening, years, the Commission has invested in all the upgrades necessary to keep the facility functioning in a safe and usable condition. That notwithstanding, the RINSC staff and the RI Atomic Energy Commission have refined our review of decommissioning options with the following underlying observations:

- There are multiple planning scenarios possible, each with different costing elements.
- Some scenarios are hampered by the fact that we currently lack access to disposal of class B & class C wastes.
- The actual scenario that would play out would depend on the context of state plans for the facility and the space it occupies at the time of a decommissioning decision.
- Decommissioning planning now should look at a typical scenario and plan for contingency funding to span the estimates of the range of likely costs for options available.
- Current contingency figures were last assembled a decade ago and the NRC request has offered the opportunity for revisiting these figures.

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In developing a decommissioning plan, we considered the decommissioning alternative for what we can call a base case, including the major technical activities needed to carry out the decommissioning safely, Rhode Island's situation with regard to disposal of radioactive waste, residual radioactivity criteria to be used in the release of the facility and the location of our facility within the confines of the Graduate School of Oceanography of the University Of Rhode Island. The aforementioned lack of access to disposal for Class B and C wastes severely limits our ability to reach a level of decontamination and removal of radioactive materials sufficient to allow the unconditional immediate release of the facility. Although this situation could change during the twenty-year license renewal period, we thought it prudent to assume that it wouldn't and plan accordingly.

We recognize that 10 CFR 50.82(b)(1)(ii) requires that a non-power reactor be decommissioned without significant delay, except when concern for public health and safety makes delay necessary. We noted that among the factors that may warrant a delay in decommissioning was unavailability of waste disposal facilities. We also noted that the Nuclear Regulatory Commission would not terminate our license until our facility met release criteria.

As a result of these considerations, we envisioned the following decommissioning scenario:

- According to 10 CFR 50.82, two general approaches to decommissioning are acceptable. One approach is to start decommissioning activities soon after operations cease and proceed toward terminating the license and releasing the facility. The other approach is to perform limited decommissioning activities soon after operations cease to prepare the facility for safe storage and maintain safe conditions until we can remove the remaining radioactivity. We chose the latter and planned accordingly.
- We will remove the fuel from the core as soon as possible after reactor operations permanently cease and ship the fuel off site in accordance with Department of Energy, Nuclear Regulatory Commission and Department of Transportation regulations.
- We will hire a contractor to dismantle the remaining non-fuel components of the reactor, characterize their radioactivity levels and prepare them for either safe storage or shipment since many of them are anticipated to be Class B and C radioactive wastes for which Rhode Island has no viable disposal option at this time.
- We will ship those non-fuel components that characterization shows meet Class A radioactive waste criteria to a licensed processor for subsequent disposal. We used processing and disposal rates quoted by a broker for Class A radioactive wastes in our cost estimate.
- We will store the remaining radioactive wastes until they can be safely and legally shipped for disposal. For costing purposes, we assumed that disposal of Class B and C radioactive wastes became available before decommissioning and estimated their cost based on current Barnwell rates.

- We will survey those areas of the facility that have been cleared of reactor components and, if Nuclear Regulatory Commission release criteria are met, release them for other uses.

To respond to your questions, we undertook a gross estimate of the decommissioning costs associated with the base case scenario. You should note that the resulting costs are a gross estimate with large uncertainties. We assumed that we would only remove the reactor itself leaving the building intact for possible other radioactive materials uses. We didn't include the costs of removing anything associated with the reactor that wasn't either contaminated or activated. Thus, for example, you won't find any estimated costs for removing the dump heat exchangers.

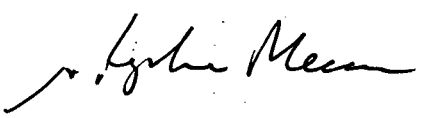
We have enclosed worksheets showing the cost estimate and labor rates (Exhibits 1 and 2 respectively) for the base case scenario. Craft hours are only for removal and packaging. No transportation costs are included. Labor rates are estimates based on Rhode Island Department of Labor and "Rent-a-tech" rates. The methodology and numbers for the labor averages used are included in Exhibit 2.

As shown in the attached worksheet, the computed cost less management and operations fees is $7.1M; the process would span between 2 and 4 years during which staffing is expected to remain at levels mandated by our license. This would add between $1.6M and $3.2M (without discounting or escalation) to the cost bringing the range for this base case scenario to $8.7M to $10.3M. We decided to compare these estimates to one based on the experience of other facility decommissioning costs or estimates. In preparing these experience-based estimates, six reactors were considered: Penn State, Georgia Tech, MIT, Watertown, Virginia and Ohio State. If the estimates for these are equally weighted, the average decommissioning cost is $13M; weighting Virginia's (a reactor closer to our own) estimate a bit higher and Army Watertown a bit lower, gives an estimate of $12M. Averaging this range and the range of our base case calculation, we observe a difference of some 31.5%, which is a bit higher than the contingency factor you have asked us to include in our final estimates.

To obtain an estimate of the more realistic costs of the decommissioning as envisioned with initial deconstruction, removal of present A wastes and subsequent removal of class B & C wastes when they decay to A class wastes, we began with the base case analysis and computed all costs out over 20 years, i.e. the time span of the pending relicense. This analysis is shown in Exhibit 3. Under a safe store scenario, one would incur disposal costs for B and C wastes as A wastes assumed to be an average of 20 years out. The results are shown in Exhibit 3. We have included a 5% per year inflationary rise in all decommissioning related costs for the projected twenty years before we undertake final disposition. We noted that since 2001, the average consumer price index (CPI) has averaged about 2.85% but believe that an inflationary rate of 5% would more accurately reflect the costs associated with this type of project. In order to put all future costs in 2010 dollars, we show present values of total costs using discount rates of 2.85 % (the recent historical CPI) and 0 % (no discounting). Note that staffing for management, monitoring and maintenance of required equipment is included. The Commission

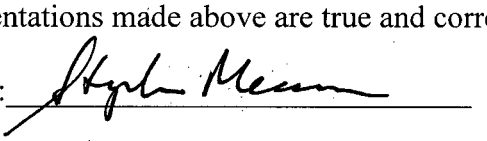
estimated this residual (post initial deconstruction) staffing would be between 20 and 30% of the present staffing of the Center. A figure of 25% was used beginning in year 4 and continuing through year 20.
The results give present values of $12.8M and $15.2M for discount rates of 2.85% and 0 (no discounting) respectively. The last elements in this summary include contingency factors 25%, 31.5% and 60 %. The latter, which is the highest contingency we have noted in the experience of other reactors. The 25% factor is the one you have asked us to use. 31.5% appears to be one that is consistent with our base case estimates and the aforementioned experience-based average noted earlier.
In summary, the Rhode Island Atomic Energy Commission is planning for the safe, successful and productive operation of our reactor and facilities for the duration of our license renewal. Nevertheless we are pleased to offer this letter and supporting exhibits relating to decommissioning planning and estimations requested in your letter of November 24, 2009. Our best estimate for the present value of costs associated with a decommissioning scenario, involving initial deconstruction and disposal of A class wastes, Safe Store of B and C class wastes for the duration of the license and disposal of final wastes at the end of that period, is $16.8M in 2010 dollars. This includes a contingency factor of 31.5%, decommissioning related costs escalating at 5% and the use of a discount rate of 2.85%. The recent decommissioning contingency amount included in our annual budget is $30M; this allows for the extremes of the calculations shown plus a cushion for returning the site to readiness for another use. It should be noted that the facility is built on a former gun mount, which would require significant demolition work to return to remove. We will expect to review these estimates periodically during the term of our license especially at times when the context of all waste disposal options has changed.

Very truly yours,



Stephen Mecca, Ph.D., Chairman
Rhode Island Atomic Energy Commission

I certify under penalty of perjury that the representations made above are true and correct.

Executed on: January 19, 2010 By: 

Enclosures: Base Case Cost Worksheet
Craft Hour Cost Worksheet
Summary Sheet

ITEM	Material	Cu. Yds.	Cu. Ft.	Labor Hrs	Labor Rate	Labor Cost	Class	Rate	RW Cost	Total Cost
Pool Base	Barytes Concrete	293	7911	1977.75	$84.00	$166,131	A	$110	$870,210	$1,036,341
RX Floor around Rx Base	Barytes Concrete	135	3645	911.25	$84.00	$76,545	A	$110	$400,950	$477,495
Gamma room floor	Barytes Concrete	76	2052	513	$84.00	$43,092	A	$110	$225,720	$268,812
Pool Liner grout to base	Barytes Concrete	35	945	236.25	$84.00	$19,845	A	$110	$103,950	$123,795
Cleanup/demin walls	Barytes Concrete	3.5	95	23.625	$84.00	$1,985	A	$110	$10,395	$12,380
Cleanup/demin walls	Barytes Concrete	7.5	203	50.625	$84.00	$4,253	A	$110	$22,275	$26,528
Holdup Tank Walls	Barytes Concrete	26	702	175.5	$84.00	$14,742	A	$110	$77,220	$91,962
Holdup Tank Walls	Barytes Concrete	2.5	68	16.875	$84.00	$1,418	A	$110	$7,425	$8,843
Holdup Tank Walls	Barytes Concrete	4.5	122	30.375	$84.00	$2,552	A	$110	$13,365	$15,917
Bio Shield/pool liner	Barytes Concrete	299	8073	2018.25	$84.00	$169,533	A	$110	$888,030	$1,057,563
Around pool liner	Barytes Concrete	199	5373	1343.25	$84.00	$112,833	A	$110	$591,030	$703,863
Bioshield	Barytes Concrete	7	189	47.25	$84.00	$3,969	A	$110	$20,790	$24,759
Floor holding tank	Barytes Concrete	7	189	47.25	$84.00	$3,969	A	$110	$20,790	$24,759
Bioshield	Barytes Concrete	71	1917	479.25	$84.00	$40,257	A	$110	$210,870	$251,127
Bioshield	Barytes Concrete	14	378	94.5	$84.00	$7,938	A	$110	$41,580	$49,518
Gate			295	56	$84.00	$4,704	A	$110	$32,492	$37,196
Reactor Bridge			1552	240	$84.00	$20,160	A	$110	$170,690	$190,850
Final Decon			75	1040	$135.00	$140,400	A	$110	$8,250	$148,650
Guide Tube			35	40	$84.00	$3,360	B	$1,000	$35,000	$38,360
Thermal Column Case			40	56	$84.00	$4,704	B	$1,000	$40,000	$44,704
Cooling Plate			56	240	$84.00	$20,160	B	$1,000	$56,000	$76,160
6-in thru tube			40	40	$84.00	$3,360	B	$1,000	$40,000	$43,360
Startup Counter			12	8	$84.00	$672	B	$1,000	$12,000	$12,672
Grid Box			150	84	$84.00	$7,056	B	$1,000	$150,357	$157,413
Ion Chamber			33	16	$84.00	$1,344	B	$1,000	$33,103	$34,447
Guide Thimbles, etc			123	84	$84.00	$7,056	B	$1,000	$123,214	$130,270
Servo Shaft, rod & coupling			11	110	$84.00	$9,240	B	$1,000	$11,282	$20,522
Beam Tubes			207	120	$84.00	$10,080	B	$1,000	$207,143	$217,223
Shutter Housing			162	160	$84.00	$13,440	B	$1,000	$162,414	$175,854
Fuel Rod End Pieces	Al		10	1	$84.00	$84	B	$1,000	$10,000	$10,084
Graphite Reflectors			30	16	$84.00	$1,344	C	$1,000	$30,000	$31,344
Control Blade			22	8	$84.00	$672	C	$1,000	$22,143	$22,815
Thermal Column	Graphite/Al	40	1080	270	$84.00	$22,680	C	$1,000	$1,080,000	$1,102,680
Old Graphite Reflectors	Graphite/Al		10	1	$84.00	$84	C	$1,000	$10,000	$10,084
						$0			$0	$0
						$0			$0	$0
						$0			$0	$0
Rad Con Support				2000	$135.00	$270,000				$270,000
Release Survey				1040	$135.00	$140,400				$140,400
			2023			$1,350,060			$5,738,688	$7,088,748
			222492							

Worker	Rate	Fringe	Hourly Rate
Asbestos Worker	$35.25	$19.88	$55.13
Hazardous Mtls Handler	$17.65	$9.95	$27.60
Stonemason	$33.80	$18.45	$52.25
Carpenter	$30.75	$19.94	$50.69
Millwright	$31.75	$19.94	$51.69
Welder	$31.75	$19.94	$51.69
Electrician	$34.08	$18.18	$52.26
Laborer	$27.10	$16.00	$43.10
Toxic Waste Remover	$27.03	$19.10	$46.13
Power Equipment Operator	$31.25	$19.10	$50.35
Plumbers & Pipefitters	$33.61	$23.22	$56.83
Sheet Metal Worker	$29.60	$22.61	$52.21
Truck Driver	$26.66	$14.05	$40.71
Boilermaker	$38.25	$17.04	$55.29
Operating Engineer	$32.90	$19.10	$52.00
Elevator Mechanic	$40.90	$18.28	$59.18
Stone Crusher	$23.68	$19.10	$42.78
Crane Operator	$28.05	$19.10	$47.15
Mechanic	$25.63	$19.10	$44.73
	Average		$49.04

Note: $84/hour provides approximately $35/hr more than the average prevailing rate for crafts in Rhode Island i

Decon Technician	$75.00	$34.50	$109.50
HP Technician	$85.00	$39.10	$124.10
HP Supervisor	$110.00	$50.60	$160.60
			$131.40

Note: Rates for decon tech, hp tech and hp supervisor based on contracted rates from Bartlett.

Summary Decommissioning Calculations

	Assumed Decom escalation factor	Assumed Discount Rate Factor	Assumed Discount Rate Factor
	0.05	.0285	0

Year	Management Maintenance & Supervision	PV Total	PV Total
1	$800,000	$5,866,092	$5,866,092
2	$840,000	$816,723	$840,000
3	$882,000	$833,796	$882,000
4	$231,525	$212,807	$231,525
5	$243,101	$217,255	$243,101
6	$255,256	$221,797	$255,256
7	$268,019	$226,433	$268,019
8	$281,420	$231,167	$281,420
9	$295,491	$235,999	$295,491
10	$310,266	$240,932	$310,266
11	$325,779	$245,969	$325,779
12	$342,068	$251,111	$342,068
13	$359,171	$256,360	$359,171
14	$377,130	$261,719	$377,130
15	$395,986	$267,190	$395,986
16	$415,786	$272,775	$415,786
17	$436,575	$278,477	$436,575
18	$458,404	$284,299	$458,404
19	$481,324	$290,242	$481,324
20	$505,390	$1,249,857	$2,131,778
	Total	$12,760,999	
		Total	$15,197,170

Contingency Factors		
0.25	0.32	0.60
$15,951,249	$16,780,714	$20,417,599
$18,996,463	$19,984,279	$24,315,473