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Dr. Carl Feldman
Office of Nuclear Regulatory Research
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Carl:

In response to your question concerning the decommissioning costs that might be incurred for a plant such as Shoreham which has operated only about 60 hours at 5% of full power, as compared with the BWR costs given in the final Decommissioning Rule for a plant which had operated for 30 effective full power years, I have prepared the following information.

Reactor Vessel Activation Levels

To a reasonable approximation, the activity levels in the core materials can be represented by

$$A = N\sigma\phi(1 - e^{-\lambda t})$$

The activity level at Shoreham relative to the values calculated for our reference BWR is given by

$$(\phi^1/\phi^*)(1 - e^{-\lambda t_1})/(1 - e^{-\lambda t_*})$$

or

$$0.05(0.000895)/(0.98) = 0.000046$$

for the conditions at Shoreham. From Table E.1-7 of NUREG/CR-0672, the dose rate from the inside of the core shroud at Shoreham should be in the vicinity of 5 - 6 R/hr. For the vessel wall, the dose rates should be around 1 mR/hr. Thus, while the vessel internals would still require remote cutting and packaging, the vessel itself could be sectioned using hands-on techniques. Applying the same factor to the dose rates from contaminated piping, as given in Table E.2-4 of the BWR study, the likely dose rates from the piping systems should be less than 1 mR/hr, more likely less than 0.1 mR/hr. It is unlikely that there is any significant activation of the reactor sacrificial shield.

While the fluid systems will undoubtedly have some internal contamination, it may well be possible to perform a chemical decontamination of those systems which would make them releasable for salvage or scrap. If so, the [redacted] disposal costs might be reduced by $25 to $30 million, neglecting any scrap values. In addition, if the systems are that clean, the working conditions for removal would be much less severe, with no masks, no anti-C clothes, no shielding, etc., being needed, which would reduce the difficulty factor on direct staff labor hours by about 20%, and could result in a reduction in direct labor costs of $10 to $12 million. Therefore, under the most optimistic [redacted]

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conditions, the decommissioning costs might be reduced by $35 to $42 million.

On the other hand, under the most pessimistic conditions, where everything still had to go to the LLW burial site, the very low activation levels throughout the plant could reduce the decommissioning costs by about $5 to $6 million.

Additional reductions may be possible by removing the fuel from the site promptly, thereby reducing the requirements for security staff. Because the radioactivity levels within the plant are very low, only ordinary industrial security would be necessary once the fuel was removed from the site. The actual savings would depend upon how quickly the fuel was removed and on how large a security staff was retained afterwards, but could easily amount to several million dollars over the life of the decommissioning activities.

On the other hand, <u>if the fuel cannot be removed</u> from the site for lack of somewhere to take it, the license cannot be terminated and there will be continuing costs for storage operations and security even after the other radioactive materials have been removed. These continuing costs could be in the <u>$2 to $3 million per year range</u>.

The above information is about all I can do for you in an afternoon. If you need to explore any of these topics in more detail, please let me know.

Sincerely,
Dick

Richard I. Smith, P.E.
Staff Engineer
Waste Systems Department