HIGH LEVEL RADIOACTIVE WASTE MANAGEMENT

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LESSONS LEARNED FROM THE SHOREHAM FUEL SHIPPING EXPERIENCE

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ABSTRACT

The shipment of slightly exposed nuclear fuel from the Shoreham Nuclear Power Station to the Limerick Generating Station serves as a model for future shipments of spent nuclear fuel (SNF). Many lessons were learned from this experience both general and specific. This paper presents a sampling of these lessons and suggests that future SNF campaigns can benefit from studying this and other relevant projects.

I. DISCUSSION

The shipment of slightly-used BWR fuel assemblies from the Shoreham Station to the Limerick Station was a first-of-a-kind activity as well as the largest domestic fuel shipping campaign in over a decade. This highly successful project with its multi-mode transportation content is a microcosm of future civilian spent fuel shipping activities, therefore, the Shoreham project has been carefully examined to extract lessons which could have application in other SNF shipping projects such as those under the NWPA. This paper contains an overview of the Shoreham project and a summary of some of the more important lessons which were derived from the effort.

II. DISCUSSION

A. Project Summary

In June 1990 planning was started for the shipment of 560 slightly irradiated BWR fuel assemblies from the Shoreham Nuclear Power Station to a then-unidentified BWR plant for reinsertion and continued use. The fuel reuse was possible because the peak fuel burnup was only 87.0 MWD/MTU. This low burnup was the result of the termination of plant operations following the low power testing phase and the subsequent political decision to decommission this essentially new facility. Although the startup core was of fairly low enrichment (i.e., 2.17% max.) the fuel contained significant "energy value" under certain core management schemes.

The search for a BWR recipient ended when Philadelphia Electric Company (now PECO Energy) agreed to take all of the Shoreham fuel plus monetary considerations, and use the fuel in its two-unit Limerick Generating Station. The fuel

would be used over time in peripheral core locations. The removal of this material from Shoreham would permit the decommissioning to go to completion and remove any long term on-site fuel storage needs. General Electric Nuclear Energy was contracted to be the overall project manager for the effort although it took the cooperation and dedication of all three parties plus a host of subcontractors to make the project successful.

The transfer took 33 shipments of the 70-ton IF-300 cask system; two IF-300s were used in the campaign. The transport involved barge and railroad with heavy hauling and rigging services at two intermodal transfer locations. With no rail access at Shoreham each cask system was heavy hauled to the on-site barge slip where it was rolled onboard and secured; one cask system per barge. The barge was towed 347 miles to PECO's Eddystone Station, a coal-fired plant on the Delaware River near Philadelphia. The shipping sequence spaced the two casks by 4 or 5 days such that the empty and loaded casks passed at sea. Off-loading at Eddystone was accomplished with a shore-based 275-ton crane. The IF-300 was placed directly onto its railcar and proceeded by dedicated train to the Limerick plant. Rail distance to Limerick was about 40 miles. Empty casks were returned in the reverse order.

The first loaded shipment departed Shoreham on September 25, 1993 and the last shipment of the campaign was unloaded at Limerick on June 7, 1994. The 33 shipment campaign proceeded without significant incident and was completed 94 days ahead of the contracted schedule and 6 days ahead of what was believed to be the ideal schedule.

B. Lessons Learned

Following past shipping experience each of the 33 shipments was unique, no two were identical. However, emerging from this campaign were a set of lessons, general and specific, which have application well beyond Shoreham. "Old Hands" may find some of them obvious but it is instructive for future reference that these lessons be preserved; a comprehensive report has been written. Time and space does not permit a full discussion of all the lessons but the more salient general ones are:

1. <u>There Is No Substitute For Experience</u>. The campaign schedule and the learning curve are at odds with each other. Experienced personnel, particularly those with a background in reactor site operations, are essential to the successful, timely execution of the campaign. SNF shipping logistics are not unlike a refueling outage and the conduct of a campaign must be similar. There is little time for on-the-job training.

2. <u>Begin Planning Earlier Than Seems To Be Reasonable</u>. Despite what we think we know, things will surface in the preshipping period which will have negative schedule impact. The only solution is to begin the process early and flush out those hidden issues. One vital function is contingency planning. Anticipating changes and planning accordingly can be a project-saving activity. Although most contingency plans go unimplemented, all it takes is one to rescue the schedule.

3. <u>Develop Teamwork</u>. The campaign is won or lost by the people carrying out the work. Formalized teamwork development should be an integral part of the campaign plan-

ning activities. This also is an on-going activity since campaigns can last for months and personnel can change over time.

4. Establish A Strong Management Structure. There are many parties and interfaces in a campaign. It is vital to the effort that clear lines of command and seamless tools of communications be established. Although decentralized decision-making is an important aspect of the process, there must be a formal management structure with a defined hierarchy for executing the program.

5. Never Underestimate The Resourcefulness Of Those Who Might Oppose You. This is an institutional matter but one that can be as disruptive as anything operational. A pro-active philosophy combined with the right resources applied in a timely fashion can do much to off-set even the most aggressive opponents. Institutional matters should be part of contingency planning.

6. Do Not Expect Some Railroads To Share Your Enthusiasm. With the recognition that the railroad industry makes thousands of individual shipments daily, each with a shipper who demands special attention, it may be surprising how unremarkable some railroad service can be even under dedicated train conditions. It is not that the service will be unacceptable but rather that it may be inconsistent with the high cost of dedicated train service. The solution is close and constant communications with "key" railroad personnel. Having some ex-railroaders on the team will help immensely.

7. Utility Cooperation Is Mandatory. The overwhelming bulk of the reactor site work is carried out by the utility even where the DOE is the shipper. This work includes: scheduling, planning, rad protection, procedures, QA, licensing, and execution. The success of a campaign lies in the utility's commitment to give appropriate priority to SNF shipping activities. This is not to suggest that utilities will be uncooperative but rather to identify their importance in the campaign. The roles and responsibilities of all parties must be defined and documented prior to the beginning of the campaign.

8. Rigorous Scheduling Is Vital To Success. Each campaign must be managed under a detailed formal schedule. Schedule review should be frequent and any adjustments must be justified. The schedule should be a collective product and should be treated as a team performance "contract." Without scheduling discipline the campaign will surely drift.

9. Do Not Forget The "Thank You" When The Job Is Done. A job well-done deserves recognition of those who made it so. Future campaigns will reap the benefit of this act.

III. CONCLUSION

The planning and execution of a SNF shipping campaign is a complex undertaking. Past experience can be of value in the formulation of future plans. The Shoreham project experience provides a host of insights applicable to a success-oriented shipping project and its examination along with that of other relevant projects can be of significant future value.

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