

SIGNIFICANT IMPROVEMENTS RESULTING FROM IMPLEMENTATION
OF THE DAVIS-BESSE LESSONS LEARNED TASK FORCE RECOMMENDATIONS

To resolve the March 2002 Davis-Besse reactor vessel corrosion issue, the NRC Executive Director for Operations promptly chartered a Lessons Learned Task Force (LLTF). The LLTF was charged with conducting an independent evaluation of the NRC's regulatory processes that ensure reactor vessel head integrity. In addition, the task force was charged with identifying and recommending areas of improvement to be made by the agency and the nuclear industry.

The LLTF developed recommendations in several key technical and programmatic areas. The recommendations and safety improvements are discussed in more detail below.

Materials Degradation

The discovery of small cracks and leaks in reactor vessel head penetrations at nuclear power plants in 2001 had prompted the NRC to issue several generic communications advising the industry of the events and requesting more extensive inspections. During one of these inspections, the Davis-Besse reactor vessel head degradation was discovered. Subsequently, the NRC issued an order requiring all licensees with plants susceptible to this degradation to visually inspect the reactor vessel head surface area for indications of leakage and boric acid accumulation, as well as inspect head penetrations using methods to detect cracks before leakage starts. Currently, all susceptible plants have completed inspections required by the order. Some have detected small cracks during these inspections and made repairs. No significant leaks or large accumulations of boric acid were found at any of the plants.

The American Society of Mechanical Engineers (ASME) Code calls for less extensive inspections than the order. The task force recommended the NRC encourage ASME to revise the code to include inspection requirements equivalent to those in the NRC order. Changes to the ASME Code are made by a consensus process involving the utilities, other industry stakeholders and the NRC. Proposed revisions are being discussed and progress has been made, but a final agreement has not been reached. The NRC also has aggressively sought stakeholder input, holding numerous public meetings on materials degradation issues. It will continue to work with the stakeholders to update the ASME Code and remains confident that interim requirements of the order will assure public health and safety until the ASME Code is updated and acceptable to the NRC and then endorsed by an NRC rulemaking.

Meanwhile, NRC task groups, supported by research at the Argonne National Laboratory, evaluated revisions to reactor coolant leakage limits in plant technical specifications and requirements to install more sensitive equipment to detect small leaks. These task groups identified technologies to provide early leak detection and allow leakage limits to be lowered. However, the resulting reduction in risk of a major loss of coolant did not justify imposing new requirements because inspections and monitoring have been generally effective at managing degradation. NRC is continuing to improve the effectiveness of these programs. In response to another LLTF recommendation, the staff determined the technical specifications of all susceptible plants include reactor coolant leakage limits and action requirements consistent with the NRC-approved standard technical specifications. However, the NRC is evaluating the potential risk from boric acid accumulation when there are reactor coolant leaks at rates less than technical specification limits for extended periods, such as between required inspections.

Communications

The LLTF provided several recommendations to improve the handling of industry operating experience information. Over the past two decades, there were numerous reports of boric acid corrosion and piping cracks, but the reports were not effectively reviewed by, evaluated by and disseminated to the staff or the industry. The cornerstone of the program is the "clearinghouse," a single organization that systematically collects, communicates and evaluates operating experience and applies the lessons learned to the core regulatory functions of oversight, licensing, rulemaking, and incident response. It also conducts a daily screening meeting at which incoming event reports and other operating experience items are reviewed. In fact, a task group is performing a benchmarking review to identify "best practices" consistent with regional programs and to strengthen the interface between the clearinghouse and other technical organizations.

In addition, the program has substantially advanced the use of information technology in making operating experience information available to internal users and members of the public. There is a new powerful database for managing all reported events, as well as a new operating experience information gateway that consolidates a large collection of individual databases and Web sources of information onto a single Web access page. It is also easier for the public to search operating experience in generic communications, event reports, morning reports, and preliminary notifications.

The NRC Office of Nuclear Reactor Regulation has a new communication tool to promptly notify NRC staff of developing operating experience in their areas of expertise or practice. Users may also use this tool to examine recent or developing operating experience in their respective areas. The office plans to create teams of technical staff by October 2005 to automatically receive and systematically assess the operational data in their specialized areas to identify trends and recommend appropriate action.

To ensure plant experience is adequately considered in licensing decisions, new or revised expectations were established with regard to the duration of a licensing Project Manager assignment to a specific plant, frequency of site visits, communication with the resident inspector staff and maintaining a questioning safety attitude about plant events.

The NRC issued improved guidance in developing generic communications, establishing criteria for acceptable responses from licensees, properly documenting evaluations of licensee responses, and performing follow-up verification of licensee implementation. The staff also conducted a follow-on verification of a sample of generic communications not related to the Davis-Besse facility event and found them to be generally effective.

The LLTF recommended an effectiveness review of the actions taken in response to previous lessons-learned reviews. This review identified the need for a centralized and rigorous process for tracking and closeout of agency actions for lessons learned recommendations. A task force is now developing a process for institutionalizing agency lessons learned and expects to provide a development and implementation schedule to the Commission in July 2005.

NRC Inspection Program

The staff made several changes to the process to enhance the NRC's ability to detect declining plant performance, including the specific issues identified at Davis-Besse. For example, the review of the Davis-Besse event indicated the deteriorating condition had been underway for several years and that the planned inspection, maintenance, and modification activities that

could have prevented, or enabled earlier discovery, of the condition were frequently deferred. The NRC inspection program procedures have since been revised to increase evaluation of licensee programs and actions relating to long-standing unresolved problems.

Several inspection procedure changes also were made to address the reactor vessel head and boric acid inspections. Along with generic communications and orders, temporary instructions were issued to provide guidance for regional inspector oversight of licensee inspection activities. The procedures for monitoring inspection activities during refueling outages have been updated, as have procedures to evaluate whether licensees have adequate programs and processes in place to detect, monitor, and take corrective actions for adverse trends in reactor coolant system leakage.

The NRC inspector training program has been enhanced by a Web-based system to provide more timely dissemination of information to the inspection staff, and a method for individual study. New training modules were developed to address lessons learned from the Davis-Besse event, such as the effects of boric acid corrosion and the importance of maintaining a questioning attitude toward safety. The latter training module used the case of the Columbia space shuttle accident to reinforce this message. There have been several recent examples of an improved questioning attitude. For instance, resident inspectors have identified a peeling paint condition inside containment, a turbine building flooding issue, and a previously unanalyzed condition regarding a crane used to move the reactor vessel head at their respective sites.

The program management aspects of the Reactor Oversight Process have been enhanced. For example, the guidance for managing NRC resources devoted to plants in an extended shutdown as a result of performance issues was revised to ensure less impact on routine oversight at other plants. Also, to ensure continuity of regulatory oversight, the staff developed and issued a site staffing metric to monitor gaps in permanent resident and senior resident staffing at reactor sites, and established the criterion of maintaining a minimum of 90-percent coverage. Only inspectors who have attained at least a basic inspector certification are credited in the metric.

Summary

In summary, the NRC has significantly improved safety by implementing the LLTF recommendations. These significant improvements include a more proactive program for evaluating materials degradation; a revitalized and robust assessment of operational experience; enhanced internal and external communications and communications protocols; specific and detailed inspection program enhancements including resident inspector staffing; and the maintenance of a safety-conscious attitude by the NRC staff. As an agency committed to continuous improvement, the NRC has "internalized" many of the lessons now captured in revised and enhanced agency requirements and guidelines.

Additional detailed information on the Davis-Besse event, the LLTF report and actions taken by the NRC can be found on the NRC Web site under the Nuclear Reactors key topics.

###