will not have access to the main FedWorld system.

If the user contacts FedWorld using Telnet, the user will see the NRC area and menus, including the Rules menu. The user will be able to download documents and leave messages, but will not be able to write comments or upload files (comments). If the user contacts FedWorld using file transfer protocol (FTP), all files can be accessed and downloaded but uploads are not allowed; the user will only see a list of files without descriptions (normal Gopher look). An index file listing all files within a subdirectory, with descriptions, is included. There is a 15minute time limit for FTP access.

Accessing FedWorld through the World Wide Web, like FTP, only provides access for downloading files and does not display the NRC Rules menu.

For more information on NRC bulletin boards call Mr. Arthur Davis, Systems Integration and Development Branch, U.S. Nuclear Regulatory Commission, Washington, DC 20555, telephone (301) 415–5780, e-mail axd3@nrc.gov.

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## SUPPLEMENTARY INFORMATION:

United States Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, Washington, DC 20555

NRC Bulletin 95–XX: Potential Plugging of Emergency Core Cooling Suction Strainers by Debris in Boiling Water Reactors

## Addressees

All holders of operating licenses or construction permits for boiling-water reactors (BWRs).

## Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this bulletin to: (1) Request addressees to implement appropriate procedural measures and plant modifications to minimize the potential for clogging of emergency core cooling system (ECCS) suppression pool suction strainers by debris generated during a loss-of-coolant accident (LOCA), and

(2) Require that addressees report to the NRC whether and to what extent the requested actions will be taken and notify the NRC when actions associated with this bulletin are complete.

## Background

On July 28, 1992, an event occurred at Barseback Unit 2, a Swedish BWR, which involved the plugging of two

ECCS suction strainers. The strainers were plugged by mineral wool insulation that had been dislodged by steam from a pilot-operated relief valve that spuriously opened while the reactor was at 3,100 kPa [435 psig]. Two of the five strainers on the suction side of the containment spray pumps were in service and became partially plugged with mineral wool. Following an indication of high differential pressure across both suction strainers 70 minutes into the event, the operators shut down the containment spray pumps and backflushed the strainers. The Barseback event demonstrated that the potential exists for a pipe break to generate insulation debris and transport a sufficient amount of the debris to the suppression pool to clog the ECCS strainers.

On January 16 and April 14, 1993, two events involving the clogging of ECCS strainers also occurred at the Perry Nuclear Power Plant, a domestic BWR. The first Perry event involved clogging of the suction strainers for the residual heat removal (RHR) pumps by debris in the suppression pool. The second Perry event involved the deposition of filter fibers on these strainers. The debris consisted of glass fibers from temporary drywell cooling unit filters that had been inadvertently dropped into the suppression pool, and corrosion products that had been filtered from the pool by the glass fibers which accumulated on the surface of the strainer. The Perry events demonstrated the deleterious effects on strainer pressure drop caused by the filtering of suppression pool particulates (corrosion products or "sludge") by fibrous glass materials entrained on the ECCS strainer surfaces. These corrosion products are typically present in large quantities in domestic BWRs. Separate test programs have been conducted by the Boiling Water Reactor Owners Group (BWROG) and the staff to quantify this filtering effect.

Based on these events, the NRC issued Bulletin 93–02, "Debris Plugging of Emergency Core Cooling Suction Strainers," on May 11, 1993. The bulletin requested licensees to remove fibrous air filters and other temporary sources of fibrous material, not designed to withstand a LOCA, from the containment. In addition, licensees were requested to take any immediate compensatory measures necessary to ensure the functional capability of the ECCS.

Following these events, the staff performed calculations to assess the vulnerability of each domestic BWR. The results of these calculations showed that the potential existed for the ECCS pumps to lose net positive suction head (NPSH) margin due to clogging of the suction strainers by LOCA-generated debris. The staff then conducted a detailed study of a reference BWR 4 plant with a Mark I containment. The preliminary results of the staff study are contained in a draft report, "Parametric Study of the Potential for BWR ECCS Strainer Blockage Due to LOCA Generated Debris," which was published in August 1994. The preliminary study results reaffirmed the results of the earlier staff calculations.

Members of the NRC staff also attended an Organization for Economic Cooperation and Development/Nuclear Energy Agency (OECD/NEA) workshop on the Barseback incident held in Stockholm, Sweden, on January 26 and 27, 1994. Representatives from other countries at this conference discussed actions taken or planned which would prevent or mitigate the consequences of BWR strainer blockage. Based on the preliminary results of the staff's study as reinforced by information learned at the OECD/NEA workshop, the staff issued NRC Bulletin 93-02, Supplement 1, "Debris Plugging of Emergency Core Cooling Suction Strainers," on February 18, 1994. The purpose of the bulletin supplement was to request that BWR licensees take the appropriate interim actions to ensure reliability of the ECCS so that the staff and industry would have sufficient time to develop a permanent resolution. In addition, the bulletin supplement informed licensees of pressurized water reactors (PWRs) and BWRs of new information on the vulnerability of ECCS suction strainers in BWRs and containment sumps in PWRs to clogging during the recirculation phase of a LOCA.

Licensee responses to NRC Bulletin 93–02 and its supplement have demonstrated that appropriate interim measures have been implemented by licensees to ensure adequate protection of public health and safety, and to allow continued operation until the final actions requested in this bulletin are implemented.

In responding to these bulletins, licensees ensured: (1) the availability of alternate water sources (both safety and non-safety related sources) to mitigate a strainer clogging event, (2) that emergency operating procedures (EOPs) provided adequate guidance on mitigating a strainer clogging event, (3) that operators were adequately trained to mitigate a strainer clogging event, and (4) that loose and temporary fibrous materials stored in containment were removed. In addition, a generic safety assessment conducted by the Boiling Water Reactor Owners Group (BWROG)