



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

May 26, 1993

Mr. Don Edwards  
Director of Industry Affairs  
Yankee Atomic Electric Company  
580 Main Street  
Bolton, MA 01740-1398

Dear Mr. Edwards:

This is in response to your letter of February 1, 1993, addressed to Mr. Richard H. Vollmer regarding the NRC inspections conducted under Temporary Instruction 2515/118, "Service Water System Operational Performance Inspection (SWSOPI)". We recognize the impact that a major inspection effort such as the SWSOPI has on licensee and NRC resources. The costs of conducting the inspections are considered in relation to the safety aspects of the issue being addressed.

With respect to the SWSOPI, NRC senior managers decided to initiate team inspections to examine service water systems (SWS) based on the large number of problems that have occurred in these systems over the last 20 years. An evaluation conducted by the Office for Analysis and Evaluation of Operational Data of plant operating experience recognized that the loss of the SWS can represent a significant contribution to core damage frequency - in the range of  $10^{-3}$  to  $10^{-5}$  per reactor year.

The proposed SWSOPI was discussed in a Commission paper, SECY-92-355, dated October 20, 1992 (Enclosure 1). The Commission directed the staff to make every attempt to reduce the number of people on each team to only those essential to perform an effective inspection. See memorandum dated November 23, 1992, from Samuel J. Chilk (Enclosure 2).

Section 11.04 of Temporary Instruction 2515/118 specifies that a program effectiveness review will be performed after a number of inspections have been completed. This review will be performed by September 1993, some nine months after initiation of the program. In addition to program effectiveness, costs to both NRC and licensees will be considered.

The NRC is developing a pilot program in which a licensee may be able to conduct the equivalent of an NRC area of emphasis inspection (e.g., SWSOPI) as an alternative to NRC conducting that area of emphasis inspection. The NRC inspection resources to review the licensee's effort, which may include independent sampling by the NRC, would vary depending on such factors as the licensee's recent SALP

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LD&R-5-1 (operating  
Examination)  
X LD&R-12 - Inspection  
X MHS-3-2  
(Package 1981)

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Enclosure 1



RELEASED TO THE PDH

12/7/92

date

initials

## POLICY ISSUE

October 20, 1992

(NEGATIVE CONSENT)

SECY-92-355

For: The Commissioners

From: James M. Taylor  
Executive Director for Operations

Subject: IMPLEMENTING SERVICE WATER SYSTEM OPERATIONAL PERFORMANCE INSPECTIONS (SWSOPIs)

Purpose: To apprise the Commission of the progress made in developing Service Water System Operational Performance Inspections, and to request Commission approval of the staff's intent to perform the inspection at sites with perceived service water system problems, problem plants, and older facilities. Commission approval is required based upon Chairman Carr's memorandum to me dated April 12, 1991, which commented on the five-year plan, and stated that Commission approval will be required before new major generic team inspection programs are undertaken.

Background: The service water system (SWS) typically removes heat from safety-related equipment and reactor decay heat during shutdown operations. An increasing number of service water system (SWS) events in the late 1970's and early 1980's resulted in the issuance of Bulletin 81-03 related to flow blockage by Asiatic clams and mussels. A number of follow-up information notices discussed other fouling and flow blockage concerns.

The above events were evaluated by the Office for Analysis and Evaluation of Operational Data and the Office of Nuclear Regulatory Research. These evaluations were published in NUREG-1275, Volume 3, November 1988, "Operating Experience Feedback Report - Service Water System Failures and Degradations," and NUREG/CR-5379, Volume 1, June 1989, "Nuclear Plant Service Water System Aging Degradation Assessment," respectively. Both evaluations concluded that the majority of the SWS events were due to fouling mechanisms including corrosion and erosion, biofouling,

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foreign material and debris intrusion, sediment deposition, pipe coating failure, and calcium carbonate deposition. The second most frequently observed cause was personnel and procedural error.

The AEOD study recognized that loss of the SWS can represent a significant contribution to core damage frequency (CDF). NUREG 1275, Volume 3, estimated the CDF to be in the range of  $10^{-5}$  to  $10^{-6}$  per reactor year, based on plant operating experience.

In response to the above indicated operating experience and studies, Generic Letter (GL) 89-13, "Service Water System Problems Affecting Safety Related Equipment," provided the following recommended licensee actions:

- I. For open-cycle SWSs, implement and maintain surveillance and control techniques to significantly reduce the incidence of flow blockage due to biofouling.
- II. Conduct a test program to verify the heat transfer capability of all safety-related heat exchangers cooled by service water.
- III. Establish a routine inspection and maintenance program for open-cycle service water piping and components to ensure that corrosion, erosion, protective coating failure, silting, and biofouling cannot degrade the performance of the safety-related systems supplied by service water.
- IV. Confirm that the SWS will perform its intended functions in accordance with the licensing basis of the plant, including consideration of the ability to perform required safety functions in the event of failure of a single active component.
- V. Confirm that maintenance practices, operating and emergency procedures, and training that involves the SWS are adequate to ensure that safety-related equipment cooled by the SWS will function as intended and that operators of this equipment will perform effectively.

Since GL 89-13 a number of plant specific SWS design and operational concerns have been identified in licensee event reports, during inspections, and as a result of licensee implementation of GL 89-13. Due to these continuing

problems, the Special Inspection Branch of the Office of Nuclear Reactor Regulation was tasked to develop an inspection to assess the operational performance of the SWS at operating plants.

Discussion:

The Service Water System Operational Performance Inspection (SWSOPI) was developed to achieve the following objectives:

- to verify that the SWS is capable of meeting thermal and hydraulic design requirements
- to identify and evaluate SWS design vulnerabilities
- to assess the SWS operation, maintenance, surveillance, testing, and associated personnel training
- to assess the unavailability of the SWS due to planned maintenance and surveillance and component failures
- to assess the licensee's planned or completed actions in response to GL 89-13

One pilot inspection is to be conducted in each region since the pilots serve to train the regional inspectors who will conduct the inspections as well as to develop the inspection methodology. Pilot inspections have been completed at the following sites:

- St. Lucie, Region II (9/91)
- Ginna, Region I (12/91)
- Quad Cities, Region III (3/92)
- South Texas, Region IV (7/92)

A pilot inspection is planned at a Region V site in January 1993. The spectrum of findings identified during the pilot inspections ranged from potential operability concerns to less significant issues. The following three examples were identified where licensees had not properly accounted for single failures of active components:

- The licensee had not evaluated the potential loss of operability due to single failure of a discharge check valve while the SWS was cross-connected. (Ginna)
- A single failure of a check valve at the interface between the normal and emergency SW systems could prevent adequate flow to room coolers during an accident. (Quad Cities)



- The technical specification requirement for two of four SWS pumps to be operable did not account for single failure modes and their effect on ensuring required flow during the accident recirculation phase. (Ginna)

Additional findings included:

- Licensee practices allowed SW equipment to be taken out of service for maintenance while the redundant train was being tested and may not have been able to perform its safety function. (Ginna)
- Lack of data on flow distribution and fouling conditions in individual emergency core cooling system pump room coolers resulted in failure to ensure adequate flows to each cooler. (Quad Cities)
- Four of eight residual heat removal (RHR) heat exchanger flow control valves were not certified as being environmentally qualified although operating instructions called for their use during harsh environment accident conditions. (Quad Cities)
- Flow restrictions in Unit 1 RHR heat exchanger room coolers were not properly addressed regarding operability and applicability to Unit 2 components. (Quad Cities)
- The licensee credited the Intake Cooling Water Pump as operable without having adequately tested the pump and its actuation circuitry. (St. Lucie)
- The manual and check valves located on each of the three seismic Category I emergency strainer wash discharge lines perform a safety function, but were not included in the inservice testing program. (South Texas)

The planned course of action is to conduct the SWSOPI at most sites. Fewer significant findings were identified at St. Lucie and South Texas, which are newer plants. In addition, South Texas had performed an effective safety system functional assessment which addressed GL 89-13 issues. Plants which are perceived to have SWS problems or more general maintenance, engineering or technical support problems as well as all plants licensed before 1979 will be inspected. Newer plants which have performed effective safety system functional assessments on the SWS may not be inspected. As a minimum, this inspection will be conducted at 62 percent of the sites, based upon the 1979 criterion and sites already inspected under the pilot program. Some

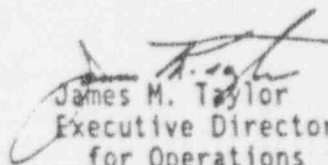
of the additional 38 percent which have problems, as noted above, will be inspected.

The inspection teams will be comprised of a team leader, a mechanical systems design engineer, an operations specialist, a maintenance specialist, and a surveillance/testing specialist. At least one member of the team will have had previous experience with GL 89-13 issues. For plants with complex electrical distribution system supplies to SWS equipment, an electrical engineer may be added to the team. The NRC resource estimate for each SWSOPI is 34 staff-weeks, including management participation and contractors. Of this, 15 staff-weeks involve site inspection, which will directly impact licensees.

The results of the first three pilot inspections were discussed at the Senior Management Meeting in June and a decision was made to proceed with the SWSOPIs as an area of emphasis, subject to Commission approval. The shutdown risk inspection will be discussed at the next Senior Management Meeting and this topic or another topic may be proposed for parallel implementation with the SWSOPI. SWSOPIs would be initiated by the regions in fiscal year 1993 and would take place over about a three year period. The remaining electrical distribution system functional inspections will be completed in fiscal year 1993 in parallel with the first SW inspections.

Recommendation:

Unless advised to the contrary, by the Commission, within 10 working days from the date of this paper, the staff plans to proceed with the SWSOPIs as an area of emphasis inspection at sites with perceived service water problems, problem plant, and older facilities.

  
James M. Taylor  
Executive Director  
for Operations

SECY NOTE: In the absence of instructions to the contrary, SECY will notify the staff on Wednesday, November 4, 1992, that the Commission, by negative consent, assents to the action proposed in this paper.

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OFFICE OF THE  
SECRETARY

November 23, 1992

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12/7/92

date

Initials

MEMORANDUM FOR: James M. Taylor  
Executive Director for Operations

FROM: Samuel J. Chilk, Secretary

SUBJECT: SECY-92-355 - IMPLEMENTING SERVICE WATER  
SYSTEM OPERATION PERFORMANCE INSPECTIONS  
(SWSOPIS)

This is to advise you that the Commission has not objected to the staff plans to proceed with the SWSOPIS as an area of emphasis inspection at sites with perceived service water system problems, problem plants, and other facilities. However, before initiating the inspection program, the staff should seriously reconsider how many people are truly needed to perform each inspection. Every attempt should be made to reduce the number of people on each team to only those essential to perform an effective inspection. In view of the resource requirements for the inspections, the Commission would like to see a progress report at the end of FY 93 discussing the staff's findings and the need for continuing SWSOPIS at the currently planned resource expenditure rate.

(EDO)

(SECY Suspense: 9/30/93)

cc: The Chairman  
Commissioner Rogers  
Commissioner Curtiss  
Commissioner Remick  
Commissioner de Planque  
OGC  
OIG  
Office Directors, Regions (via E-Mail)  
OP, SDBU/CR, ASLBP (via FAX)

SECY NOTE: THIS SRM AND SECY-92-355 WILL BE MADE PUBLICLY  
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SRM

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Mr. Don Edwards

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May 26, 1993

performance, the quality of the self-assessment planned by the licensee, and NRC observations during in-process monitoring of the self-assessment. This program is designed to reduce the NRC regulatory impact on selected licensees and to allow more efficient utilization of NRC resources. As you may know, the Maine Yankee facility is being considered for inclusion in the pilot program.

Sincerely,

original signed by Marylee Slosson for

Anthony T. Gody, Acting Director  
Program Management, Policy Development  
and Analysis Staff  
Office of Nuclear Reactor Regulation

Enclosures:

1. SECY-92-355
2. Memo from S. J. Chilk, SECY  
dtd 11/23/92

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DATE	5/10/93	5/10/93	5/12/93	5/12/93	5/13/93	5/24/93

performance, the quality of the self-assessment planned by the licensee, and NRC observations during in-process monitoring of the self-assessment. These factors would be used by the NRC to determine the degree of reduction, if any, to the NRC's inspection effort. This program is designed to reduce the NRC regulatory impact on licensees and to allow more efficient utilization of NRC resources. As you may know, the Maine Yankee facility is being considered for inclusion in the pilot program.

Sincerely,

Anthony T. Gody, Acting Director  
Program Management, Policy Development  
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audit the licensee's self-assessment. This program is designed to reduce the NRC regulatory impact on licensees and to allow more efficient utilization of NRC resources. As you may know, the Maine Yankee facility is being considered for inclusion in the pilot program.

Sincerely,

Anthony T. Gody, Acting Director  
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DATE	5/10/93	5/10/93	5/ /93	5/ /93	5/ /93	5/ /93