ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:8906020019 DOC.DATE: 89/05/26 NOTARIZED: NO DOCKET #
FACIL:50-305 Kewaunee Nuclear Power Plant, Wisconsin Public Servic 05000305
AUTH.NAME AUTHOR AFFILIATION
HINTZ,D.C. Wisconsin Public Service Corp.
RECIP.NAME RECIPIENT AFFILIATION
Document Control Branch (Document Control Desk)

SUBJECT: Forwards results of safety sys functional insp of station & instrument air sys,in response to Generic Ltr 88-14.

DISTRIBUTION CODE: A048D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 15
TITLE: OR/Licensing Submittal: Equipment Qualification

NOTES:

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD3-3 LA	1	0	PD3-3 PD	1	0
	GIITTER,J	1	1			
INTERNAL:	ACRS	6	6	NRR/DEST/ADE 8H	1	0
	NRR/DEST/MEB 9H	1	1	NRR/DEST/SGB 8D	1	1
	NUDOCS-ABSTRACT	1	1	OC/LFMB	1	0
	OGC/HDS1	1	1	REG FILE 01	1	1
	RES/DSIR/EIB	1	1			
EXTERNAL:	LPDR	1	1	NRC PDR	1	1
	NSIC	1	1			

R I D S / A D D S

R I D S / A D D S

NOTE TO ALL "RIDS" RECIPIENTS:

PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM P1-37 (EXT. 20079) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 20 ENCL 16

MA4
ce

WPSC (414) 433-1598
TELECOPIER (414) 433-5544

NRC-89-69
EASYLINK 62891993

WISCONSIN PUBLIC SERVICE CORPORATION
600 North Adams • P.O. Box 19002 • Green Bay, WI 54307-9002

May 26, 1989

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
Response to Generic Letter 88-14, "Instrument Air Supply System Problems Affecting Safety-Related Equipment"

Reference: 1) Letter from C. R. Steinhardt (WPSC) to NRC Document Control Desk Dated December 16, 1988

In reference 1, Wisconsin Public Service Corporation informed the Nuclear Regulatory Commission that the requirements of Generic Letter 88-14 would be primarily fulfilled through the internal Safety System Functional Inspection (SSFI) Program. WPSC has completed its SSFI of the Kewaunee Nuclear Power Plant's station and instrument air system. The attachment to this letter provides the results of this inspection.

This letter serves as written notification that all the requirements of the generic letter have been implemented. Also, as requested by Generic Letter 88-14, the documentation assembled in response to the Generic Letter's requirements will be maintained for a minimum of two years from the date of this submittal.

Sincerely,

D. C. Hintz
Senior Vice President - Power Production

Subscribed and Sworn to
Before Me This 26th Day
of May 1989

Notary Public, State of Wisconsin

My Commission Expires:
July 2, 1989

KAH/jms
Attach.
cc - Mr. Robert Nelson, US NRC
US NRC, Region III

A048
1/1

Attachment

To

Letter from D. C. Hintz (WPSC) to NRC Document Control Desk

Dated

May 26, 1989

Response to Generic Letter 88-14, "Instrument Air Supply System Problems Affecting Safety-Related Equipment"

WPSC RESPONSE TO GENERIC LETTER 88-14

Introduction

In a letter to the Nuclear Regulatory Commission dated December 16, 1988, Wisconsin Public Service Corporation committed to fulfill the Generic Letter 88-14 requirements primarily through the existing internal Safety System Functional Inspection (SSFI) Program. A SSFI of the Kewaunee Nuclear Power Plant's (KNPP) station and instrument air system was conducted from January 9 to February 22, 1989. In addition, a physical walkdown of the system was completed during the 1989 refueling outage. The following sections describe the results of this inspection as they relate to the requirements of Generic Letter 88-14.

Several important assumptions were made during the preparation of this response:

- The requirements of Generic Letter 88-14 apply only to safety-related equipment. For the KNPP this is defined as Quality Assurance (QA) Type 1 equipment. The WPSC Operational Quality Assurance Program defines QA Type 1 as "structures, systems and components that prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public."

- The requirements of Generic Letter 88-14 apply only to the KNPP instrument air system. However, the SSFI also included the emergency diesel generator (DG) air start system. This system is an independent compressed air system used to start the DGs and control associated air-operated equipment. The inspection results as they apply to the DG air start system are included in this letter for your information.

- The requirements of Generic Letter 88-14 include "verification by test that air-operated safety-related components will perform as expected in accordance with all design-basis events, including a loss of the normal instrument air system." This requirement was satisfied through a review of procedures that vented air from air-operated safety-related components. This verified the proper component response for a loss-of-air event.

Generic Letter 88-14 Requirement

Verification by test that actual instrument air quality is consistent with the manufacturer's recommendations for individual components served.

WPSC Response

Response to this requirement required investigation in two independent areas. The manufacturer's recommendations for instrument air quality for safety-related components had to be determined. In addition, the actual instrument air quality had to be measured. The comparison of these two results fulfilled this requirement.

The determination of manufacturer's recommendations for instrument air quality was performed through the review of vendor manuals and applicable industry standards. In general, vendor manuals described instrument air quality recommendations in vague terms only. However, following discussions with several manufacturers, it was determined that instrument air that fulfilled the air quality standards in ISA-S7.3-1975 was acceptable. Standard ISA-S7.3-1975 generally required air quality more stringent than manufacturer recommendations, most notably for particle size. Therefore, WPSC determined that this standard was an appropriately conservative recommendation for instrument air quality.

The air quality standards listed in ISA-S7.3-1975 are as follows:

1. "The dew point at line pressure shall be at least 10°C (18°F) below the minimum temperature to which any part of the instrument air system is exposed at any season of the year. In no case should the dew point at line pressure exceed 2°C (approximately 35°F)."

   "Dew Point, (at line pressure) (for the purpose of this standard)" is defined as "the dew point value of the air at line pressure of the compressed air system (usually measured at the outlet of the dryer system, or at any instrument air supply source, prior to pressure reduction)."

2. "The maximum particle size in the air stream at the instrument shall be three (3) micrometers."

3. "The maximum total oil or hydrocarbon content, exclusive of noncondensables, shall be as close to zero (0) w/w or v/v as possible; and under no circumstances shall it exceed one (1) ppm w/w or v/v under normal operating conditions."

Air quality testing for dew point and hydrocarbon content was performed from July, 1988 through September, 1988 as part of an investigation of solenoid valve failures at the KNPP. The initial measurement of dew point was conducted in a small containment penetration room with an ambient temperature of approximately 109°F. The measured dew point was 37.8°F. In response to this result, WPSC performed additional testing at the outlet of the train A and B air dryers. The highest recorded dew point was 25.9°F at the outlet of the train A air dryers

and 34.4°F at the outlet of the train B air dryers. The desiccant was then replaced in both trains of air dryers and the dew points were measured again. After this replacement, the highest measured dew point was 19.8°F at the outlet of the train A air dryers and -22.7°F at the outlet of the train B air dryers. These values are below the ISA S7.3-1975 recommendation for dew point.

To ensure compliance with the particle size standard, new air filters will be added to the instrument air system. This improvement is part of an upgrade of the entire instrument air dryer package. The upgrade consists of adding a new high capacity air dryer with 1.0 micron prefilters and 0.5 micron after-filters along with filter differential pressure gauges and an in-line dew point monitor. The installation of this new equipment is scheduled for completion during the current operating cycle. In addition, the existing instrument air dryer package will be upgraded and left in parallel with the new air dryer package. This provides the KNPP with a permanently installed backup instrument air dryer package.

During the air quality testing performed from July, 1988 through September, 1988, condensed hydrocarbon content in the instrument air system was found to be 0.15 ppm which is well below the ISA S7.3-1975 recommendation of 1 ppm.

In parallel with the instrument air dryer upgrade, WPSC initiated the purchase of equipment and the development of procedures to periodically test instrument air hydrocarbon content, dew point, and particle size. An initial particle size test is scheduled for completion prior to June 30, 1989. This particle size test will use a filter smaller than the ISA S7.3-1975 standard of 3 microns and will compare before and after filter weights. This initial test

will provide a base line value prior to the completion of the installation of the new instrument air filters. The new instrument air filters will ensure that the instrument air quality will meet the ISA S7.3-1975 standard.

In conclusion, the KNPP's instrument air quality meets manufacturer's recommendations for dew point and hydrocarbon content. Action is underway to ensure that manufacturer's recommendations concerning particle size are met through the use of instrument air filters on the new instrument air dryer package. In addition, instrument air quality tests are currently scheduled for annual implementation.

For the DG air start system, initial air quality measurements are scheduled for completion during the current operating cycle. In addition, periodic air quality measurements are also scheduled for annual implementation. The ISA S7.3-1975 air quality standards are currently planned to be used to implement the manufacturer recommendations. However, the hydrocarbon standard will apply only downstream of the system's oil filters.

Generic Letter 88-14 Requirement

Verification that maintenance practices, emergency procedures, and training are adequate to ensure that safety-related equipment will function as intended on loss of instrument air.

WPSC Response

Maintenance Practices:

The SSFI maintenance review consisted of a performance based review (where possible) to assess current maintenance practices and their effect on equipment. In addition, preventative maintenance procedures, general maintenance proce-

dures, and corrective maintenance procedures were compared to vendor manuals to insure vendor preventative maintenance recommendations were incorporated as appropriate. In general, the maintenance practices were found to be adequate to ensure that safety-related equipment will function as intended on loss of instrument air. However, improvements and refinements of instrument air maintenance practices are being considered as part of the Preventive Maintenance (PM) Program Reliability Upgrade Project. The review of instrument air maintenance practices is using reliability-centered maintenance techniques to identify and define PM requirements and activities for the entire instrument air system.

Emergency Procedures:

The SSFI operations review included normal, abnormal, and emergency operating procedures, alarm responses, and operating instructions. In general, the items reviewed were found to be adequate to ensure that safety-related equipment will function as intended on loss of instrument air. However, as part of the overall SSFI and additional WPSC review, several improvements were identified for the abnormal and emergency operating procedures. Examples of planned improvements include explicit identification of critical air-operated components and their failure modes and additional information to assist in restoring system lineups following a loss-of-air. These revisions will strengthen the already adequate abnormal and emergency operating procedures.

Training:

The SSFI training review covered senior reactor operator, reactor operator, auxiliary operator, equipment operator, shift technical advisor and maintenance

lesson plans. In addition, later reviews by SSFI personnel covered simulator training for operations personnel. In general, the training items reviewed were found to be adequate to ensure that safety related equipment will function as intended on a loss of air. However, as part of the overall SSFI, several improvements were identified for instrument air lesson plans. Examples of planned improvements include addition of supplemental information concerning failure modes and normal operating parameters and correction of editorial errors in description of equipment and the control logic.

DG Air Start System:

The current DG air start system is a safety-related compressed air system. Therefore, this system is currently designed, installed, operated, and maintained in a manner that is intended to ensure that the system will not fail. The details of the system improvements made in order to ensure the operability of this system are described in Licensee Event Report 89-005 dated April 10, 1989 and in the following sections of this attachment.

Conclusion:

While improvements are planned for maintenance practices, emergency procedures and training, these improvements are not necessary to fulfill this requirement of Generic Letter 88-14. These improvements are intended to enhance already adequate and effective programs.

Generic Letter 88-14 Requirement

Verification that the design of the entire instrument air system including air or other pneumatic accumulators is in accordance with its intended function:

WPSC Response

As part of the instrument air SSFI, the areas of mechanical design, electrical design, testing, maintenance, operations, training, quality assurance, and physical condition were reviewed. These reviews involved accumulators as well as other instrument air components. The SSFI confirmed the KNPP instrument air system has a generally sound design which is capable of fulfilling its intended function. However, several concerns were raised and addressed as described in the following paragraphs:

- The service water system has two air-operated valves which are expected to be available to isolate service water flow to nonessential components post-accident. Each of the valves has a QA Type 1 accumulator that is intended to provide sufficient compressed air for one close cycle. The valves fail as-is on a loss of air. The concerns involved the lack of retrievable design data for the accumulators. Therefore, a design change request (DCR) was initiated which remounted the accumulators, provided additional accumulator capacity, and verified adequate accumulator supply. This DCR was completed during the 1989 refueling outage.

- The KNPP has two containment vacuum breakers which serve a dual function of containment isolation and containment vacuum relief. The original design of the vacuum breakers required a QA Type 1 accumulator to ensure containment isolation and a spring-to-open air operator to ensure vacuum

relief. In addition, a check valve was included in line with each vacuum breaker to provide redundant, passive containment isolation capability. Again the concerns identified involved the lack of retrievable design data for the accumulators. Therefore, a DCR was initiated which provided additional accumulator capacity, upgraded accumulator air tubing, and verified adequate accumulator supply. As part of the DCR, the decision was made to reverse the failure mode of the vacuum breakers. The accumulators now support the vacuum relief function and the vacuum breakers are spring-to-close to ensure containment isolation. The new failure mode is consistent with the current industry practice for vacuum breaker design and provides a system that is less likely to result in excessive accumulator leakage; i.e., the seal is at the solenoid valve rather than the air operator when the valve is closed. These modifications were completed during the 1989 refueling outage.

- The DG air start system actually consists of two redundant compressed air supply systems, one for each DG. Deficiencies were discovered which could have rendered both DGs inoperable. The deficiencies primarily involved the lack of seismic documentation and the existence of components exposed to pressures greater than their design pressures. The lack of seismic documentation applied to the mounting of small diameter copper tubing used to supply positioning air to the DG ventilation dampers and to several components on this tubing. The underrated components were also primarily used in the DG ventilation system. During the 1989 refueling outage, modifications were completed that ensured the DG air start system was QA

Type 1 and could fulfill its intended function. Further details concerning these deficiencies were transmitted to the Nuclear Regulatory Commission by Licensee Event Report 89-005 dated April 10, 1989.

Generic Letter 88-14 Requirement

Verification by test that air-operated safety-related components will perform as expected in accordance with all design-basis events, including a loss of the normal instrument air system:

WPSC Response

The safety-related end-users of normal instrument air were identified as QA Type 1 control valves and control dampers. A total of 154 QA Type 1 control valves and control dampers were identified of which 114 fail closed, 38 fail open, and 2 fail as-is. Existing documentation was reviewed in order to determine if tests equivalent to loss-of-air tests had already been performed. It was discovered that periodic surveillance procedures, pre-operational tests, and post-maintenance tests ensured that the safety-related components performed as expected. In a majority of the tests, the loss of instrument air was initiated by venting the air-operated component through its associated solenoid valve. No discrepancies were discovered by this review.

Generic Letter 88-14 Requirement

This design verification should include an analysis of current air operated component failure positions to verify that they are correct for assuring required safety functions:

WPSC Response

The current failure positions of QA Type 1 control valves and control dampers were compared to the positions required for the component's safety function. No discrepancies were discovered although the following items involved additional investigation of failure mode requirements:

- As noted in an earlier paragraph, the failure mode of the containment vacuum breakers was reversed in order to reduce the potential for accumulator leakage.

- The KNPP uses two redundant shield building ventilation systems to filter the majority of containment leakage post-accident. Each discharge path for the two redundant shield building ventilation fans included an air-operated damper which failed closed on loss of air but also had a QA Type 1 accumulator. A previous modification to the system had added a mechanical back-draft damper in line with the air-operated damper. The SSFI identified a concern with the failure mode of the air-operated damper and its potentially adverse effect on the shield building ventilation system's functionality post-accident. Subsequent review of the entire shield building ventilation system determined that these air-operated dampers could be removed since the back-draft dampers fulfilled the fail-closed function of the air-operated dampers. Therefore, the air-operated dampers were removed during the 1989 refueling outage.

- The KNPP has two redundant air-operated valves that can be used to vent containment for post-accident hydrogen control. Both of these valves are

containment isolation valves which fail closed on loss of air. The KNPP Updated Safety Analysis Report indicates that maximum hydrogen concentration is reached ten days post-accident and implies that control by pressurization alone (without venting) will maintain the concentration below 3.5%. Therefore, it was determined that the failure mode was correct in order to ensure containment integrity. However, a DCR has been initiated to provide a seismically-designed supply line to both valves which will allow the connection of a backup compressed air supply post-accident.

Generic Letter 88-14 Requirement

Each licensee/applicant should provide a discussion of their program for maintaining proper instrument air quality.

WPSC Response

WPSC has initiated several actions which will not only improve instrument air quality but will also ensure it is properly maintained. The foremost of these actions is the addition of new high-capacity instrument air dryers and extremely fine pre- and after-filters. In addition, the instrumentation associated with the new dryer package will allow improved monitoring capabilities for filter and desiccant status. In order to ensure that the proper air quality is maintained, air quality tests are currently scheduled for annual implementation. It is anticipated that these tests will be taken at various points in the instrument air system.

The quality of the DG air start system will also be improved through the addition of new air dryers and filters. This upgrade is scheduled for completion

during the current operating cycle. In addition, air quality tests are currently scheduled for annual implementation on the DG air start system.

For both systems, WPSC currently intends to use the standards in ISA-S7.3-1975 to implement the manufacturer's recommendations for air quality.

Generic Letter 88-14 Requirement

The submittal should also identify any components that cannot accomplish their intended safety function, and state the corrective action taken or to be taken.

WPSC Response

As stated earlier, WPSC identified two deficiencies in the DG air start system which could have rendered both DGs inoperable. These deficiencies were reported to the Nuclear Regulatory Commission by Licensee Event Report 89-005 dated April 10, 1989. As discussed earlier in this attachment, during the 1989 refueling outage, both the lack of seismic documentation and the use of pressure-underrated components were corrected. In general, these deficiencies were corrected by replacing equipment and remounting equipment.