

DAEDALEAN ASSOCIATES, Incorporated

PROGRESS REPORT NO. 6

THE APPLICATION OF THE INTERNAL
FRICTION NONDESTRUCTIVE EVALUATION
TECHNIQUE FOR DETECTING INCIPIENT
CRACKING OF BYPASS LINES AND PIPES
IN BOILING WATER REACTOR PIPING SYSTEMS

Submitted to:

Nuclear Regulatory Commission
Division of Reactor Safety Research
Washington, D. C. 20555

NRC Research and Technical
Assistance Report

Contract Number
NRC-04-78-242
Continuation - Phase II

Report of Progress During the Period
26 May 1980 through 20 June 1980

July 1980

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PROGRESS DURING THE REPORTING PERIOD

During this reporting period, construction of the in-house pipe test loop has been nearly completed. Check-out of individual subsystems will be carried out in the next few days. Pipe specimens have been prepared at Battelle Pacific Northwest Laboratories and were shipped on 18 June 1980. They are expected to arrive at DAI around 1 July 1980.

Discussions have been held with personnel from Battelle Columbus and Battelle Northwest concerning water quality monitoring instrumentation and test procedures. It is anticipated that one of the cognizant persons with which discussions have been held will be utilized as a consultant to examine the water chemistry controls at DAI and verify their correct application.

SUMMARY OF IMPORTANT TRIPS, CONFERENCES,
MEETINGS AND BRIEFINGS

Trip to Zion Station 2-5 June 1980

During the week of 2 June 1980, Messrs. David Fresch and Bruce Jachowski of DAI visited the Zion Nuclear Generating Station for radiation re-training and data gathering.

Upon arrival at Zion on Monday, 2 June 1980, the Unit 1 was shutdown for replacement of some components. Unfortunately, the unit has a limit of 12 people inside containment at one time due to the size of the airlock. This limitation precluded gathering data during the outage, as the quota was constantly filled by maintenance personnel. The unit was brought back up to power on Wednesday, 4 June 1980 and on Thursday, 5 June, Messrs. Al Krawczak of Zion and David Fresch of DAI entered containment along with two insulators and obtained IFD data on the steam generator feedwater nozzles B and D.

With the unit operating at between 96 and 100 percent of full power, only one resonant frequency was observed on each nozzle. Steam Generator B had a resonance of 5253 Hertz; for Generator D it was 6096 Hertz. There was a great deal of noise, both airborne and vibrational, limiting the quality of the decay curves which could be obtained. Measured specific damping capacity values for the nozzle on steam Generator B were between 29×10^{-4} and 40×10^{-4} . For steam Generator D feedwater nozzle $\frac{\Delta W}{W}$ values were between 24×10^{-4} and 41×10^{-4} . A Tektronix instrument package was used which has a bandpass filter with a 3 dB bandwidth of 6.7 percent. Portability and durability necessitate using this system when the equipment must be carried in and out of containment. When the computerized system is used in the future, a laboratory grade

frequency analyzer will be included which has tighter filters. This coupled with the high sampling rate of the A/D converter will enable a more accurate determination of the $\frac{\Delta W}{W}$ values.

Meeting at NRC Office - 12 June 1980

On Thursday, 12 June 1980, Messrs. Larry Yeager and Ray Brasfield of DAI met with Dr. Joseph Muscara of the NRC at Dr. Muscara's office in Silver Spring, Maryland at 9:00 a.m. Discussed at the meeting were: 1) the cost estimates provided by Dr. Robert Clark for the work at Battelle Pacific Northwest Laboratories, 2) amendments 3 and 4 to the contract between DAI and Battelle, 3) pipe sample preparation and shipment to DAI, 4) water chemistry instrumentation, and 5) review of DAI's water chemistry tests and controls by an outside consultant.

With reference to Item 1, the cost estimate was reviewed and areas where DAI feels that the estimates are too high or need justification were indicated. Also discussed was the extension of estimates from last year and their impact on the contract proposal to NRC.

It was indicated that further negotiations are needed before the contract amendments can be signed by DAI.

With reference to Item 3, it was noted that the pipe specimens have been prepared but were being held at Battelle PNL until Amendment 3 was signed and returned. Dr. Muscara indicated he would call Dr. Clark and ask him to ship the specimens.

Under Item 4, Dr. Muscara indicated his requirement for strict water chemistry control and a detailed, coordinated effort on this with Battelle PNL.

With reference to Item 5, Dr. Muscara indicated the necessity of a review of the DAI loop operation, water chemistry tests and procedures by an outside consultant before commencement of testing.

Meeting at NRC Office - 16 June 1980

On Monday, 16 June 1980, Messrs. Larry Yeager and Ray Brasfield of DAI, Dr. Joseph Muscara of NRC and Dr. Robert Clark of Battelle PNL met at Dr. Muscara's office.

1. Pipe preparation and shipment. Dr. Clark indicated that the welding operation and parameters were monitored closely to insure consistent welds in each specimen. The specimens for DAI in-house use are to be shipped on or around 18 June 1980.
2. Metallography. The need for metallography to correlate pipe condition to the IFD-NDE data signature was discussed. This service was not included in the cost estimate provided in Dr. Clark's May 20 letter to Mr. David Fresch.
3. Security access at PNL. The need for 24 hour access by DAI personnel during testing at PNL was discussed.

Dr. Clark is to pursue this item further with Department of Energy security.

4. Discussion was held concerning various items in the cost estimate, including quarterly loop charges and where the costs of maintenance were included.
5. Water loop chemistry requirements were discussed and it was indicated there would be further coordination on this item.
6. Also addressed was cost effective use of DAI personnel on-site at PNL and the capability of utilizing these personnel for other tasks between pipe tests.

ACRS Subcommittee Meeting on Metal Components - 17 June 1980

On Tuesday, 17 June 1980, Messrs. Larry Yeager and Ray Brasfield attended the ACRS Subcommittee Meeting on Metal Components in Washington, D. C., where they gave a presentation on the results of the Phase I IFD-NDE program for monitoring intergranular stress corrosion cracking in 304 stainless steel BWR piping. The anticipated results of Phase II were discussed along with the schedule and program deliverables. Questions by the ACRS committee were answered.

UNANTICIPATED TECHNICAL OR MANAGEMENT PROBLEMS

None

ANTICIPATED PROBLEMS

None

REQUIREMENTS FOR CHANGES IN KEY PERSONNEL

None

ANTICIPATED COST AND COMPLETION SCHEDULE

Based on the progress to date, it is anticipated that the program will be completed on schedule and within the estimated cost.

