

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-346/91011(DRSS)

Docket No. 50-346

License No. NPF-3

Licensee: Toledo Edison Company  
Edison Plaza  
300 Madison Avenue  
Toledo, OH 43652

Facility Name: Davis-Besse Nuclear Power Station, Unit 1

Inspection At: Davis-Besse Nuclear Power Station, Oak Harbor, Ohio

Inspection Conducted: June 24-27, 1991 (On-site)

Inspector: *J. E. House*  
J. E. House

7-18-91  
Date

Approved By: *M. C. Schumacher for*  
M. C. Schumacher, Chief  
Radiological Controls and  
Chemistry Section

7-18-91  
Date

Inspection Summary

Inspection on June 24-27, 1991 (Report No. 50-346/91011(DRSS))

Areas Inspected: Routine announced inspection of: (1) the chemistry program, including procedures, organization, and training (IP 84750); (2) primary and secondary systems water quality control programs (IP 84750); (3) quality assurance/quality control program in the laboratory (IP 84750); and (4) nonradiological confirmatory measurements (IP 84750).

Results: The licensee's water quality control program is well managed, conforms to the EPRI Steam Generator Owners Group and Primary System Guidelines. The nonradiological confirmatory comparisons were good as was the laboratory QA/QC Program. No violations or deviations were identified.

## DETAILS

### 1. Persons Contacted

- <sup>1</sup>B. Andrews, QA Auditor
- <sup>1</sup>D. Briden, Senior Chemistry Program Advisor
- <sup>1</sup>R. Edwards, Chemistry Analyst
- <sup>1</sup>J. Ferguson, Chemistry Analyst
- <sup>1</sup>K. Filar, Licensing Engineer
- <sup>1</sup>D. Hennen, General Supervisor, Chemistry
- <sup>1</sup>M. Hoffman, Training Supervisor
- <sup>1</sup>R. Messersmith, Supervisor, Chemistry
- <sup>1</sup>G. Honma, Compliance Supervisor, Licensing
- <sup>1</sup>M. Stewart, Training Manager
- <sup>1</sup>H. Stevens, Supervisor, Industrial Safety Engineering
- <sup>1</sup>J. Wood, Operations Manager

The inspector also interviewed other licensee personnel in various departments in the course of the inspection.

<sup>1</sup>Present at the Exit Meeting on June 27, 1991.

### 2. Management Controls, Organization, and Training (IP 84750)

Organization of the Chemistry Section is essentially unchanged since the last inspection in this area (Region III Inspection Report No. 50-346/91007). Low turnover has contributed to stability of the chemistry staff. The inspector reviewed the licensee's chemistry training program which is managed by the Training Department. The training laboratory is independent of the plant laboratory and is well equipped with the types of instrumentation used in performing analyses in the plant. Chemistry technicians (Assistant Testers) who are not ANSI qualified are always under the supervision of a Chemistry Tester and are never alone on backshift. The training program is INPO accredited and recently completed a reaccreditation inspection.

No violations or deviations were identified.

### 3. Water Chemistry Control Program (IP 84750)

The water chemistry program is similar to that described in Region III inspection report, 50-346/89024 and is defined by DB-CH-03001, Reactor Coolant System Chemistry, Revision 01, April 1, 1990 and DB-CH-06900, Operational Chemical Control Limits Revision 01, April 11, 1990.

A review of selected trend chart data from the previous year indicated that primary system chemistry parameters were well within the EPRI guidelines with chloride and fluoride averaging less than 5 ppb (150 ppb limit), sulfate less than 4 ppb (100 ppb limit), dissolved oxygen approaching 0 ppb (10 ppb limit) and dissolved hydrogen within 25-50 cc(STP)/kg RCS.

The once through steam generators (S/G) require high quality feedwater in order to minimize corrosion. Chemistry parameters are trended, and for the previous year indicated that feedwater quality met or exceeded the EPRI Owners Group Guidelines. Dissolved oxygen averaged one ppb or less (5 ppb limit), sodium and chloride were each less than 2 ppb (3 and 5 ppb limits respectively), and total iron averaged less than 1.5 ppb (10 ppb limit). Cation conductivity approached the 0.2 umho/cm limit but licensee representatives stated that this was due to the use of morpholine for pH control in S/G feedwater. The licensee monitors conductivity, pH, hydrazine, dissolved oxygen and sodium with in-line analyzers. Acetate, formate, chloride, fluoride, sulfate, morpholine, ammonia, nitrate and silica are monitored by an in-line Ion Chromatograph.

The laboratory trends chemistry parameters daily and notifies plant management of any anomalies. Chemistry also produces a monthly report for plant and corporate management. The licensee's has upgraded the instrumentation used to monitor primary and secondary water chemistry parameters. The water quality control program appears to be well managed and to have the support of plant management. This area continues to improve and is a strength.

The licensee has implemented a Chemistry Improvement Program to maximize the lifespan of the once through steam generator (OTSG). Corrosion reduction and minimizing iron sludge buildup between the steam generator (S/G) tubes and the tube support plate is a major goal of this program. Although morpholine is currently used to maintain the pH of S/G feedwater, other amines are being considered as alternatives. Dry layup of the secondary side has been proposed as a means of reducing corrosion of carbon steel piping during outages. This program will be reviewed during subsequent inspections.

No violations or deviations were identified.

#### 4. Nonradiological Confirmatory Measurements (IP 84750)

The inspector submitted chemistry samples to the licensee for analyses as part of a program to evaluate the laboratory's capabilities to monitor nonradiological chemistry parameters in various plant systems with respect to regulatory and administrative requirements. These samples had been prepared, standardized, and periodically reanalyzed (to check for stability) for the NRC by the Safety and Environmental Protection Division of Brookhaven National Laboratory (BNL). The samples were analyzed by the licensee using routine methods and equipment.

A single dilution of each sample was prepared by licensee personnel as necessary to bring the concentrations within the ranges normally analyzed by the laboratory, and run in a manner similar to that of routine samples. The results are presented in Table 1 which also contains the criteria for agreement. These criteria are based on BNL analyses of the standards and on the relative standard deviations (RSD) derived from the results of the plants participating in the 1986 interlaboratory comparisons. (Table 2.1, NUREG/CR-5422). The acceptance criteria were that the licensee's value should be within 2 Standard Deviations of the BNL value for agreement and between 2 and 3 SD for qualified agreement. A qualified agreement may indicate a bias in the assay.

The licensee determined ten analyses at three concentrations each. Of the initial 30 analyses, 28 were agreements or qualified agreements (93%) and 2 were disagreements (low level iron and high level silica). The low level iron was repeated and became an agreement. The high level silica had a negative bias of approximately 18%. It was not repeated due to lack of sample. The middle and high level chloride results were qualified agreements as were the three hydrazine results. Reanalysis of the chlorides resulted in an agreement for the middle concentration, but the high level remained a qualified agreement. Reanalysis of the three hydrazine samples resulted in no change, the negative bias remained at approximately .0%. As these results (qualified agreements) are statistical agreements (within 3 standard deviations of the mean) they are counted as agreements. The inspector reviewed possible causes for the the biases observed for the two disagreements and five qualified agreements with licensee representatives who agreed to review the calibration of the iron, hydrazine, silica and chloride assays.

No violations or deviations were identified.

5. Implementation of the QA/QC Program in the Laboratory (IP 84750)

The inspector reviewed the chemistry QA/QC program as defined by DB-CH-00001, Chemistry Program Administration, Revision 01, April 27, 1990; and DB-CH-00010, Chemistry Quality Control Program, Revision 01, January 11, 1991. The licensee has control charts, independent controls and multiple point calibration curves. Control charts are statistically based and are reviewed by the tester performing the analysis and by a supervisor. The inspector noted to licensee representatives that the previously completed control chart should be left in the instrument manual to provide the technician with the instrument's performance history. A review of selected charts did not indicate any significant biases in the analyses and observations of technicians indicated that the charts are updated and reviewed during the analyses.

Vendor supplied unknowns are used for the interlaboratory comparison and chemistry technician testing programs. Technicians are required to be tested twice per year. Statistically based acceptance criteria have been established and technician results within 2 standard deviations (SD) of the mean value are considered passing, beyond 2 SD are considered failing and the technician repeats the assay. A review of selected data indicated that the technicians are tested as required, the results met the procedural requirements and the analytical performance was adequate.

No violations or deviations were identified.

6. Audits and Appraisals (IP 84750)

The inspector reviewed two audits, one surveillance and one audit/surveillance closure package; Quality Assurance (QA) Audit AR-91-CMRWCR-01 conducted March 18-April 1, 1991, QA Audit-91-TSTCA-01 conducted March 25-April 1, 1991, and QA Surveillance Report SR-91-BKSFT-01 conducted January 22, 1991. Auditors observed sample collection and analysis, the chemistry QA program and instrument QA

including in-line monitors. The Quality Verification Audit/Surveillance closure package reviewed the response of chemistry management to previous audit findings. These audits appeared to be performance based and A review of selected items identified in the audits indicated that they were addressed in a timely manner.

No violations or deviations were identified.

8. Exit Interview

The scope and findings of the inspection were reviewed with licensee representatives (Section 1) at the conclusion of the inspection on June 27, 1991. The inspector discussed observations on the chemistry quality control program, the confirmatory measurements and plant water systems.

During the exit interview, the inspector discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspector during the inspection. Licensee representatives did not identify any such documents or processes as proprietary.

Attachments:

1. Table 1, Nonradiological Interlaboratory Test Results, June 24-27, 1991

TABLE 1  
 Nonradiological Confirmatory Measurements Results  
 Davis-Besse Nuclear Station  
 June 24-27, 1991

Analyte	Method <sup>1</sup>	Concn <sup>2</sup>	Ratio <sup>3</sup>	Acceptance Ranges <sup>4</sup>		Result <sup>5</sup>	
				+ 2RSD	+ 3RSD		
<u>ppb</u>							
Fluoride	A	IC	3	1.063	0.875-1.125	0.813-1.187	A
	B		5	1.018	0.875-1.125	0.813-1.187	A
	C		9	1.006	0.875-1.125	0.813-1.187	A
Chloride	A	IC	3	0.985	0.933-1.067	0.900-1.100	A
	B		6	0.912	0.917-1.081	0.879-1.121	A+
	C		12	0.907	0.926-1.074	0.895-1.105	A+
Rerun	B		6	0.947	0.917-1.081	0.879-1.121	A
	C		12	0.919	0.926-1.074	0.895-1.105	A+
Sulfate	A	IC	15	0.993	0.895-1.105	0.842-1.158	A
	B		30	1.036	0.895-1.105	0.868-1.132	A
	C		50	1.001	0.900-1.100	0.867-1.133	A
Iron	G	AA/FU	11	1.266	0.904-1.096	0.854-1.146	D
	H		20	1.021	0.903-1.097	0.857-1.143	A
	I		30	1.063	0.903-1.097	0.855-1.145	A
Rerun	G	AA/FL	1000	1.091	0.904-1.096	0.854-1.146	A
Copper	G	AA/FU	11	0.988	0.904-1.095	0.859-1.141	A
	H		20	1.088	0.904-1.096	0.857-1.143	A
	I		30	0.992	0.904-1.096	0.857-1.143	A
Sodium	J	AA/FL	50	0.965	0.863-1.137	0.784-1.216	A
	K		250	1.051	0.859-1.141	0.788-1.212	A
	L		500	1.036	0.862-1.138	0.789-1.211	A
Lithium	J	AA/FL	200	1.005	0.859-1.141	0.788-1.212	A
	K		750	1.031	0.859-1.141	0.788-1.212	A
	L		1300	1.020	0.868-1.142	0.787-1.213	A
Silica	S	Spec	25	1.000	0.906-1.094	0.859-1.141	A
	T		55	0.938	0.909-1.091	0.860-1.136	A
	U		80	0.821	0.907-1.093	0.857-1.143	D

Analyte	Method <sup>1</sup>		Concn <sup>2</sup>	Ratio <sup>3</sup>	Acceptance Ranges <sup>4</sup>		Result <sup>5</sup>
					+ 2RSD	+ 3RSD	
<u>ppb</u>							
Hydrazine	P	Spec	10	0.914	0.922-1.078	0.888-1.118	A+
	Q		40	0.913	0.922-1.078	0.888-1.118	A+
	R		80	0.911	0.922-1.078	0.888-1.118	A+
Rerun	P	Spec	10	0.888	0.922-1.078	0.888-1.118	A+
	Q		40	0.908	0.922-1.078	0.888-1.118	A+
	R		80	0.915	0.922-1.078	0.888-1.118	A+
<u>ppm</u>							
Boron	D	Titr	1000	1.000	0.979-1.021	0.968-1.032	A
	E		300	1.005	0.979-1.021	0.968-1.032	A
	F		500	0.982	0.979-1.021	0.968-1.032	A

1. Methods: Titr - Titration  
 IC - Ion Chromatography  
 Spec - Ultraviolet/Visible Spectrophotometry  
 AA/FU - Atomic Absorption Spectrophotometry  
           - Graphite Furnace  
 AA/FI - Flame Atomic Absorption Spectrophotometry
2. Conc: Approximate concentration analyzed.
3. Ratio of Licensee mean value to NRC mean value.
4. The SD in the fifth and sixth columns represents the coefficient of variation obtained from averaging licensee data from the preceding cycle (Table 2.1 of NUREG/CR-5244). A result is considered to be in agreement if it falls within the + 2 SD range; a qualified agreement if it lies outside + 2 SD, but within + 3 SD; and in disagreement if it is outside the + 3 SD range.
5. Result:  
 A = Agreement: Licensee value is within +2 SDs of the NRC mean value.  
 A+ = Qualified agreement, licensee is between + 2 and +3 SDs of the NRC value.  
 D = Disagreement: licensee value is outside + 3 SDs.

