U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-331/86018(DRSS)

Docket No. 50-331 License No. DPR-49

Licensee: Iowa Electric Light and
Power Company
IE Towers
Post Box Office 351
Cedar Rapids, IA 52406

Facility Name: Duane Arnold Energy Center

Inspection At: Duane Arnold Site, Palo, Iowa

Inspection Conducted: November 17-21, 1986

Inspector: Richard B. Holtzman 12/9/86
Date

Approved By: M. Schumacher, Chief 12/10/86
Radiological Effluents and Date
Chemistry Section

Inspection Summary

Inspection on November 17-21, 1986 (Report No. 50-331/86018(DRSS))
Areas Inspected: Routine, unannounced inspection of plant chemistry and radiochemistry, including management controls and organization, training, chemistry staffing, water chemistry quality control programs, facilities and equipment, quality assurance/quality control of analytical measurements and chemical processes and practices controlling chemical impurities.
Results: No violations or deviations were identified.

DETAILS

1. Persons Contacted

*D. Mineck, Plant Superintendent, IE
*K. Young, Assistant Plant Superintendent, Radiation Protection/Security, IE
*J. Smith, Technical Support Supervisor, IE
*H. Georgio, Radiation Protection Supervisor, IE
*L. Kriege, Chemistry Coordinator, Linn Engineering (LE)
*J. West, Senior QA Engineer, IE
*P. Schmelzer, Health Physicist, IE
*R. Lewis, Chemistry Foreman, IE
G. Taylor, Chemist, IE
C. Sealls, Chemistry Foreman, IE
W. Keith, Chemist, LE
W. Holden, Training Supervisor for Radiation Protection, IE
R. Tucker, Staff Instructional Technologist, IE
W. McVickers, Chemistry Technician (CT), IE
J. Ford, CT, IE
A. Funke, CT, IE
D. Rees, CT, IE
R. Smiley, Radwaste Operator, IE

*N. Gilles, Resident Inspector, NRC

The inspector also contacted other plant personnel during this inspection.

*Denotes those present at exit interview.

2. Licensee Actions on Previous Inspection Reports

a. (Open) Open Item (331/83013-02): Inadequate ventilation in laboratory and sample fume hoods (findings in radiochemistry Audit I-82-28). The licensee is currently removing asbestos from the plant structures above the laboratory prior to completing ventilation modifications. The ceiling has been modified to allow, laboratory operation while limiting infiltration of asbestos. The laboratory rooms are monitored for asbestos contamination. This item will remain open and be examined during a subsequent inspection.

b. (Open) Open Item (331/86016-01): Analyze sample for gross beta, H-3, Sr-89 and Sr-90 and report results to Region III. This item has not been completed since the last inspection.

3. Management Controls, Organization and Training

The inspector reviewed the management controls, organization and training of the Chemistry Group. The group is headed by the Chemistry Coordinator (CC) who reports to the Radiation Protection Supervisor, who, in turn, reports to the Assistant Plant Supervisor - Radiation Protection and Security. The CC supervises a permanent and a temporary Laboratory Foreman who supervise the eight Chemistry Technicians (CT). The CC is also assisted by three chemists (a Chemical Engineer, a Corporate Chemist and an Assistant Chemistry Coordinator). However, since they work only part-time in chemistry, their total efforts for direct support are equivalent to about 1½ full-time chemists. The staffing appears to be marginally adequate but is somewhat alleviated by having two foremen and experienced technicians.

The qualifications of the CC and other chemists were discussed previously.[1] Six of the eight CTs have had more than three years experience, so that they meet the Technical Specification commitment to ANSI N18.1-1971 and they have also completed their classroom and OJT qualifications. The other two have about two years of service and will complete their training and ANSI qualifications next year. A retraining/ continuing education program for the CTs has been developed and will start shortly after January 1, 1987.

The licensee is applying for INPO accreditation of the CT training program. INPO has accepted the licensee's Self Evaluation Report (SER) as of October 23, 1986, and has scheduled a critical evaluation visit for July 1987. The inspector noted that current CT training includes the laboratory analyses of blind chemistry samples with documentation of individual results.

No violations or deviations were identified.

4. Water Chemistry Control Program

The licensee has formed a Water Chemistry Steering Committee to implement and maintain close cooperation among the various groups involved in controlling water quality in the plant. This committee includes at least one member each from Chemistry, Radwaste, Health Physics, Operations, and Engineering. This demonstrates management involvement and the interaction of these groups responsible for water quality appears to be a valuable tool for maintaining control of this parameter.

The inspector reviewed the administrative procedures governing the water chemistry quality activities, No. 1411.10, "Water Chemistry Control," Revision 1, February 26, 1986. It includes the responsibilities of the plant management and the actions to be implemented when plant parameters exceed one of three Action Levels. The parameters governing these levels given in Plant Chemistry Procedures PCP 2.9, "Water Chemistry Guidelines," Revision 1, July 1, 1986, appear to be consistent with the T/S and with BWR Owners Group Guidelines.

[1]Region III Inspection Reports No. 50-331/85009 and No. 50-331/85019.

The values of various parameters, including the conductivity of reactor and hotwell water, and reactor feedwater, and pH, chloride, silica, and dissolved oxygen in the various systems, were plotted on trend charts. In the last year the plant has had little problem in maintaining the parameters below the administrative limits listed as "achievable." Increases in conductivity levels (spikes, which have been within the limits) were correlated with the regeneration cycles of various demineralizer beds and attributed to the injection of resin beads into the water during valve manipulation. The program appears to be operating well.

The licensee plans to implement the use of a hydrogen injection system after the next outage in May or June 1987 to reduce the oxygen content of the reactor coolant for better corrosion control. A three-day test in May 1986 showed that, compared to other reactors, relatively little hydrogen was needed to control the oxygen. This will limit the increase in radiation levels due to nitrogen-16 in the turbine building and will minimize the problems in disposing of the excess hydrogen. This appears to be very useful addition to the plant.

No violations or deviations were identified.

5. Water Sampling and Process Monitoring

The inspector observed the reactor and turbine building sample panels during a tour of the plant and during the collection of a hotwell sample by a CT. The conductivity of this grab sample was within 5% of that from the in-line monitor. Two other CTs (one in training) analyzed for chloride, sulfate and nitrate on the ion chromatograph.

No violations or deviations were identified.

6. Implementation of the Chemistry Programs

The inspector reviewed aspects of the chemistry and radiochemistry programs, including physical facilities, laboratory operations and QA/QC practices.

The laboratory space and facilities were adequate. The whole laboratory, consisting of two rooms and a counting room area was treated as a hot laboratory, using the reactor radiological access control point as the radiological control for the laboratory. This appeared to be satisfactory, as noted previously.[2] The facilities were clean and well-maintained and the housekeeping was good. Because of the previously noted poor ventilation (Section 2), the licensee was rebuilding the ventilating system, which results in a dusty laboratory. At times, during the inspection the laboratory was closed off because of atmospheric asbestos contamination.

[2]Ibid.

The laboratory had adequate instrumentation for the required analyses, including Orion 701A meters for specific ion and pH measurements, several Spectronic 20 Spectrophotometers, turbidimeters, titrators and an IL aa/ae Spectrophotometer 157 atomic absorption spectrophotometer with a graphite furnace for trace metal analysis. The licensee has been using a Dionex 2020i Ion Chromatograph since about June 1986 as the primary method for the analyses of anionic species, including chloride, sulfate, and nitrate in the various reactor and auxiliary systems. The analytical methods on this system are being developed and optimized. As presently operated, the detection limits are about one ppb (±10%) for the above anionic species.

The inspector observed several CTs collect and analyze a sample. They appeared to be generally knowledgeable about the procedures and laboratory operations. One CT, still being trained in used of the IC, was nevertheless quite knowledgeable in its operation.

No violations or deviations were identified.

7. Implementation of the QA/QC Program in the Chemistry and Radiochemistry Laboratory

The inspector reviewed the Chemistry QA/QC program as described in the procedures and implemented in the laboratory. Over the last few years, the licensee has been developing a program for both radiological and non-radiological analyses to include the testing of the CTs for analytical proficiency. This program is based mainly on Procedures:

CQCP 1.0 DAEC, "Quality Control Program," Revision 6, December 27, 1985, and

QCCP 2.0, "Analysis of Chemistry Quality Control Samples," Revision 6, November 20, 1986.

The non-radiological program includes the use of monthly crosscheck samples from a vendor (Analytics, Inc.), periodic performance checks on the instruments, and the measurement of duplicate samples at prescribed intervals. The performance checks consist of standard samples that are run with each group of analyses and recorded on the respective instrument logbooks. The results are acceptable if within ±10% of each other. The results are reviewed by management but are not trended on control charts or subject to any statistical analysis.

The results of the crosscheck samples for chloride, fluoride, nitrate, nitrite, sulfate, silica and high and low-level boron are listed on a data sheet along with the expected values supplied by the vendor, the ratio of the laboratory-to-vendor values and the acceptabilities of the ratios (0.90-1.10). The results were audited by the chemists, but again, no further documentation was presented, such as control charts or statistical analyses of the data showing the overall performance of the individual

CTs or procedures. The value of the crosscheck program was demonstrated when the chemists found a problem in the low-level chloride analyses by chloride probe when a group of results of the crosscheck samples were outside the acceptance criteria. This problem was corrected by repair of a faulty electrode.

Licensee representatives acknowledged the inspector's concerns that the absence of documentation on the analyses of the results, such as sorting and statistical analysis of the results by type of analyses and by analyst (CT) and a separate tabulation of duplicate results, other than the listing of the measurements and acceptance levels, indicates poor quality control of the laboratory. In particular, the lack of control charts on the non-radiological instrument performance checks appears to be a substantial deficiency in the program. The inspector discussed how some of the problems in the use of control charts might be alleviated, the amount of performance check data actually reduced, and control over the analyses improved. The licensee representatives agreed to investigate these suggested changes in the QC program. This will be examined in a subsequent inspection (Open Item 50-331/86018-01).

The inspector reviewed the analysis of boron in the Standby Liquid Control Tank (SBLC) done according to Procedure PCP 5.8, "Boron-Sodium Pentaborate Poison System," Revision 6, May 3, 1985. This analysis, which uses the specific gravity (SG) of the solution to determine the boron concentration, appears to have some substantial weaknesses. The inspector's major concerns were that the procedure is neither specific for boron, nor is it a standard procedure, such as from the ASTM. Moreover, the procedure does not reference its source, nor the origin of the data used in the graph of sodium pentraborate concentration vs. SG. Further, no discussion is given of possible problems that might arise, such as the effect of non-stoichiometric mixing of the boric acid and sodium tetraborate on the SG and the effect on accuracy due to the differences in temperatures between the calibration of the hydrometer at 77°F and that of measurement at 80°F.

The results of 18 vendor-supplied crosscheck sodium pentaborate samples had a mean ratio (licensee-to-vendor values) of 1.02 ± 0.03 (standard deviation), which, based on the inspector's Student's t-test analysis represents a statistically significant bias and a fairly large variability with respect to the vendor's samples. No performance checks or precision determination results were available for this procedure as performed at the station.

To compensate for some of the weaknesses of this procedure, licensee representatives agreed to determine the boron concentration at least once a year by means of a boron-specific analysis, such as the curcumin method, and to consider changing to a standard method. This will be examined in a subsequent inspection (Open Item 50-331/86018-02).

The radiological QA/QC program consists of quarterly crosscheck samples from the above vendor of mixed gamma-ray samples, H-3, Sr-89, Sr-90 and gross alpha and beta samples. The acceptance criteria for these samples were those used in the NRC radiological confirmatory measurements program. Additionally the counters are checked periodically with performance check sources and the data plotted on control charts. The results for the gamma isotopic measurements for the vial were generally good, with a mean ratio (licensee-to-vendor values) of 0.96 ± 0.04, but those for the air filters, while acceptable, showed some bias, with a ratio of 1.10 ± 0.04.

The QA/QC program is operational, but the inspector had concerns about various aspects, mainly relating to lack of documentation of analyses of the collected data, as noted above, Progress in these matters will be followed in subsequent inspections.

No violations or deviations were identified.

8. Participation in the Emergency Exercise

The inspector observed the Emergency Exercise by the licensee on November 18, 1986, 1800-2400 hours, with particular emphasis on the collection and processing of a sample from the Post Accident Sampling System (PASS). Two CTs collected an actual reactor coolant sample according to the Post Accident Sampling Procedures P.A.S.A.P 2.1, "Preliminary and Standard Systems Operations," Revision 7, September 16, 1986 and P.A.S.A.P 2.4, "Small Volume Liquid Sample," Revision 9, September 16, 1986. The CTs followed the procedures in detail and appeared to be generally knowledgeable about the operation of the system. They were also very aware of the radiation exposure potential under accident conditions. They checked the radiation exposure levels (both simulated and actual) frequently with the health physicist monitoring the operation. The latter appeared to use the proper monitoring procedures. The sample was then brought to the laboratory where it was processed for counting by another CT. She was knowledgeable of the required procedures and noted the differences in treatment between this sample and an accident sample. In a post exercise discussion with licensee representatives, the inspector noted that better simulation of accident conditions and quicker return of needed analytical information would have been achieved by counting the supposedly hot sample for about one minute, rather than the 16 minute count done during this exercise. Licensee representatives acknowledged this comment. Overall, the operations went smoothly and the CTs appeared to be competent in their jobs.

No violations or deviations were identified.

9. Licensee Internal Audits

The inspector reviewed two licensee audits: "Radiochemistry Quality Control Program," Audit Reports I-85-23, December 6, 1986 and I-86-15, October 7, 1986. The first had nine findings and one observation relating to lack of procedures, calibration data sheets, inventory of

radioactive sources, internal auditing of records and laboratory ventilation. These items were closed out in a timely manner except for that relating to laboratory ventilation, which is currently being corrected (Section 2). The second audit had one finding dealing with the lack of an operating procedure for some new pH meters. Because of the recentness of the audit this item was not closed.

The QC Department does monthly QC reviews of various aspects of the chemistry program. No findings were identified in the last ten reviews.

No violations or deviations were identified.

10. Radiological and Environmental Monitoring Program

The inspector's review of several Environmental Sampling Procedures noted some errors in Procedure No. E 4.5, "Statistical Comparison of TLD's for Direct Radiation Impact," Revision 0, December 9, 1985. A licensee representative was apprised of these errors in the equations and parameters for Student's t-test in the procedure. He stated that these would be corrected. These errors caused no problems because the procedure had not yet been used.

No violations or deviations were identified.

11. Open Items

Open Items are matters which have been discussed with the licensee, which will be reviewed further by the inspectors, and which involve some action on the part of the NRC or licensee or both. Open Items disclosed during the inspection are discussed in Section 6.

12. Exit Meeting

The inspectors reviewed the scope and findings of the inspection with licensee representatives denoted in Section 1 at the conclusion of the inspection on November 21, 1986. The licensee acknowledged the inspector's concerns about the QA/QC program and the boron analysis and that they would look into the suggested modifications to improve the programs.

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