U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-483/86001(DRSS)

Docket No. 50-483 License No. NPF-30

Licensee: Union Electric Company
Post Office Box 149
St. Louis, MO 63166

Facility Name: Callaway Plant, Unit 1

Inspection At: Callaway Site, Reform, MO

Inspection Conducted: January 13-16, 1986

M. J. Oestmann

Inspector: M. J. Oestmann 1/30/86
Date

M. C. Schumacher

Approved By: M. C. Schumacher, Chief, Radiological Effluents and Chemistry Section 1/30/86
Date

Inspection Summary

Inspection on January 13-16, 1986 (Report No. 50-483/86001(DRSS))
Areas Inspected: Routine, announced inspection of: (1) Chemistry and Radiochemistry, including water chemistry control, quality assurance/quality control of sampling and analysis in the laboratory, observations of technician performance, and of hot and cold laboratories, counting room, and sampling facilities; (2) training and qualifications of chemistry staff; (3) licensee internal audits; and (4) review of corrective action taken regarding a previously identified open item. The inspection involve 26 inspection-hours onsite by one NRC inspector.
Results: No violations or deviations were identified.

DETAILS

1. Persons Contacted

*G. L. Randolph, Assistant Manager, Technical Services
*V. J. Shanks, Superintendent, Chemistry
*C. A. Riggs, Supervisor, Primary Chemistry
*B. L. Allen, Supervisor, Secondary Chemistry
J. R. Peevy, Superintendent, Health Physics
R. R. Roseluis, Supervisor, Health Physics Technical Support
*T. W. Stotlar, Acting Supervisor, Operations Support
*R. L. Plautz, Quality Assurance Engineer
*D. R. Brownawell, Quality Assurance Engineer
D. D. Stretch, Chemist, Primary
P. M. Bell, Chemist, Secondary
M. Evans, Head, Radiochemistry Training
V. Weldon, Training Supervisor
R. Sietz, Rad-Chemistry Technician, Counting Room
E. J. McDaniel, Rad Chemistry Technician
W. R. Johnson, Rad Chemistry Technician
J. V. Kerrigan, Laboratory Foreman
*W. R. Bledsoe, Jr., Compliance Engineer
*Q. B. DuBois, Assistant Manager, Site Quality Assurance
*C. H. Brown, NRC Resident Inspector

*Denotes those present at exit interview on January 16, 1986.

2. Licensee Action on Previous Findings

(Closed) Open Item (50-483/85009-02): Large number of errors in counting data entry for control charts in counting room. The inspector reviewed input data on control charts developed for different counters in the counting room, and determined that no errors had been made. Control charts are prepared from counting data obtained from the previous month and are based on calculations of standard deviations for total counts rather than count rates. The upper and lower investigation limits at the two standard deviation levels and control limits at the three standard deviations levels were plotted as expected and were not so wide as found previously when the limits were based on count rates. This closes this item.

3. Management Controls and Organization, Training, and Qualifications

No changes in management controls and staffing organization have occurred since the previous inspection.[1] The Chemistry Department, managed by the Superintendent, Chemistry, is divided into two subgroups - Primary and Secondary Chemistry, each with a supervisor, a chemist, two foremen and eight to ten Radiation/Chemistry Technicians (RCTs). Secondary chemistry analyses are performed in the cold laboratory, while the radiochemistry

[1]Inspection Report No. 50-483/85009

work is done in the hot laboratory of the Primary Chemistry subgroup. Radioactive samples are counted in the counting room which is under the direction of the Health Physics Department. The Counting Room Supervisor reports to the Supervisor of Health Physics Technical Support who is responsible to the Superintendent Health Physics. The RCTs under Health Physics do the counting and maintenance of their facility. The RCTs of both Chemistry and Health Physics Department are permanently assigned to their respective departments. The two departments appear to cooperate well together.

Qualifications of the Chemistry Department staff were described in a previous inspection.[2] The chemistry management have had good academic training and obtained undergraduate degrees in chemistry or chemical engineering, prior to employment with the licensee. The entire staff appears to be highly qualified in conformance with T/S 6.3.1.

The inspector also reviewed the Chemistry Training program presented by the Training Department in cooperation with the Chemistry Department. A 21 week training program involving formal lectures, on the job training and supervisory observation were presented to the 18 experienced RCTs and is now being presented to two newly hired technicians. The experienced RCTs will undergo one week retraining program each six months with emphasis on chemical instrumentation, procedure implementation, and upgrading laboratory practices. No problems were noted during the inspector's review of subject material presented to the RCTs. These RCTs have all completed their qualification card in accordance with Procedure CDP-ZZ-00600 "Rad-Chem Technician, Chemistry Qualification/OJT Program," dated July 10, 1984. The training program, which is presently undergoing review for INPO accreditation, appears to be well planned and adequately presented based on the RCTs responses to inspector questions on chemical procedures being followed in the laboratories.

No violations or deviations were identified.

4. Implementation of the Primary Chemistry and Radiochemistry Program

The inspector reviewed the Primary Chemistry and Radiochemistry programs, including physical facilities, laboratory operation, counting room, procedures and QA/QC practices in the hot laboratory and counting room.

The laboratory space and facilities were adequate, including bench space and fume hoods. The laboratory was adequately ventilated. Housekeeping was good. Chemical instrumentation was found well maintained, operable and had current calibration stickers, in accordance with Procedure CDP-ZZ-00300 "Control of Chemical Instrumentation and Equipment," Revision 6, dated June 27, 1985. No chemical or reagent bottle appeared to have passed their posted expiration date. No changes in the radiochemical instrumentation have occurred since the previous inspection.[3] The licensee has well maintained gamma, alpha, and beta counting equipment, each of which is computerized to facilitate data handling.

[2]Ibid
[3]Ibid

The inspector observed the collection of reactor coolant gas sample in a gas bomb in accordance with Procedure CTP-SJ-01101 "Observation of Auxiliary Building Sample Station (SJ-143)," Revision 5, dated February 27, 1985. The RCT properly stripped off the gas from the liquid in a gas stripping system in the hot laboratory and prepared several samples for counting the gas on the Nuclear Data 6685 gamma spectrometer and for measuring hydrogen gas using a gas chromatograph. The RCT appeared skilled in laboratory practices and quite knowledgeable about the analyses to be conducted and often referred to the relevant procedures involved such as Procedure CTP-ZZ-02550 "Determination of Reactor Coolant Gases," Revision 5, dated April 2, 1985. No problems were noted in the sample collection and analyses of the reactor coolant gases by the RCT. Another RCT observed properly analyzed boron in reactor coolant using first a standard solution of 1000 ppm B and then titrating the sample solution using an automatic titrator in accordance with procedure CTP-ZZ-02039 "Determination of Boron Utilizing the Mettler DL 40 Memotitrator," Revision 3, dated February 12, 1985. No problems were noted during review of these procedures or their implementation.

The inspector also observed the analysis of chloride, fluoride, and sulfate in the RCS coolant in which the Dionex ion chromatograph was used. A detection level of 5 ppb chloride was being used. The licensee finds this method to be more sensitive than the use of a specific ion probe. The licensee also tracks the concentration levels of various anions to keep under control any stress corrosion cracking effects. Atomic absorption measurements for determining lithium and other metals were also observed. No problems were noted during these observations.

Licensee representatives indicated that there had been no difficulty in maintaining the required chemistry parameters in the primary reactor coolant. At no time was Technical Specification 3/4 4.7 for limiting conditions of operation for dissolved oxygen, chloride and fluoride in reactor coolant exceeded. However in December 1985, the licensee identified that the boron concentration in the refueling water storage tank (RWST) dropped below the 2000 ppm B limit because new demineralizers used to clean up the refueling water had deborated the water circulating to the RWST. The licensee promptly corrected the problem before the T/S 3.1.2.5.b(2) was violated, and rewrote procedures to assure no recurrence of this event.

The licensee also maintains a good QA/QC program as described in procedure CDP-ZZ-00700, Revision 5, dated February 6, 1985. This includes use of accuracy and precision control charts for analysis of key parameters including chloride, fluoride, silica, lithium, copper, sodium, iron, as well as tritium, strontium 89/90, gross beta and alpha, and gamma activity (Cs-137). The licensee utilizes control charts to assure that adequate precision and accuracy of each chemical analyses is obtained. The control charts uses two SD for the warning limits and three SD for the control limits, based on data obtained from the previous month. Control charts are also maintained for counting equipment to assure instruments are operating properly (see Section 2). Several parameters (centroid, efficiency, and resolution of the 122- and 1836-kw gamma peaks) taken

from daily check source counts using the Nuclear Data program are also plotted on control charts. The program calculates limits and flags out-of-limit data. No problems were noted in review of control charts in the hot laboratory or the counting room.

As part of the QA/QC program, the licensee also participates in an interlaboratory crosscheck program involving liquid samples obtained from Analytics, Incorporated. These include samples containing several gross alpha, gross beta, tritium, and several gamma emitters. Samples are provided to each RCT every six months. The inspector's review of 1985 results found that the licensee had overall agreement with Analytics. However, the chemist had to evaluate the data and correct several calculations on Ce-141 and Ce-144 performed by the RCTs to assure they had properly calculated the concentrations prior to submittal of the data to Analytics. For the one or two instances where disagreement for one or two nuclides were found, the RCT was provided another sample until he obtained agreement. The licensee agreed to provide review to the RCTs for calculating concentrations of different nuclides during the retraining program.

Overall the primary chemistry/radiochemistry program appeared to be adequately implemented. The RCTs appear to have good training, procedures are satisfactorily prepared and implemented, and an excellent QA/QC program for radionuclides is in place.

No violations or deviations were identified.

5. Implementation of a Secondary Water Chemistry Control Program

a. Secondary Water Chemistry Control Program

The inspector determined that the licensee established and is adequately implementing a secondary water chemistry control program in accordance with the requirements in T/S Section 6.8.4.c. This program is summarized in procedure APA-ZZ-00630 "Secondary Chemistry Program" and detailed in a number of the following chemistry procedures:

CDP-ZZ-00200 "Chemistry Schedule and Water Specs," Revision 7, August 21, 1985
CDP-ZZ-00460 "Condenser In-Leakage Investigation Program". Revision 0, May 21, 1985
CDP-ZZ-00470 "Steam Generator Hideout Return Program," Revision 0, September 15, 1985
CTP-AK-01208 "Sampling of Individual Condensate Polishing Demineralizer Effluent," Revision 2, May 23, 1985
CTP-AK-01209 "Sampling of the Condensate Demineralizer Regeneration System Dilute Acid and Caustic," Revision 0, May 5, 1983
CTP-AP-01204 "Sampling of Condensate Water Storage Tank, Revision 1, April 3, 1984
CTP-AQ-06010 "Chemical Addition to the Condensate System, Revision 3, November 5, 1984

CTP-AQ-06020 "Chemical Addition to Feedwater Chemical Addition System for Steam Generator Wet Layup, Revision 1, March 17, 1984
CTP-RM-01205 "Sampling from the Process Sampling Panel (RM-172), Revision 2

These procedures adequately address the major elements of the PWR owners guidelines and include assignment of authority and responsibilities to implement the program and provide guidance to the chemistry staff on operational chemistry limits designed to minimize localized corrosion in the steam generators and turbines. The inspector also determined that these procedures as well as other chemical procedures address the analytical measurements program, performance monitoring of the program, documenting data, logging and trending of results, and includes action levels for the licensee to take to correct plant operation when monitored chemical parameters are confirmed to be outside the normal operating values.

The inspector also reviewed operational conditions and determined that there was close cooperation between the Operations Department and the Chemistry Department staffs in maintaining tight controls in the plant water chemistry during different modes of operation. The inspector determined during review of trend plots of different chemical parameters in the secondary system, that the licensee has effectively implemented a good water chemistry control program.

b. Water Sampling and Analysis, Monitoring, and Processing

The inspector reviewed the sampling and monitoring programs and water treatment processes during a tour of the plant including a review of the cold laboratory facilities and laboratory equipment.

The inspector observed an RCT collect samples from the Process Sampling Panel (RM-172) located in the cold laboratory. The RCT collected several different samples from each of the four steam generators blowdown, condenser hotwell, demineralizer water storage tank, main steam lines, heater drain pump discharge, condensate polisher effluent, moisture separator reheater drain, low pressure feedwater outlet, and condensate pump discharge header. The inspector noted that each line appeared to be adequately purged before sampling and that the RCT had no difficulty in properly collecting each sample. He and another RCT were then observed to conduct a number of analyses on each sample, including measuring the concentrations of chloride, hydrazine, ammonia, sodium, sulfate, fluoride, and determining the pH, cation conductivity, and dissolved oxygen of each sample. In addition, in-line monitors for conductivity, sodium, pH, and dissolved oxygen were also observed. Each monitor had current calibration stickers and was found operable. The RCTs appeared well trained and knowledgeable in performing the sampling and analyses. The chemistry foreman also reviews the logged data and if an off normal concentration level is found, the Shift Supervisor and Chemistry Management are promptly notified.

A licensee representative also reported that there has been no evidence of primary to secondary leakage since the plant went operational. In addition water in-leakage through the condenser is kept under tight control. If an in-line monitor for sodium and dissolved oxygen indicates leakage, a licensee representative reported that the condenser tubes would be promptly plugged.

During the upcoming outage, the licensee plans to check steam generator tubes with eddy current tests for any degradation and also plug any condenser tubes where needed. The licensee appears to be well aware of the need to maintain tight chemistry controls over the secondary chemistry system to minimize SG tube degradation and is willing to expend the necessary effort to improve water chemistry monitoring and water quality control.

c. QA/QC for Secondary Chemistry

During the observation of the RCT performing sample collection and analysis, the inspector also reviewed the QA/QC practices used in analyzing secondary chemistry samples. The licensee analyzes standard samples for chloride, fluoride, sulfate, ammonia, hydrazine, sodium and other species during each analysis. The licensee also uses precision and accuracy control charts for each chemical analysis and plots the results on the control charts. The control charts are based on the previous month's data. No problems were noted in a review of each control chart. Furthermore, the RCTs are tested each six months by conducting analysis of blind samples containing chloride, fluoride, silica, sodium, iron, lithium, copper and boron in an interlaboratory crosscheck program.

Review of results for 1985 indicate that there appears close agreement with the Analytics, Incorporated, results when concentrations are in the ppm range. This applies to boron, lithium and the metals which are analyzed using the atomic absorption spectrophotometer. However, the licensee appears to need improvement in analyzing the ppb range particularly for chloride and fluoride where there is about a 20% difference in results between the licensee and Analytics. The licensee agreed to evaluate the analytical results of this program and make any necessary improvements to obtain agreeable results. This item will be examined in a subsequent inspection (Open Item 50-483/86001-01).

No violations or deviations were identified.

6. Licensee Internal Audits

The inspector reviewed the audit (AD5A87510D) performed by the licensee's QA Department from October 28 through November 8, 1985. The audit was designed to verify various aspects of the chemistry program, including implementation of chemical technical procedures, a laboratory QC program, training and qualifications of chemistry personnel, compliance with T/S requirements, and post accident sampling. Out of the 37 items on the

checklist, two minor deficiencies were identified and four recommendations made. Corrective actions were promptly taken and accepted. This audit is considered closed. In addition, no problems were identified during a surveillance of steam generator chemistry sampling frequencies and laboratory techniques made in November and December 1985 by a QA auditor.

No violations or deviations were identified.

7. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspector and which involve some action on the part of the NRC or licensee or both. An open item disclosed during the inspection is discussed in Section 6.c.

8. Exit Interview

The inspector met with licensee representatives (denoted in Section 1) at the conclusion of the inspection. The scope and findings were summarized. The licensee agreed to improve the QC control regarding the crosscheck program for nonradiological species in secondary chemistry.

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 any such documents or procedures as proprietary.