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UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

FEB 8 1977

Docket No. 50-331

Iowa Electric Light and
Power Company
ATTN: Mr. Duane Arnold
President
IE Towers
P. O. Box 351
Cedar Rapids, Iowa 52406

Gentlemen:

This refers to the inspection conducted by Mr. L. R. Greger of this office on January 11-14, 1977, of activities at Duane Arnold Energy Center authorized by NRC License No. DPR-49 and to the discussion of our findings with Mr. Mineck and others of your staff at the conclusion of the inspection.

The enclosed copy of our inspection report identifies areas examined during the inspection. Within these areas, the inspection consisted of a selective examination of procedures and representative records, observations, and interviews with personnel.

During this inspection, certain of your activities appeared to be in noncompliance with NRC requirements, as described under Enforcement Items in the Summary of Findings section of the enclosed inspection report. The inspection showed that action had been taken to correct the identified noncompliance and to prevent recurrence. Consequently, no reply to this noncompliance is required and we have no further questions regarding this matter at this time.

Based on discussions with your representatives at the site, we understand that: (1) portions of your radiation protection orientation training will be upgraded, and (2) you will intensify your efforts regarding resolution of area radiation monitor operability problems.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and the enclosed inspection report will be placed in the NRC's Public Document Room, except as follows. If this report contains information that you or your contractors

believe to be proprietary, you must apply in writing to this office, within twenty days of your receipt of this letter, to withhold such information from public disclosure. The application must include a full statement of the reasons for which the information is considered proprietary, and should be prepared so that proprietary information identified in the application is contained in an enclosure to the application.

We will gladly discuss any questions you have concerning this inspection.

Sincerely yours,

James M. Allan

James M. Allan, Chief
Fuel Facility and
Materials Safety Branch

Enclosure:
IE Inspection Report
No. 050-331/77-01

cc w/encl:
Mr. Ellery Hammond,
Chief Engineer
Central Files
Reproduction Unit NRC 20b
PDR
Local PDR
NSIC
TIC

UNITED STATES NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report of Radiation Protection Inspection

IE Inspection Report No. 050-331/77-01

Licensee: Iowa Electric Light and Power Company
Security Building
P. O. Box 351
Cedar Rapids, Iowa 52406

Duane Arnold Energy Center
Palo, Iowa

License No. DPR-49
Category: C

Type of Licensee: BWR (GE) - 538 MWe

Type of Inspection: Routine, Unannounced

Dates of Inspection: January 11-14, 1977

Principal Inspector: L. R. Greger — 2/8/77 (Date)

Accompanying Inspectors: None

Other Accompanying Personnel: None

Reviewed By: W. L. Fisher, Chief
Fuel Facility Projects and
Radiation Support Section — 2/8/77 (Date)

SUMMARY OF FINDINGS

Inspection Summary

Inspection on January 11-14, (77-01): Review of radiation protection program; follow-up on previously identified licensee commitments. One item of noncompliance regarding whole body counting was identified.

Enforcement Item

The following item of noncompliance was identified during the inspection:

Infraction

Contrary to Technical Specification 6.9.1 and Section 4.5 of the DAEC Plant Radiation Protection Manual, whole body counts were not conducted on licensee personnel, except for approximately nineteen individuals, during the period from October 1974 to April 1976.

Licensee Action on Previously Identified Enforcement Items

None reviewed.

Other Significant Items

A. Systems and Components

A significant amount of area radiation monitor downtime was experienced during 1976.

B. Facility Items (Plans and Procedures)

None identified.

C. Managerial Items

None identified.

D. Deviations

None identified.

E. Status of Previously Reported Unresolved Items

The correlation between airborne gross beta-gamma activity and the corresponding gamma isotopic MPC was established by the licensee. The correlation resolves the concerns about adequacy of airborne radioactivity area postings.

Management Interview

A management interview was conducted with Messrs. Mineck, Rinderman, Young and Van Sickel at the conclusion of the inspection on January 14, 1977. The following items were discussed:

A. The inspector reviewed the scope of the inspection and discussed the noncompliance regarding failure to conduct annual whole body counting. The inspector stated that the licensee's corrective action appeared adequate; therefore, no reply to the noncompliance would be required. (Paragraph 8, Report Details)

B. In response to the inspector's expressed concern over the RPPM audit performed during 1976, the licensee stated that a second RPPM audit was scheduled for conduct during the 1976 audit year. (Paragraph 3, Report Details)

C. The inspector acknowledged the radiation protection orientation training program changes, including the biennial retraining requirements. Shortcomings in the orientation training given to administrative visitors were discussed. The licensee stated that the shortcomings would be corrected and added that the retraining effort was expected to be completed during February 1977. The inspector further commented that it would seem desirable to have more than one set of questions for testing comprehension of the orientation material. (Paragraph 4, Report Details)

D. The inspector expressed concern over the operability problems experienced with the area radiation monitors and inquired regarding the causes. The licensee indicated that the situation had been brought about by a combination of replacement parts procurement and equipment reliability problems. The licensee further stated that increased management attention would be focused on resolution of the problem. (Paragraph 6, Report Details)

E. The inspector noted that the licensee's calibration procedures for certain radiological survey and monitoring instruments specified an electronic calibration accompanied by a one point (or one point per scale in some cases) calibration check using a radioactive source. The licensee agreed to evaluate the adequacy of the calibrations. (Paragraph 6, Report Details)

F. The inspector requested that the licensee: (1) establish criteria for the conduct of whole body counts for non-plant personnel and (2) establish administrative action levels to identify whole body count results which require further evaluation to ensure compliance with 10 CFR 20.103. The licensee stated that both items would be examined. (Paragraph 8, Report Details)

G. The inspector stated that he had reviewed the licensee's derivation of the correlation between airborne gross beta-gamma activity and the corresponding gamma isotopic MPC, including use of the correlation in assessing airborne radioactivity area posting and respiratory protection requirements. The licensee was told that this matter, an unresolved item from a previous inspection, was considered resolved. (Paragraph 10, Report Details)

H. The inspector stated that he had toured the licensee's facilities and was favorably impressed with the state of cleanliness. (Paragraph 11, Report Details)

I. The inspector noted that the licensee was involved in review and revision of several radiation protection related procedures and stated that several additional procedures had been identified during the inspection as requiring minor revisions. The licensee stated that the identified procedures would be reviewed and revised as necessary. (Paragraph 5, Report Details)

J. The licensee stated that correspondence would be submitted clarifying a previous report concerning airborne iodine-131 and particulate releases during the fourth quarter of 1976. (Paragraph 15, Report Details)

REPORT DETAILS

1. Persons Contacted

R. Johnson, Chemist
D. Kalavitinos, Acting Training Coordinator
L. Nelson, Surveillance Coordinator
R. Rinderman, Quality Supervisor
K. Young, Radiation Protection Engineer

2. Organization - Qualifications

The radiation protection/chemistry organization remains unchanged from the previous radiation protection inspection. As reported in a previous inspection report, the Assistant Radiation Protection Engineer position was filled during 1976.[1/] The licensee intends to add a radwaste and health physics supervisory position during early 1977.

The chemical and radiation protection technicians are currently apportioned as follows:

Chemistry	3
Health Physics	2*
Radwaste	6*
Environmental	1

*One radwaste technician is assigned to work with the health physics technicians on a weekly rotating basis.

Offshift radiation protection coverage is provided by the radwaste technicians.

3. Audits

The DAEC Quality Department continues to perform audits of: (1) RWP implementation, (2) ACP 1407.1 and 1407.2 requirements, (3) implementation of the Plant Radiation Protection Manual (PRPM), and (4) general plant status including radiation protection activities. In addition, audit of the Radiation Protection Procedures Manual (RPPM) requirements was initiated as a result of findings made during a previous radiation protection inspection.[2/]

1/ IE Inspection Rpt No. 050-331/76-04.
2/ IE Inspection Rpt No. 050-331/75-15.

Audits of ACP 1407.1 and 1407.2 requirements were conducted on two occasions during the 1976 audit year; the PRPM and RPPM audits were conducted once to date during the 1976 audit year and are currently scheduled for conduct a second time (January 1977). Approximately one to two RWP and general area audits were conducted per week during the 1976 audit year. A selective review of the 1976 audits was conducted. It was noted that although the RPPM is much more extensive and instrumental to conduct of the radiation protection program than is ACP 1407.1, the licensee's records indicated that significantly less time was expended on the RPPM audit than on the ACP audits.

The IELP quality group conducted one audit of the DAEC radiation protection activities since the previous radiation protection inspection. The audit report, dated February 12, 1976, was reviewed. Followup was noted to have been completed by March 1976.

4. Training

Radiation protection orientation training is provided via a combination videotape/lecture presentation. Use of the three-hour videotape presentation commenced during 1976. The same presentation is used biennially for retraining purposes. Records of initial training of selected personnel were reviewed; no discrepancies from the licensee's procedural requirements were noted. The retraining effort commenced during December 1976 and is expected to be completed by the end of February 1977. Retraining was approximately 75% complete at the time of this inspection. Tests are given for all but one of the four categories of personnel to whom the orientation training is given.

The inspector reviewed the orientation videotape. The one-hour presentation given to administrative visitors requires upgrading in several areas. The remaining orientation categories appear to be receiving adequate training.

5. Radiation Protection Procedures

The PRPM and RPPM contain the licensee's radiation protection procedures. The PRPM has undergone three revisions since the preceding radiation protection inspection while the RPPM has had six revisions. The revisions were reviewed for administrative and technical content. No discrepancies from the administrative requirements contained in the licensee's technical specifications were noted. The revisions did not appear to diminish the effectiveness of the radiation protection program.

In addition to the respiratory protection procedures (see Paragraph 9), several other procedures require revision to clarify inconsistencies or conform to changes in program conduct. These procedures include: RPPM Sections II.C.4.d; II.I.4.1; III.F.8; and V.B.3.e.2.

6. Instruments and Equipment

Calibration records for survey instruments, fixed radiation monitors, air samplers, and fixed air monitors were reviewed for calendar year 1976. The calibrations were noted to conform to the requirements contained in the RPPM for frequency and technique. Calibrations for the above instruments are performed quarterly/semiannually. The area radiation monitors and several survey instruments were noted to be checked at only one point, or only one point per scale, with a radioactive source (in addition to an electronic calibration). It was noted that the RPPM specifies a quarterly frequency for calibration of the RM-15 instruments but does not specify the calibration procedure to be used.

Area radiation monitor operability appeared poor. The thirty monitors throughout the plant averaged only about seventy-five percent operability during 1976. According to licensee personnel, parts procurement and reliability as well as manpower limitations caused the inordinate amount of monitor downtime.

TLD spike records (three per month) and self reading pocket dosimeter drift and calibration check records (semiannual) were reviewed. No significant problems were noted.

7. Personal Dosimetry

Thermoluminescent dosimeters (TLD) and self-reading pocket dosimeters are used to monitor personal exposures. Neutron exposures are determined from stay-time calculations. The basic TLD exchange frequency is monthly for persons requiring access to controlled areas. The exchange frequency was increased to semi-monthly during the refueling in March 1976. A limited number of administrative personnel are on a quarterly exchange frequency.

Self-reading pocket dosimeters are read daily. The daily dosimeter exposure information is utilized to maintain a listing of the available exposure remaining for the quarter. The "remaining exposure" is based on an administrative limit of

1000 mrems per quarter (unless specific approval has been received to exceed this limit). Monthly comparisons of pocket dosimeter and TLD readings are maintained.

An NRC-4 form is completed on all personnel requiring access to controlled areas upon arrival at the site. Review of the licensee's personal dosimetry records for 1976 did not reveal any discrepancies from regulatory record keeping requirements or exposure limits. No doses in excess of 2 rems for the year were noted. Less than ten individuals were noted to have exceeded 1250 mrems for the year. The NRC-4 forms for all individuals with greater than 1250 mrems for the year were reviewed; no discrepancies were noted.

Extremity monitoring requirements are evaluated on a job specific basis and are noted on the RWP. There are no procedures or instructions defining criteria for use of extremity monitoring.

8. Bioassay and In Vivo Counting

A whole body counter has been installed on the licensee's premises since the previous radiation protection inspection. Use of the installed whole body counter commenced in April 1976 following the refueling outage. Approximately 120 individuals were counted during 1976.

During a previous inspection, it was noted that the required annual whole body counting for 1975 had not been conducted as of the time of the inspection.[3/] Nineteen individuals were counted during 1975. The previous whole body counting was conducted in October 1974 (129 individuals). Technical Specification 6.9.1.2.d.6 requires that the licensee conduct a bioassay and/or whole body counting program in support of the respiratory protection program. The licensee's procedures (PRPM, Section 4.5) specify that whole body counting is to be conducted at least annually. According to licensee personnel, unanticipated delays in the initial operation of the onsite whole body counter resulted in the whole body counting omissions. The licensee was noted to have conducted the required whole body counts during 1976. Other than the urine analyses noted during a previous inspection, no bioassays have been performed.[4/]

3/ Ibid.
4/ IE Inspection Rpt No. 050-331/76-09.

The licensee revised Section 4.5 of the PRPM during 1976 to differentiate between whole body counting requirements for specified plant personnel (operations, maintenance, and radiation protection) and all other plant and offsite personnel. The revised procedure does not contain specific guidance for counting personnel other than the specified plant personnel.

The 1975 and 1976 whole body counts revealed the presence of Co-60, Co-58, Cs-134, Cs-137, and Zr/Nb-95 in approximately 50%, 10%, 2%, 100%, and 10%, respectively, of the 139 individuals counted. The maximum quantities of Co-60, Co-58, and Zr/Nb-95 detected were 49 nCi, 52 nCi, and 94 nCi, respectively. These maximum quantities were detected in the same individual. The individual was recounted approximately one week later; the quantities of Co-60 and Zr/Nb-95 detected during the second count were 14 nCi and 36 nCi, respectively. (Co-58 was not detected during the recount.) No individual was noted to have exceeded an internal deposition corresponding to 40 MPC-hours inhalation. The licensee presently uses "5% MPBB" as a criterion to identify whole body count results requiring further investigation. While the "5% MPBB" criterion appears to be a valid action level for a single long lived nuclide (e.g., Co-60), it does not appear to be valid for short lived nuclides or multiple nuclide counting results.

9. Respiratory Protection

The licensee's respiratory protection equipment (two full-face mask models for air purifying and air line use; self contained breathing equipment; and hood for air line use) are NIOSH certified. The licensee no longer uses the combination filter-sorbent cartridge. Filter cartridges are used for particulate protection and supplied air is used for iodine protection.

Procedures are available and training provided for selection, fitting, testing, use, and maintenance of the respiratory protection equipment. A monthly equipment inspection is conducted by radiation protection personnel. MPC-hour records are maintained and nasal swabs taken for prescribed respiratory protection uses. Whole body counting is provided on an annual basis for licensee personnel and on a case basis for contractor personnel.

The licensee was currently evaluating the procedural and operational changes required to meet the new 10 CFR 20.103 regulation.

10. Surveys

The licensee's direct radiation, airborne activity, and contamination survey records for the period since the preceding radiation protection inspection were selectively reviewed. Activity and radiation levels continue to be maintained at

relatively low levels throughout the plant. Survey frequencies were noted to conform to the requirements of the RPPM. Area beta-gamma surveys are performed approximately weekly. Neutron surveys are performed quarterly. (Neutron survey results are used to compute neutron personal exposures.) Continuous air monitors and area radiation monitors are utilized to provide warnings of general airborne activity and direct radiation level increases.

During a previous inspection, the licensee was asked to evaluate the correlation between gross beta-gamma and gamma isotopic analyses for typical airborne samples in order to justify use of a gross beta-gamma MPC which was less conservative than the unidentified MPC of 3E-10 μCi/ml.[5/] The results of the licensee's evaluation were reviewed. Approximately 30 airborne samples of varying activity were considered with the predominant nuclides being Co-60, Co-58, Mn-54, and Cr-51. The comparative data were fairly consistent, indicating that a gross beta-gamma activity of 1-2E-08 μCi/ml corresponded to one MPC (determined by gamma isotopic analyses). The licensee has adopted an action level of 1E-09 μCi/ml, by gross beta-gamma analysis, for defining airborne radioactivity areas. This item is considered resolved.

At the time of this inspection, the licensee had not revised the RPPM to reflect the revised airborne radioactivity area action level of 1E-09 μCi/ml. The licensee had revised the RPPM, since the previous radiation protection inspection, to incorporate monitoring requirements and survey procedures for airborne surveys.

11. Posting, Labeling and Control

The inspector toured the licensee's facilities in company with a licensee representative. General housekeeping appeared good as did control of radiological hazards. Controlled area postings and control of high radiation areas were observed to comply with regulatory requirements.

The licensee requires issuance of a radiation work permit (RWP) for access to radiation (2.5 mr/hr), contamination (2000 dpm/ft^2), or airborne (1E-09 μCi/ml) areas. Selected RWP's were reviewed for adherence to the licensee's procedural requirements. No discrepancies were noted.

The licensee's actions in response to IE Circular No. 76-03 were reviewed.[6/] Several areas were identified as potential high

5/ IE Inspection Rpt No. 050-331/76-04.
6/ Ltr, Hammond to Keppler, dtd 10/28/76.

radiation areas and the licensee's control of high radiation area access was modified slightly in response to the circular. The licensee's control mechanism appears adequate.

The inspector selectively reviewed the licensee's radiation occurrence reports and the health physics log. No significant problems were noted.

12. Materials Inventory and Leak Tests

According to the licensee's records: radioactive material onhand complied with the possession limitations of the operating license; sealed source leak tests have been conducted semiannually as required by the technical specifications; and physical inventories are conducted quarterly.

13. Material Receipt and Transfer

The licensee's records of radioactive material receipts and transfers since the previous radiation protection inspection were selectively reviewed. No discrepancies were noted. No irradiated fuel shipments have been made to date. The licensee's procedures contain requirements for receiving and opening radioactive material packages, including receipt surveys, and requirements for transferring radioactive material, including license authorization, packaging, labelling, and surveying. Review of the licensee's records and discussions with licensee personnel did not reveal any discrepancies from the licensee's procedural requirements. No shipping accidents are known to have occurred since the previous radiation protection inspection.

14. Notifications and Reports

Reports to employees and the NRC appear to have conformed to the requirements of 10 CFR 19, 10 CFR 20, and the technical specifications.

15. Airborne Radioactive Release Report

The licensee reported exceeding 2% of the technical specification limit for release of airborne iodine-131 and particulates during the fourth quarter of 1976.7/ Further review of the matter indicated that the 2% reporting level had not been exceeded. According to licensee personnel, the report was made in anticipation of planned plant operations which had, in the past, increased release rates. The planned operations were not conducted and the airborne release rates consequently remained relatively low. Airborne iodine-131 and particulate releases for 1976 will be examined further during a subsequent inspection.

7/ Ltr, Hammond to Stello, dtd 12/22/76.