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 RECIP. NAME RECIPIENT AFFILIATION

DOCKET #  
05000269

SUBJECT: LER 90-002-00: on 890313, Tech Spec sample sensitivity requirements not met on multiple liquid waste releases.

W/8 ltr.

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Duke Power Company  
Oconee Nuclear Station  
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**DUKE POWER**

February 16, 1990

U. S. Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555

Subject: Oconee Nuclear Station  
Docket Nos. 50-269, -270, -287  
LER 269/90-02

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report (LER) 269/90-02 concerning Technical Specification sample sensitivity requirements not met on multiple liquid waste releases due to inappropriate action.

This report is being submitted in accordance with 10 CFR 50.73 (a)(2)(i)(b). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

H. B. Barron  
Station Manager

RSM/ftr

Attachment

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## LICENSEE EVENT REPORT (LER)

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|---|--------|--|----------------|-------------------|-----------------|------------------|-----------------|-----------|----------------|---|--|--|--|--|-----|------|--|--|--|----------------------|--|
| FACILITY NAME (1)<br>Oconee Nuclear Station, Unit 1   |        |  |                |                   |                 |                  |                 |           |                | DOCKET NUMBER (2)<br>0 5 0 0 0 2 6 9 1 OF 0 7       |  |  |  |  |     |      |  |  |  | PAGE (3)<br>1 OF 0 7 |  |
| TITLE (4)<br>Technical Specification Sample Sensitivity Requirements Not Met On Multiple Liquid Waste Releases Due to Inappropriate Action, Lack of Attention to Detail |        |  |                |                   |                 |                  |                 |           |                |   |  |  |  |  |     |      |  |  |  |                      |  |
| EVENT DATE (5)  |        |  | LER NUMBER (6) |                   |                 |                  | REPORT DATE (7) |           |                | OTHER FACILITIES INVOLVED (8)                       |  |  |  |  |     |      |  |  |  |                      |  |
| MONTH   | DAY    | YEAR   | YEAR           | SEQUENTIAL NUMBER | REVISION NUMBER | MONTH            | DAY             | YEAR      | FACILITY NAMES |   |  |  |  | DOCKET NUMBER(S)   |     |      |  |  |  |                      |  |
| 0 3   | 1 3    | 8 9  | 9 0            | 0 0 2             | 0 0             | 0 2              | 1 6             | 9 0       | Oconee Unit 2  |   |  |  |  | 0 5 0 0 0 2 7 1 0  |     |      |  |  |  |                      |  |
|   |        |  |                |                   |                 |                  |                 |           | Oconee Unit 3  |   |  |  |  | 0 5 0 0 0 2 8 7  |     |      |  |  |  |                      |  |
| OPERATING MODE (9)  |        | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11) |                |                   |                 |                  |                 |           |                |   |  |  |  |  |     |      |  |  |  |                      |  |
| H   |        | 20.408(a)  |                |                   |                 | 20.408(a)        |                 |           |                | 80.73(a)(2)(iv)                                     |  |  |  | 73.71(b)   |     |      |  |  |  |                      |  |
| POWER LEVEL (10)  |        | 20.408(a)(1)(i)  |                |                   |                 | 80.38(a)(1)      |                 |           |                | 80.73(a)(2)(v)                                      |  |  |  | 73.71(a)   |     |      |  |  |  |                      |  |
| 1 0 0   |        | 20.408(a)(1)(ii)   |                |                   |                 | 80.38(a)(2)      |                 |           |                | 80.73(a)(2)(vi)                                     |  |  |  | OTHER (Specify in Abstract below and in Text, NRC Form 308A) |     |      |  |  |  |                      |  |
|   |        | 20.408(a)(1)(iii)  |                |                   |                 | 80.73(a)(2)(i)   |                 |           |                | 80.73(a)(2)(vii)(A)                                 |  |  |  |  |     |      |  |  |  |                      |  |
|   |        | 20.408(a)(1)(iv)   |                |                   |                 | 80.73(a)(2)(ii)  |                 |           |                | 80.73(a)(2)(vii)(B)                                 |  |  |  |  |     |      |  |  |  |                      |  |
|   |        | 20.408(a)(1)(v)  |                |                   |                 | 80.73(a)(2)(iii) |                 |           |                | 80.73(a)(2)(viii)                                   |  |  |  |  |     |      |  |  |  |                      |  |
| LICENSEE CONTACT FOR THIS LER (12)  |        |  |                |                   |                 |                  |                 |           |                |   |  |  |  |  |     |      |  |  |  |                      |  |
| NAME<br>H. R. Lowery, Chairman Oconee Safety Review Group   |        |  |                |                   |                 |                  |                 |           |                | TELEPHONE NUMBER<br>AREA CODE 8 0 3 8 8 5 - 3 0 3 4 |  |  |  |  |     |      |  |  |  |                      |  |
| COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)  |        |  |                |                   |                 |                  |                 |           |                |   |  |  |  |  |     |      |  |  |  |                      |  |
| CAUSE   | SYSTEM | COMPONENT  | MANUFACTURER   | REPORTABLE TO NRC |                 | CAUSE            | SYSTEM          | COMPONENT | MANUFACTURER   | REPORTABLE TO NRC                                   |  |  |  |  |     |      |  |  |  |                      |  |
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| SUPPLEMENTAL REPORT EXPECTED (14)   |        |  |                |                   |                 |                  |                 |           |                | EXPECTED SUBMISSION DATE (15)                       |  |  |  | MONTH  | DAY | YEAR |  |  |  |                      |  |
| YES (If yes, complete EXPECTED SUBMISSION DATE)   |        |  |                |                   |                 |                  |                 |           |                | X NO  |  |  |  |  |     |      |  |  |  |                      |  |

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

## ABSTRACT

On March 13, 1989, a Radiation Protection Technician failed to properly revise a memo giving the calibration results of a Gamma Spectroscopy system. The memo informed count room personnel of the count times required for a specific detector to meet Technical Specification detectability requirements for radioactive samples. As a result of the error, technicians continued to use the old count time, and approximately 180 radioactive Liquid Waste Releases (LWRs) were based on improper count times. The error was discovered at 1500 hours on January 17, 1990, during a Quality Assurance audit of LWRs. Corrective actions identified were to use other detectors until a corrected memo was issued, identify the affected LWRs and recalculate releases assuming levels equal to the actual limit of detectability, verify no other detectors were similarly affected, and to revise the calibration procedure. The root cause was Inappropriate Action, lack of attention to detail.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED FOR NO. 7-10-810  
EXPIRES DATE

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Oconee Nuclear Station, Unit 1

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TEXT of event report is required, use additional NRC Form 288a if (17)

BACKGROUND

Technical Specification (TS) Table 4.1-3 specifies the Lower Limit of Detection (LLD) for laboratory analysis for radioactive Liquid Waste Releases (LWRs). Note 5 of the table gives an equation for calculation of LLD. Notes 6 and 7 specify the principal gamma emitting isotopes for which the LLDs are given. The actual LLDs for individual detectors are dependent on background radiation levels, the detector used, detector geometry, sample volume, and count time.

The Oconee Nuclear Station Count Room is equipped with two ND-9900 Gamma Spectroscopy Systems, which are each composed of three detectors connected to a computer to process and store data. Each detector must be calibrated individually for several different sample geometries as part of procedure HP/O/B/1003/19, "Calibration of the ND-9900 Gamma Spectroscopy System." This process is lengthy (approximately 40 hours per detector) due to the large number of source/sample counts required. Furthermore, the final package of data for one detector is composed of over one hundred separate documents: enclosures, worksheets, sample count data, etc. The completed package for the complete procedure is approximately 36 inches thick.

Due to the fact that this calibration affects the availability of the system for counting samples, the work is scheduled on night shift. Both systems are calibrated under this procedure: one system remains in service while the other is calibrated. In addition, the systems are programmed such that new calibration data can be acquired and stored during one work shift, then the old calibration information can be used for processing samples on the next shift. Therefore, each day the system being calibrated is restored to normal service at the end of the calibration shift.

After the calibration for a specific detector is complete, the procedure requires that a non-radioactive sample be counted for each different sample geometry. This process establishes a set of measurements of background radiation which indicate the Minimum Detectable Amount for each isotope. These results are then used to calculate the minimum sample volume and count time required to meet the Lower Limit of Detection (LLD) of isotopes specified in Technical Specifications (TS) for all sample geometries on each detector.

EVENT DESCRIPTION

In February 1989, Radiation Protection Technician (RPT) "A" began performing procedure HP/O/B/1003/19, "Calibration of the ND-9900 Gamma Spectroscopy System." Due to the fact that this calibration affected the availability of the system for counting samples, RPT "A" was scheduled

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U.S. NUCLEAR REGULATORY COMMISSION

APPROVED ONE NO 2100-0100

EXPIRES 07/1/88

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Oconee Nuclear Station, Unit 1

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to work nights, 10 to 12 hours per shift, from February 21 until March 27. RPT "A" started calibration of detector 1641 on March 6, 1989. The calibration was completed March 8. On March 10, 1989, RPT "A" reviewed the Lower Limit of Detection (LLD) data for a one liter bottle set at 0 cm and counted for 600 seconds (ten minutes) on detector number 1641. To assist the review of the data, RPT "A" had made up a worksheet which listed the isotopes and the corresponding LLD limits specifically identified in TS. He copied data from the computer printout for the sample onto the worksheet. The recorded values of  $6.51\text{E}-7$  for Fe-59 and  $6.75\text{E}-7$  for Zn-65 did not meet the TS limit of  $5\text{E}-7$  for these isotopes. For Zn-65, the LLD criteria was not met due to a background count of 3 counts per minute rather than 2 counts per minute.

At the time of the initial review, RPT "A" recognized that the criteria were not met, but he did not make any notation on the work sheet to indicate this fact. By standard practice carried over from use of older, more limited equipment, the Radiation Protection Section (RP) has set standard count times of 600, 2000, 7200, and 10,000 seconds. Therefore, the next standard time, 2000 seconds (33 minutes), was used for an additional count, rather than actually calculating the minimum count time required to meet the LLD requirement. The worksheet for the second count showed that a count time of 2000 seconds was adequate to meet the TS LLD requirement for the sample.

On March 13, 1989, RPT "A" failed to properly revise the memorandum for detector 1641 which documented the LLD results and listed the minimum count times and volumes for the various geometries. RPT "A" states that he collated data from the various worksheets and made a scratch sheet with all the count times and volumes for each detector geometry, then edited a copy of the standard memo in disk storage using a word processor. He cannot recall if he failed to recognize during the collating process that the 600 second count time was inadequate, or if he failed to enter the change on the memo. The memo was printed along with those for the other detectors. The entire calibration package, including these memos, was submitted to RPT "A's" supervisor, Supervisor "A", for review and signature. In addition, Associate Scientist "A", a member of the station Radiation Protection staff, also reviewed the data. The error was not detected during these reviews.

It should be noted that detector 1641 was purchased with a higher detector efficiency than the other detectors. As a result of this higher efficiency, this detector was the only one capable of meeting the LLD limits at 600 seconds during the previous (1988) calibration. Therefore, it was reasonable that it would have a 600 second count time on this calibration.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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The memorandum provided information to count room personnel as to the limiting sample count times required for detector 1641 to meet Technical Specification detectability requirements for radioactive samples. As a result of the erroneous memo, technicians continued to use an inadequate count time. The impact of the error was increased by the fact that detector 1641 was used preferentially by count room personnel because the other detectors were slightly less efficient and required 2000 second count times in this geometry. Therefore, approximately 180 radioactive Liquid Waste Releases (LWRs) were made based on improperly counted samples.

The error was discovered at 1500 hours on January 17, 1990, during a Corporate Quality Assurance audit of LWRs. Corrective actions were initiated to remove detector 1641 from service, use other detectors until a corrected memorandum was issued, identify the affected LWRs and recalculate releases assuming levels equal to the actual limit of detectability, verify no other detectors were similarly affected, and to revise the calibration procedure. The recalculation of LWRs will be reflected in appropriate Effluent Reports.

### CONCLUSIONS

The root cause was inappropriate action, lack of attention to detail. Radiation Protection Technician (RPT) "A" and Supervisor "A" both failed to adequately assure the accuracy of the memorandum issued for detector 1641 giving the requirements necessary to meet the Lower Limits of Detection (LLD) specified in Technical Specifications (TS).

Since RPT "A" does not recall exactly how the error occurred, the following two scenarios are addressed. He may have failed to recognize on March 13, when collating data, that the 600 second count was inadequate, and that an acceptable 2000 second count was included in the package. Conversely, he may have recognized that a 2000 second count time was required, yet failed to revise the appropriate line of the file for the memo. Either of these actions constitute lack of attention to detail.

In order to identify corrective actions to minimize the possibility of recurrence, the calibration procedure, HP/O/B/1003/19, was reviewed for adequacy. The procedure had to require transfer of data from multiple computer printouts of sample analyses to a data sheet or memo. This transfer requires identification of the proper data sheet and accurate transfer of the appropriate data. It was this process that failed, at a level of detail which should not be required to be specified in a procedure, therefore no procedural deficiencies are identified as root or contributing causes.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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| Oconee Nuclear Station, Unit 1 | 08000269          | 90             | -002              | -00            | 05       | OF | 07 |

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However, several areas for general improvement were noted. The process actually used included a worksheet which was not specified by the procedure. This worksheet had been initiated by RPT "A" to simplify the comparison of computer generated output to the TS criteria. It did not have a blank requiring a pass/fail comment be added. Such a blank would have flagged the unacceptability of the results during the process of consolidating the data necessary to prepare the memo. The procedure will be revised to include this worksheet, with an additional column to record acceptability.

Several Human Factors are believed to have contributed to this event. First, the work involved long hours, working nights, performing repetitive tasks which frequently required review and comparison of large amounts of numerical data. These factors have been proven to adversely affect human performance. Second, the sheer bulk of work covered by the procedure produced a massive package that was difficult to review adequately. Since these factors cannot reasonably be eliminated, effort should be made to recognize the potential for errors and to identify procedural enhancements to review calculations, clarify comparisons to acceptance criteria, and otherwise improve the review process.

Third, the method used to generate the memo was to revise the previous copy stored on disk. This meant that a value for the minimum count time was already entered. The failure to enter a value would have been more obvious if the method used had been to revise a blank copy rather than a previous copy. This level of activity is not normally addressed by procedure or directive.

During the last 12 months, Oconee Nuclear Station has had numerous events with root or contributing causes of Inappropriate Action. Two specific events were sufficiently similar to make this event recurring. LER-270/89-05 reported an event where two valves were installed without proper Environmental Qualification requirements being met. The failure was not detected due to less than adequate review of the documentation by appropriate supervision. A non-reportable event, documented as Problem Investigation Report 3-089-0131, occurred when a licensed operator apparently failed to properly key commands into a computer to initiate a Reactor Coolant System leakage calculation required by Technical Specifications. The operator later printed out the results, which were actually for the previous day's calculation. Neither the operator nor his immediate supervisor reviewed the printout in sufficient detail to note that the date indicated that the data was not current. These events were discovered after the inappropriate actions occurred in this event. Therefore, none of the corrective actions from these events would have prevented this occurrence.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED FOR NO. 2100-0104  
EXPIRES 02/1/88

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As discussed in the Safety Analysis below, the quantities of radioactive materials which may have been unaccounted for during approved releases due to this event are extremely small. The TS LLD is set at one per cent of the allowed release rate given in 10CFR 20, Appendix B, Table II. The actual LLDs for Fe-59 and Zn-65 on detector 1641 were approximately 1.3 per cent of the allowed release limit. If the affected isotopes had been present at the actual limit of detectability, in all releases made during the time that the count time was inadequate, all of the releases would still have met all requirements for release. The health and safety of the public was not affected by this event.

There were no NPRDS reportable failures or any personnel injuries related to this event.

CORRECTIVE ACTIONS

## Immediate

1. Detector 1641 was removed from service until a revised memo was issued.

## Subsequent

1. Appropriate personnel received counselling concerning their inappropriate actions.
2. Data for other count room detectors was reviewed to assure that this was an isolated incident.
3. All Liquid Waste Releases were reviewed for the effect of this error. Samples counted on detector 1641 were evaluated to see if LLD activity was not met. If the LLD was not met, then the detector LLD activity for Zn-65 and Fe-59 was added to the release activity. Approximately 180 LWRs were identified as being affected.

## Planned

1. The revised release data will be included in the 1989 Semi-annual Effluent Reports.



## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED CASE NO. 3120-0100  
EXPIRES 8/31/88

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2. HP/O/B/1003/19 will be revised to add a worksheet to compare actual LLD values to the Technical Specification limits. Other enhancements will be evaluated and incorporated as appropriate.

SAFETY ANALYSIS

The effect of this incident is minor. As a result of the failure to properly update and issue a correct memo, count room technicians continued to use an inadequate count time for processing samples, specifically those related to radioactive Liquid Waste Releases (LWRs). The result of this difference was that more Fe-59 and Zn-65 may have been released than previously thought. The review of LWRs by Radiation Protection personnel show that approximately 180 LWRs were affected, and that, by conservatively adding the 600 second measured Lower Limit of Detection (LLD) for these two isotopes to each release, a total increase of 2.65 E-4 micro Curies per milliliter has been credited to our releases. This change constitutes 0.232 per cent of the 1989 annual total of 3.47 Curies gross radioactivity released from the station (not including Tritium or noble gasses).

These quantities are considerably less than the allowed release rate given in 10CFR 20, Appendix B, Table II. The actual LLDs for Fe-59 and Zn-65 on detector 1641 were approximately 1.3 per cent of the allowed release limit. If any samples had actually contained any significant amount of either of these isotopes, i.e. close to or higher than the 10CFR 20 Appendix B, Table II limits, the detector would have detected it. If the affected isotopes had been present at the actual limit of detectability, in all releases made during the time that the count time was inadequate, no release limits would have been exceeded. Therefore, there was no significant affect on the health and safety of the public due to this incident.

However, this event shows the possibility of an administrative failure to properly specify and use appropriate procedural operating limits or required parameters. Programatically this error is similar to a failure to properly revise test acceptance criteria when required after maintenance. The basic error, failure to accurately transfer a number from one document to another, is applicable to virtually all station activities.