

ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION  
REGION IV

Docket No.: 50-416  
License No.: NPF-29  
Report No.: 50-416/97-14  
Licensee: Entergy Operations, Inc.  
Facility: Grand Gulf Nuclear Station  
Location: Waterloo Road  
Port Gibson, Mississippi  
Dates: July 14-17, 1997  
Inspector: L. T. Ricketson, P.E., Senior Radiation Specialist  
Plant Support Branch  
Approved By: Blaine Murray, Chief, Plant Support Branch,  
Division of Reactor Safety

ATTACHMENT: Supplemental Information

## EXECUTIVE SUMMARY

### Grand Gulf Nuclear Station NRC Inspection Report 50-416/97-14

This announced, routine inspection reviewed the program to maintain occupational exposures as low as is reasonably achievable (ALARA), training and qualifications of members of the radiation protection organization, and quality oversight of the radiation protection program.

#### Plant Support

- Overall, the ALARA program produced good results. The licensee's 3-year collective radiation exposure for 1994-1996 was below the most recently available national average. However, some elements of the ALARA program could have been improved (Section R1.1).
- External exposure controls were appropriate, generally. However, more positive controls could be implemented with respect to the locked high radiation area associated with the spent fuel pool cooling and cleanup heat exchangers (Section R1.2).
- A violation involving the control of high radiation areas was identified because corrective actions taken after the first example were ineffective in preventing occurrence of a second example (Section R7).
- An effective training program for radiation protection technicians was implemented. The training program for radiation protection supervisors and professionals indicated good management support (Section R5).
- Management oversight of radiation protection activities was good. The latest audit was of appropriate scope and depth to identify areas where improvement was possible. Radiation protection self assessments were performed infrequently (Section R7).
- Improvement was noted in radiation protection's response to condition reports (Section R7).

Report Details

IV. Plant Support

**R1 Radiological Protection and Chemistry Controls**

**R1.1 ALARA**

a. Inspection Scope (83750)

- Person-rem totals
- ALARA initiatives
- Source term reduction techniques
- Work planning
- ALARA post job reviews

b. Observations and Findings

As part of the source term reduction program, the licensee tracked hot spots and performed system flushes prior to work in the areas. One hot spot had been removed by entering the piping and removing the radioactive source. Other than the periodic, remedial flushes prior to work activities, no other hot spot removals were planned for dose reduction purposes.

The licensee had a stellite reduction program; however, the ALARA group no longer had significant involvement. Components with stellite had been identified and cataloged. Plant engineering assumed the lead in maintaining the program and ensured that components without stellite replaced old components when practical.

The inspector reviewed the licensee's post-job reviews, outage reports, and radiation work permit files to determine if lessons learned were identified and perpetuated. Radiation Protection Procedure 08-S-01-24, "Radiological Work Planning, Performance, and Reviews," Revision 101, instructed ALARA technicians to consult job histories when planning work activities. The procedure did not specifically define what was meant by the term "job history." The inspector determined that lessons learned were sometimes documented in the site outage report, the radiation work package documents, or other portions of the job files. The process required that individuals review several sources of information if they were to be thorough in their preparation. Despite the vague wording within the procedural guidance, the inspector confirmed from review of selected examples that lessons were captured and perpetuated. Licensee personnel stated that they were reviewing means to simplify job planning.

An ALARA representative was newly integrated into the job planning organization. Licensee representatives stated that they had been pleased with the results of this change, thus far. The inspector concluded that the integration of ALARA personnel into the work planning organization was an improvement because it allowed earlier review of work activities by radiation protection personnel and better coordination of the use of dose saving measures.

Workers demonstrated little support for the ALARA suggestion program. No suggestions were submitted in 1996. In 1997, one suggestion was submitted prior to the inspection; one was submitted during the inspection. The licensee offered no explanation for the poor support of the suggestion program.

The ALARA committee met at the required frequency and reviewed topics as required by plant procedures. Based on the attendance listed in the meeting minutes, the inspector concluded that good support was provided by all site departments.

The licensee's person-rem totals for 1994-1996 are listed below. The licensee's 3-year average for this period (251 person-rem) was below the most recent, available industry averages. The licensee's goal for 1997 is 120 person-rem. The 1997 goal includes approximately 60 person-rem for plant preservation work, such as painting. The totals and goals are based on thermoluminescent dosimeter results.

TOTAL RADIATION EXPOSURE (in person-rem)

	1994	1995	1996
Site total	56	342	354
National BWR Average	327	256	Not yet available

c. Conclusions

Overall, the ALARA program produced good results. The licensee's 3-year collective radiation exposure for 1994-1996 was below the most recently available national average. However, some elements of the ALARA program could have been improved.

R1.2 Exposure Controls

a. Inspection Scope (83750)

The inspector toured the radiological controlled area and reviewed the following:

- Radiological posting
- Control of high and locked high radiation areas
- High radiation area key controls

b. Observations and findings

Radiological areas were posted properly. High radiation areas were properly controlled. Updated survey maps were posted outside rooms in the radiological controlled area to inform workers of radiological dose rates.

The inspector noted that an area around the spent pool cooling and cleanup heat exchangers was controlled as locked high radiation area using rope barricades and flashing lights. Licensee representatives stated that the area had been controlled in this manner since at least 1991. Technical Specification 5.7.3 allows such controls if the construction of other means of control are not reasonable. The inspector asked if the licensee had (1) attempted to reduce the source term responsible for high radiation areas or (2) attempted to control the area through more positive controls than ropes and flashing lights.

The licensee responded that numerous attempts at source term removal were attempted with little lasting success. The situation was exacerbated by the fact that the heat exchangers were of a unique design and could not be replaced easily. Licensee representatives also stated that they had explored alternate means of controlling the area. To support the statement, licensee representatives shared with the inspector a memorandum dated April 5, 1991 (GIN: 91/02009). The memorandum, from the acting director of the Nuclear Plant Engineering Department to the site general manager discussed options addressing the situation. Plant engineering recommended constructing a woven wire mesh wall with an access door around the heat exchangers. This plan was never implemented. Licensee representatives stated that they were still trying to determine the best means of handling the situation. The inspector concluded that the licensee had been slow in evaluating alternate means of controlling personnel access to the area.

Improvements were made in the control of high radiation area keys. During a previous inspection, an inspector noted weaknesses in the licensee's key control program. Since that time a new system was implemented. The inspector confirmed that the licensee could account for all high radiation area keys and concluded that the new system was an improvement.

c. Conclusions

External exposure controls were appropriate, generally. However, more positive controls could be implemented with respect to the locked high radiation area associated with the spent fuel pool cooling and cleanup heat exchangers.

R5 **Staff Training and Qualification**

a. Inspection Scope (83750)

The inspector interviewed the technical training supervisor and a radiation protection technician instructor and reviewed the following:

- Radiation protection technician continuing training topics
- Training for radiation protection supervisors and professionals
- Training procedures listed in the attachment to this report
- Instructor qualifications
- Class attendance
- Examination results
- Training resources
- Personnel qualifications and resumes

b. Observations and Findings

Formal committee meetings were conducted to determine appropriate training topics. Topics presented during the assessment period included current events, lessons learned, and information on selected plant systems. The inspector concluded that the topics complied with the licensee's procedural guidance. One instructor was assigned to radiation protection technician training. The instructor had practical radiation protection experience and had instructed for 7 years.

Radiation protection supervisors and professionals were provided sufficient opportunities for continuing training in their fields of expertise. The inspector verified that, in addition to attending the technician continuing training program, radiation protection supervisors and professionals were allowed to attend professional meetings, attend vendor training, or visit other nuclear sites to discuss similar challenges.

Through a review of condition reports and interviews with training personnel, the inspector determined that training deficiencies had not been identified as the root cause of identified problems. Therefore, the inspector concluded that an effective training program for radiation protection technicians was implemented.



During a review of personnel qualifications, the inspector determined there was no one in the licensee's site and corporate radiation protection organization that was certified as a health physicist by the American Board of Health Physics. The inspector reviewed educational experience of staff members and determined there was no one with an advanced degree. Within the radiation protection operations group, approximately half of the individuals were registered by the National Registry of Radiation Protection Technologists.

c. Conclusions

An effective training program for radiation protection technicians was implemented. The training program for radiation protection supervisors and professionals included good management support.

**R6 Radiological Protection and Chemistry Organization and Administration**

The radiation protection organization gained the responsibility for calibrating portable survey instruments for Entergy sites. This function was formerly performed by a corporate group. Five additional personnel were reassigned from the corporate office to the site radiation protection staff. However, radiation protection personnel stated that there was a slight decrease in the staff that handled all remaining radiation protection responsibilities. Excluding the instrument calibration group, staffing declined from 49 to 44. Licensee representatives stated that the site also received support from a corporate health physicist and two radioactive waste specialists. The inspector identified no evidence that the staff reduction compromised safety.

**R7 Quality Assurance in Radiological Protection and Chemistry Activities**

a. Inspection Scope (83750)

- Audits
- Surveillances
- Condition reports
- Radiological observation reports
- Internal audits
- Independent audits
- Event trending and analysis
- Management observations

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b. Observations and Findings

Quality Program Audit Report QPA 37.01-97 was conducted March 31 - May 14, 1997. The audit report was dated May 30, 1997. The stated focus of the audit was "potential problem areas." In preparation for the audit, quality assurance personnel reviewed corrective action documents and inspection reports for the previous 3 years. The audit team consisted of three individuals. One of the auditors was a radiation protection technical specialist from another Entergy site.

The audit results identified three general areas where improvement to the radiation protection program was possible. Seven condition reports, needing radiation protection response, were issued to address the negative findings. The radiation protection group had responded to all but one condition report. An extension to the response time was requested for the unanswered condition report. Proposed corrective actions appeared appropriate to address the deficiencies.

The radiation protection organization had performed one internal, self assessment since the previous inspection of this area. The self assessment was performed June 16, 1997. (NRC Inspection Report 50-41C/97-02 noted that no self assessments were performed June 1996 to February 1997.) The radiation protection organization performed what it termed a "mini self assessment" to determine if the radiation protection personnel were documenting work in accordance with plant procedures and whether the documents were being transmitted properly. The assessment was good quality, identifying many details, which could be improved upon and making recommendations to address the problems identified. Radiation protection personnel stated that a number of self assessments had been considered but not performed because of personnel shortages or differing priorities resulting from resource sharing within the Entergy organization.

Licensee representatives stated that one independent assessment was performed by an individual from another nuclear facility. The assessment reviewed the program for control of high radiation area keys. However, no documented findings were available for the inspector's review.

To enhance management oversight of the program, the radiation protection organization implemented in April 1997, through Standing Order No. 97-001, a management observation program of plant conditions and work practices. The program had not produced the number of observations expected by radiation protection management. Management envisioned 30 observations per month; however, there had been a total of 8. Radiation protection management acknowledged that specific responsibilities would probably have to be assigned to radiation protection personnel to ensure that the program results met management expectations.

A review of entries into the radiological controlled area by selected radiation protection supervisors and professionals indicated that management oversight of the radiological controlled area was adequate.

During NRC Inspection 50-416/97-02, the inspector noted that the radiation protection organization did not meet management expectations for closeout of condition reports. During this inspection, the inspector verified that improvement was made in radiation protection's response time to condition reports. No actions were overdue.

During a review of condition reports and corrective actions, the inspector noted that Condition Report 1997-0064 documented the circumstances surrounding an individual entering a high radiation area without complying with the requirements of Technical Specification 5.7.1. Condition Report 1997-0759 documented a similar occurrence.

Technical Specification 5.7.1 requires any individual or group of individuals permitted to enter areas with radiation levels greater than 100 millirems per hour be provided with or accompanied by one or more of the following:

1. A radiation monitoring device that continuously indicates the radiation dose rate in the area.
2. A radiation monitoring device that continuously integrates the radiation dose rate in the area and alarms when a preset integrated dose is received. Entry into such areas with this monitoring device may be made after the dose rate levels in the area have been established and personnel are aware of them.
3. An individual qualified in radiation protection procedures with a radiation dose rate monitoring device, who is responsible for providing positive control over the activities within the area and shall perform periodic radiation surveillance at the frequency specified by the health physics supervision in the radiation work permit.

A search of the licensee's condition report data base indicated no other similar occurrences in the previous 2 years. (Condition Report 96-0310 identified an occurrence in which an individual entered a high radiation area without a radiation monitoring device that continuously integrated the radiation dose and alarmed at a preset integrated dose; however, the individual was accompanied by a person qualified in radiation protection procedures with a radiation dose rate monitoring device. Therefore, while this example violated radiation work permit requirements, it complied with Technical Specification 5.7.1 and was not considered by the inspector to be a similar example.)

Condition Report 1997-0064 was initiated in January 1997; Condition Report 1997-0759 was initiated in July 1997. Both occurrences were identified by licensee personnel. A root-cause analysis was not performed following the first example because it was not considered significant. Because the second example was identified as a repeated occurrence, a root-cause analysis was scheduled; however, it had not been completed at the time of the inspection.

According to Condition Report 1997-0064, corrective action after the first example consisted of the retraining of the individual involved in plant access training and radiation worker training. Broader corrective actions were not implemented, although licensee personnel stated that additional actions were still under consideration when the second example was identified, six months later. Because corrective actions following the first occurrence were not effective in preventing a second occurrence, this item does not meet the guidance for exercise of discretion, as described in Section VII.B.1 of the NRC Enforcement Policy. The entries of individuals into a high radiation areas without the required radiation monitoring devices or accompaniment by radiation protection personnel is a violation of Technical Specification 5.7.1 (50-416/9714-01).

c. Conclusions

Management oversight of radiation protection activities was good. The latest audit was of appropriate scope and depth to identify areas where improvement was possible. Radiation protection self assessments were performed infrequently.

Improvement was noted in radiation protection's response to condition reports.

A violation involving the control of high radiation areas was identified because corrective actions taken after the first example were ineffective in preventing occurrence of a second example.

V. Management Meetings

**X1 Exit Meeting Summary**

The inspector presented the inspection results to members of licensee management at an exit meeting on July 17, 1997. The licensee acknowledged the findings presented. No proprietary information was identified.

## ATTACHMENT

### Supplemental Information

#### Partial list of Persons Contacted

##### Licensee

A. Burks, ALARA Specialist  
D. Coulter, Quality Programs Auditor  
N. Edney II, Radiation Controls Supervisor  
F. Guynn, Radiation Controls Supervisor  
J. Hagan, Vice President  
J. Hall, ALARA Technician  
B. Heisler, Radiation Protection Technician Instructor  
T. Kreisel, Radiation Controls Superintendent  
D. Landrum, Health Physics ALARA Technician  
M. Larson, Senior Licensing Specialist  
T. Tankersley, Assessor  
J. Venable, Operations Manager  
J. Watts, Health Physics Specialist

##### NRC

J. Dixon-Herrity, Senior Resident Inspector  
K. Weaver, Resident Inspector

#### INSPECTION PROCEDURES USED

83750 Occupational Radiation Exposure

#### ITEM OPENED

##### Opened

50-416/9714-01 VIO Failure to comply with Technical Specification 5.7.1

#### LIST OF DOCUMENTS REVIEWED

##### Quality Assurance/Self Assessment

Quality Program Audit Program QPA 37.01-97 (May 30, 1997)

Quality Activity Monitoring Report/Radiological Practices and Observation of Radiological  
Cask Loading Activities (GIN: 97/00127)

Quality Activity Monitoring Report/Radiography (GIN: 97/00612)

Health Physics Assessment - "Surveys, Condition Reports, Radiation Work Permits, and Lost and Damaged Dosimetry Reports"

List of condition reports initiated 1/01/97 - 7/14/97

Condition Report 1997-0064 Individual entered high radiation area without proper dosimetry or health physics coverage

Condition Report 1997-0338 Radiation area sign posted backward

Condition Report 1997-0353 Procedure do not incorporate the requirements of 10 CFR 20.2205

Condition Report 1997-0380 Containment entry rope and posting were down

Condition Report 1997-0405 Tools painted magenta only

Condition Report 1997-0406 ALARA Process review files are not maintained according to procedure

Condition Report 1997-0473 HP did not receive permission to install catch basins

Condition Report 1997-0532 FSAR discrepancies

Condition Report 1997-0759 Individual entered high radiation area without proper dosimetry or health physics coverage

#### Procedures

Administrative Procedure 01-S-04-9, "Health Physics Training Program," Revision 14

Administrative Procedure 01-S-08-8, "ALARA Program," Revision 14

Radiation Protection Procedure 08-S-01-10, "Qualification and Training of Health Physics Personnel," Revision 102

Radiation Protection Procedure 08-S-01-24, "Radiological Work Planning, Performance, and Reviews," Revision 101

Radiation Protection Procedure 08-S-01-28, "Use and Control of Temporary Shielding," Revision 7

General Maintenance Instruction 07-S-14-191, Control Rod Drive Removal and Replacement," Revision 102

Miscellaneous

Organization chart - Radiation Control

Health Physics Training Schedules (January 1, 1996 - August 6, 1997)

Standing Order No. 97-001