

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

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

Report No: 50-331/98017(DRS)

Licensee: Alliant, IES Utilities Inc.

Facility: Duane Arnold Energy Center

Location: Palo, Iowa

Dates: October 13 - 16, 1998

Inspector: Steven K. Orth, Senior Radiation Specialist

Approved by: Gary L. Shear, Chief, Plant Support Branch 2
Division of Reactor Safety

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EXECUTIVE SUMMARY

Duane Arnold Energy Center, Unit 1
NRC Inspection Report 50-331/98017

This announced inspection included an evaluation of the effectiveness of aspects of the radiation protection (RP) and chemistry programs. Specifically, the inspection consisted of a review of the implementation of the solid radioactive waste management program and the radioactive material shipping program, which included a review of radioactive waste classification and storage. In addition, the inspector reviewed the packaging, labeling, and shipping documentation associated with the shipment of radioactive materials. The report covers a one-week inspection concluding on October 16, 1998, performed by a senior radiation specialist. No violations of regulatory requirements were identified.

Plant Support

- o The RP staff properly determined the activity of radioactive waste shipments via scaling factors. The inspector noted good evaluations of radionuclide data. The RP staff also performed effective trending of reactor water chemistry parameters to identify any significant changes in the composition of the waste streams. (Section R1.1)
- o The inspector identified several minor problems concerning the communications between the RP and chemistry groups and the timeliness of 10 CFR Part 61 scaling factor evaluations. For example, the RP staff did not discuss comparisons between radiochemistry results obtained by the vendor's laboratory and the licensee's chemistry laboratory, such that the chemistry staff was unaware of disagreements or anomalies. In addition, the evaluations of scaling factor data did not appear to be completed in a timely manner. (Section R1.1)
- o The RP staff properly packaged and classified radioactive material and waste shipments in accordance with regulatory requirements. The shipping documentation and low level waste manifests contained the information required by 49 CFR Part 172 and 10 CFR Part 20. For example, shipping documents contained information concerning reportable quantities, placarding and labeling, emergency response actions, and exclusive use instructions. (Section R1.2)
- o The licensee properly posted and controlled radiological hazards within the Radwaste Building. Contaminated areas, radiation areas, and high radiation areas were posted and controlled, as applicable. In addition, the staff effectively minimized the amount of radioactive waste in storage and performed proper inventories of the storage locations. (Section R2.1)
- o The inspector noted that personnel involved in the radioactive material shipping program were properly trained. The licensee issued a document specifically listing those individuals who were certified to approve and to release radioactive shipments. In addition, training lesson plans were comprehensive and presented a broad review of the radioactive shipping program. (Section R5.1)

- o The inspector noted an inconsistency in the training of RP technicians. The licensee provided technicians with training which covered aspects of radioactive shipping. However, the licensee did not consider the technicians subject to Subpart H of 49 CFR Part 172 and, as such, did not record or track the training to ensure compliance. (Section R5.1)

- o The quality assurance staff performed comprehensive evaluations of the process control program and the radioactive material shipping program. For example, the audits reviewed waste characterization and classification, as well as shipping documentation and training of personnel. In addition, the RP staff implemented actions to correct audit findings. (Section R7)

Report Details

IV. Plant Support

R1 Radiological Protection and Chemistry (RP&C) Controls

R1.1 Classification of Radioactive Waste Shipments

a. Inspection Scope (IP 86750)

The inspector reviewed the licensee's method for determining the activity and classification of radioactive waste shipments. The inspector reviewed the most recent waste stream analyses and the verifications which were performed to ensure the validity of radionuclide scaling factors used to determine the activity of hard to detect radionuclides. The inspector also reviewed the implementation of the following procedures:

- o RWH 3406.1 (Revision 4), "Waste Classification and Characterization;"
- o RWH 3409.2 (Revision 7), "Sampling Instructions and Analysis of Radwaste Streams;" and
- o RWH 3410.1 (Revision 6), "Process Control Program for Wet Radioactive Wastes."

b. Observations and Findings

In accordance with 10 CFR 61.55(a)(8), the radiation protection (RP) staff used scaling factors as an indirect method to determine radionuclide activity in radioactive waste shipments transported to NRC licensed low-level waste burial sites. This is done by inferring a concentration of hard to detect radionuclides by applying scaling factors to a known concentration of an easier to detect radionuclide, provided that there is a reasonable assurance that the indirect method can be correlated with actual measurements. As required by the above procedures, the licensee obtained samples from its waste streams (i.e., reactor coolant crud filter, condensate resin, reactor water cleanup system (RWCU) resin, torus sludge resins, and dry active waste (DAW)), sent the samples to a vendor laboratory for isotopic analyses, and calculated a scaling factor for each hard to determine radionuclide in each sample. Consistent with NRC guidance, procedures RWH 3410.1 and RWH 3409.2 recommended that each waste stream determined to produce Class B and C wastes be sampled every year and that each waste stream determined to produce Class A wastes be sampled every two years.

The above procedures also stated that waste streams should be sampled following changes in reactor water chemistry trends or plant operations. For example, the RP staff performed quarterly reviews of the isotopic composition of reactor coolant samples. During these reviews, the RP staff compared the current radionuclide concentrations to the reactor coolant waste stream (scaling factor) database and to previously measured radionuclide activities. If the licensee identified any significant changes (i.e., if the quarterly nuclide concentrations differed by a factor greater than 10), the procedure

recommended additional evaluations and waste stream sampling. Although the licensee observed a gradual decrease in cobalt-60 and other select activation and fission products, the licensee's evaluations did not identify any significant changes in the reactor coolant composition between the routine waste stream analyses.

In the case of the torus sludge resin waste stream, the RP staff recently determined that the radionuclide distribution (and the corresponding scaling factors) for this waste stream were adequately represented by the radionuclide distribution found in condensate resin. Consequently, in 1998, the RP staff used the scaling factors for the condensate resin waste stream to characterize a shipment of torus sludge resins. The inspector reviewed this characterization and did not identify any problems.

For each spent resin shipment, the RP staff determined the total activity by obtaining the product of the radionuclide concentrations (determined by direct gamma spectroscopy measurements and scaling factors) and the mass of the material. In the case of the DAW stream, the RP staff collected surface contamination surveys from within the radiologically posted area and forwarded those surveys to a vendor for analysis. For each shipment of DAW, the RP staff determined the total activity through a dose-to-curie calculation, applying the radiation levels measured at 1 meter and the radionuclide scaling factors.

The inspector reviewed the most recent scaling factor evaluations (i.e., samples, analyses, and comparisons) of the waste streams, which had been performed since December of 1996. In accordance with procedure RWH 3409.2, the RP staff performed comparisons of the following data:

- the gamma isotopic results obtained by the vendor laboratory and by the licensee's chemistry staff;
- the fractional abundances of radionuclides determined in the current analysis and in the previous analysis; and
- the scaling factors determined in the current analysis and in the previous analysis.

During the review of the current data, the inspector found the licensee's practices to be in accordance with plant procedures. The RP staff properly compared the vendor data to plant results, and the proper comparisons were made between the current results and the previous results. The inspector observed that any abnormal variances were investigated and resolved. For example, the RP staff noted a decrease in the fraction of cobalt-60 in each waste stream and in the fraction of other radionuclides, which was attributed to the licensee's chemistry initiatives (NRC Inspection Report No. 50-331/98011(DRS)). Upon completion of the evaluation, the RP staff either replaced the previous database values with the new data (to account for identified changes in the waste streams) or averaged the new data with the current database values (to reduce statistical fluctuations in a steady waste stream); however, the licensee's documentation for this determination was not consistent. For example, the RP staff identified slight shifts in two waste streams which were both documented as resulting from reactor water chemistry and radioactive source term reduction initiatives, but the data were not treated

consistently. Although the RP staff had a valid justification for the treatment of the data, the staff acknowledged that improvements in the documentation were warranted.

The inspector also observed some problems concerning the communications between the RP and chemistry staffs and concerning the timeliness of the scaling factor evaluations. Although the chemistry and RP staffs worked together to evaluate an anomaly concerning the identification of cerium-144, the staffs did not routinely discuss the vendor laboratory's results. On two occasions, the vendor's laboratory identified a gamma emitting radionuclide that the licensee's chemistry staff did not identify. The RP staff attributed the anomaly to interferences from higher activity radionuclides (i.e., system dead time); however, the RP staff did not discuss the comparisons or the anomalies with the chemistry staff. During the inspection, the inspector discussed the issue with the chemistry staff and verified that the identified nuclides were below the licensee's lower limit of detection. However, members of the chemistry staff indicated that these comparisons were not shared with them but that the data would be a valuable addition to their quality control program. In addition, the inspector noted time intervals of 12 to 18 months between the dates when the samples were obtained and the dates that the RP staff completed the evaluations. Although no radioactive waste classification problems were identified and waste shipments were not classified with out-dated scaling factors, the radiation protection manager (RPM) acknowledged that the times appeared excessive and that the vendor's data should be shared with the chemistry staff.

c. Conclusions

The RP staff properly determined the activity of radioactive waste shipments via scaling factors. The inspector noted good evaluations of radionuclide data. The RP staff also performed effective trending of reactor water chemistry parameters to identify any significant changes in the composition of the waste streams.

However, the inspector identified several minor problems concerning the communications between the RP and chemistry groups and the timeliness of scaling factor evaluations. For example, the RP staff did not discuss comparisons between radiochemistry results obtained by the vendor's laboratory and licensee's chemistry laboratory, such that the chemistry staff was unaware of disagreements or anomalies. In addition, the evaluations of scaling factor data did not appear to be completed in a timely manner.

R1.2 Conduct of Radioactive Material and Waste Shipments

a. Inspection Scope (IP 86750)

The inspector reviewed the shipping documents for the following radioactive shipments, including the package classifications and labeling and shipping papers:

- o RSR No. 95-61 Torus Sludge Filters (August 23, 1995);
- o R3R No. 96-16 Torus Sludge Filters (December 18, 1996);
- o RSR No. 97-14 Laundry (May 16, 1997);

- o RSR No. 98-18 Control Rod Drive (CRD) Mechanisms and CRD wheels (April 16, 1998);
- o RSR No. 98-31 Dewatered Condensate Resins (May 5, 1998);
- o RSR No. 98-39 Low Power Range Monitor Tube Sections and Fuel Spacers (June 6, 1998);
- o RSR No. 98-40 Torus Sludge Filters (June 9, 1998); and
- o RSR No. 98-58 10 CFR 61 Samples (October 14, 1998).

The inspector reviewed the shipping documents to determine their compliance with 10 CFR Part 71 and 49 CFR Parts 172 and 173. In addition, the inspector verified that the shipments were made in accordance with the following procedures:

- o RWH 3406.6 (Revision 5), "Characterizing Radioactive Material for Transport;"
- o RWH 3406.8 (Revision 4), "Packaging Radioactive Material for Shipment;"
- o RWH 3406.9 (Revision 5), "Marking and Labeling for Radioactive Material and Radwaste Packages;" and
- o RWH 3406.10 (Revision 5), "Placarding of Radioactive Material Loads."

b. Observations and Findings

The inspector observed that the RP staff prepared shipments in accordance with the above procedures. As allowed by these procedures, the staff used a vendor-supplied computer program to classify the shipments and prepare the required shipping documents. Prior to each shipment, the staff sampled and analyzed the materials and compared the gamma spectroscopy results to the specific waste stream's scaling factor database. For spent resin shipments, the RP staff compared the radionuclide composition (i.e., cobalt-60 to cesium-137 ratio) in the shipment to the applicable scaling factor database. In accordance with the above procedures, the RP staff indicated that differences greater than a factor of ten were evaluated and that actions were taken. Based on the review of the above shipments, the inspector noted that the comparisons were properly completed and were within the licensee's acceptance criteria.

The inspector reviewed the classification of radioactive materials and wastes shipped as Low Specific Activity-II (LSA-II), limited quantity, Type A, and Type B packages and noted that the shipments were properly prepared. Based on radiological survey data, the inspector verified that the radiation levels (i.e., for the packages and transport vehicles) were within regulatory requirements. In the case of shipment numbers 98-31, 98-39, and 98-40, the licensee transported the material or waste in an NRC Type B package. The inspector verified that the licensee was included in the registered listing of users. The licensee also properly tracked the receipt of the packages.

The inspector observed that the shipping documents and waste manifests contained the information required by 49 CFR Part 172 and 10 CFR Part 20, respectively. The licensee documented reportable quantities, placarding and labeling requirements, exclusive use instructions, and other required information on the shipping documents. The inspector also noted that the RP staff recorded the activity of shipments using the International System of Units and that the shipping documentation included required

emergency response information including the emergency contact (i.e., telephone number for the control room). In addition, the RP staff prepared an instruction sheet for the control room staff to ensure that accurate information was promptly provided to the driver or to an emergency responder in the event of an accident.

c. Conclusions

The RP staff properly packaged and classified radioactive material and waste shipments in accordance with regulatory requirements. The shipping documentation and low level waste manifests contained the information required by 49 CFR Part 172 and 10 CFR Part 20. For example, shipping documents contained information concerning reportable quantities, placarding and labeling, emergency response actions, and exclusive use instructions.

R2 Status of RP&C Facilities and Equipment

R2.1 Radiological Conditions in the Radwaste Building and Storage of Radioactive Waste

a. Inspection Scope (IP 86750)

The inspector observed the radiological conditions within the Radwaste Building and reviewed the condition of containers of radioactive waste and materials stored within the building. In addition, the inspector reviewed the licensee's quarterly inventories of radioactive material and waste containers.

b. Observations and Findings

The inspector reviewed the radiological conditions within the Radwaste Building and found radiological hazards to be properly posted with the applicable caution signs. The inspector also noted that contaminated areas were properly posted, and cords and hoses crossing boundaries were properly secured to prevent the spread of contamination. Entrances to high radiation areas (HRAs) were adequately controlled and locked, if applicable.

The inspector observed that the licensee effectively implemented a program to minimize the amount of radioactive waste stored at the site. At the time of this inspection, the licensee had only one high integrity container of waste in storage, which was being filled and processed. In addition, containers of radioactive waste and materials were properly labeled, and the inspector did not identify any integrity issues concerning the containers. The inspector also noted that quarterly inventories of the storage areas were properly performed, and the licensee took appropriate actions to resolve any discrepancies between the contents of storage areas and the radioactive waste building logs and to correct any material condition deficiencies.

c. Conclusions

The RP staff properly posted and controlled radiological hazards within the Radwaste Building. Contaminated areas, radiation areas, and HRAs were posted and controlled, as applicable. In addition, the staff effectively minimized the amount of radioactive waste in storage and performed proper inventories of the storage locations.

R5 Staff Training and Qualification in RP&C

R5.1 Training of Personnel Involved in Shipping Radioactive Materials and Waste

a. Inspection Scope (IP 86750)

The inspector reviewed the training of personnel involved in the shipping of radioactive materials, as required by Subpart H of 49 CFR Part 172. Specifically, the inspector reviewed the licensee's designation of authorized shipping personnel and the training records of those personnel involved in the shipping program.

b. Observations and Findings

The licensee designated, in writing, the personnel qualified to sign the radioactive material manifest, or record, prior to shipment. Per memorandum dated October 13, 1998, the RPM designated specific individuals as qualified to ship radioactive material and waste from the site and to sign all the appropriate shipping documentation. The inspector reviewed the training certificates for these individuals and the training records for the radioactive waste handlers and verified that all personnel had been trained within the last 3 years, as required by 49 CFR 172.704. However, the inspector noted that the licensee's site-wide training tracking system had not been updated to reflect the most recent training certificates for the designated shippers, which the RP staff acknowledged and planned to correct.

In addition, the inspector reviewed the outlines for the applicable training courses. Based on this review, the inspector noted that the training was comprehensive and provided personnel with instructions for the scope of their shipping activities, as well as a broad understanding of other NRC and Department of Transportation (DOT) requirements.

However, the inspector noted a discrepancy concerning the manner in which the licensee treated the training of the RP technicians, who performed the radiological surveys of the shipments. The RP technicians were provided initial qualification training that covered DOT and NRC requirements and attended periodic continuing training which also discussed certain aspects of radioactive shipping requirements (e.g., radiological surveys). However, the licensee did not consider the DOT training requirements (i.e., Subpart H of 49 CFR Part 172) to be applicable to the RP technicians and, consequently, did not record or track this training. Since the RP technicians performed required radiological surveys which were necessary to prepare hazardous (i.e., radioactive) materials for shipment, the inspector concluded that the RP technicians

were subject to the requirements of Subpart H. The licensee acknowledged the inspector's conclusion and initiated an action request form and a training management action request to ensure that the applicability of RP technician training with respect to Subpart H of 49 CFR Part 172 was fully reviewed and that appropriate actions were implemented. The result of the licensee's review of RP technician training will be reviewed in subsequent RP&C inspections (IFI 50-331/98017-01).

c. Conclusions

The inspector noted that personnel involved in the radioactive material shipping program were properly trained. The licensee issued a document specifically listing those individuals who were certified to approve and to release radioactive shipments. In addition, training lesson plans were comprehensive and presented a broad review of the radioactive shipping program. However, the inspector noted an inconsistency in the training of RP technicians. The licensee provided technicians with training which covered aspects of radioactive shipping. However, the licensee did not consider the technicians subject to Subpart H of 49 CFR Part 172 and, as such, did not record or track the training to ensure compliance.

R7 Quality Assurance in RP&C Activities (IP 86750)

The inspector reviewed the 1997 and 1998 quarterly assessment reports and audits of the radioactive waste management (i.e., the PCP) and radioactive shipping programs. The inspector also discussed the scope of quality assurance audits with a member of the quality assurance staff. Based on these discussions and the contents of recent audits, the inspector concluded that the staff performed comprehensive reviews of these programs. For example, the staff reviewed several radioactive shipments and verified the adequacy of shipping documents and package labeling. The audits also assessed the adequacy of personnel training and the organization. In the case of the PCP, the audits documented the review of the applicable procedures, training, and classification of radioactive waste for burial. The inspector also reviewed the audit findings and verified that the licensee had taken actions to correct issues identified in the audit. For example, a shipping audit identified that the shipping papers did not contain an acceptable link to the waste stream database used to classify the shipment. Based on the inspector's observations, the inspector found that the RP staff had taken necessary steps to include this information in subsequent shipments.

R8 Miscellaneous RP&C Issues (IP 92904)

R8.1 (Closed) Violation (VIO) No. 50-331/98007-01: The licensee failed to perform an adequate evaluation of the radiological hazards incident to the April 4, 1998, low pressure core injection system full flow testing, which resulted in a significant increase in plant radiation levels. In addition to the corrective actions documented in NRC Inspection Report No. 50-331/98007(DRS), the inspector verified that the licensee had completed the following:

- o On September 2, 1998, the licensee implemented a revision to procedure WG-10, "Surveillance Test Procedure Writers Guide," which required that the RP staff review any procedure revision or new procedure that could result in the possibility of changing plant radiological conditions.
- o On September 30, 1998, the licensee implemented a revision to procedure STP-NS490002, "LPCI Inject Check Valve Full Flow Test," which included provisions to ensure that proper radiological actions were taken during the surveillance.
- o The licensee incorporated a review of the incident in the third quarter of health physics continuing training. In the case of operations training, the licensee planned to review the event in the operations training cycle which directly preceded the next refueling outage.

The inspector discussed these actions and verified that the actions had been completed as committed to by the licensee. In addition, the inspector did not identify any other instances of operational events resulting in unexpected radiation levels in the plant. This violation is closed.

R8.2 (Closed) VIO No. 50-331/98007-03: The RP staff failed to properly implement radiation work permit (RWP) requirements associated with the April 1998 diving evolutions in the torus. In addition to the corrective actions documented in NRC Inspection Report No. 50-331/98007(DRS), the inspector verified that the licensee had completed the following:

- o On August 19, 1998, the health physics supervisor issued a memorandum to the health physics staff describing the subject violation and management expectations for job coverage situations involving HRAs. The inspector noted that the memorandum was reviewed and initialed by the RP staff by August 28, 1998.
- o On October 12, 1998, the licensee implemented a revision to procedure HPP 3104.07, "Diving Operations Within Radiological Areas," to provide appropriate job coverage requirements. The inspector reviewed the procedure and found the requirements to be consistent with NRC generic communications.

The inspector did not observe any recent problems with RWP adherence. This violation is closed.

R8.3 (Closed) VIO No. 50-331/98007-04: During diving evolutions, the licensee failed to post the torus as a HRA. As described in Section R8.2, the licensee revised the diving procedure, which provided clear instructions to post HRA caution signs to entrances to the torus for diving evolutions. During this inspection, the inspector reviewed the posting of radiological hazards within the radiologically posted area and did not identify any subsequent problems. The inspector planned to review radiological postings during any further diving evolutions as a routine aspect of future RP&C inspections. This violation is closed.

- R8.4 (Closed) VIO No. 50-331/98007-5(a-b): Personnel failed to adhere to procedural requirements when entering a HRA (i.e., the individuals did not receive a briefing and were not on the correct RWP). In addition to the corrective actions documented in NRC Inspection Report No. 50-331/98007(DRS), the inspector verified that the licensee had implemented a revision to procedure ACP 1411.13, "Control of Locked High Radiation Areas," dated July 24, 1998, to increase the requirements for entries into the areas. For example, the procedure required RP technicians to verify that personnel were on the correct RWP, that they had received a pre-job briefing, and that they were aware of the radiological conditions in the area. In addition, the event and the changes to procedure ACP 1411.13 were discussed with all RP technicians, and incoming worker training was revised to include a discussion of this event. Since the licensee had completed these corrective actions and no additional events were identified, this violation is closed.
- R8.5 (Closed) VIO No. 50-331/98007-06(a-d): Personnel failed to adhere to RWP dosimetry requirements when entering radiation areas and HRAs. Specifically, personnel entered these areas without electronic dosimeters (EDs) or with inactive EDs. As documented in NRC Inspection Report No. 50-331/98007(DRS), the licensee communicated the problem to the staff and corrected the maintenance issue with the access control gate, which automatically verified that personnel had active EDs when entering the radiologically posted area. During this inspection, the inspector verified that the access control gate was properly functioning and that personnel entering the radiologically posted area were wearing active EDs. This violation is closed.

V. Management Meetings

X1 Exit Meeting Summary

On October 16, 1998, the inspector presented the inspection results to licensee management. The licensee acknowledged the findings presented. The inspector asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified which related to inspection findings.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

D. Allison, Radwaste Shipping Coordinator
B. Cheney, Radwaste Material Handler
D. Curtland, Operations Manager
D. Eilers, Radwaste and Material Handling Supervisor
C. Engelby, Radiation Protection Helper
R. Hite, Radiation Protection Manager
J. Johnson, Radiation Protection Helper
J. Karrick, Licensing
L. Kriege, Chemistry Supervisor
R. Murrel, Licensing
V. Patrilla, Lead Technical Instructor
R. Perry, Health Physics Supervisor
K. Pevele, Regulatory Performance Manager
K. Putnam, Licensing Supervisor
B. Richmond, Health Physics Supervisor
D. Schebler, Quality Assurance
R. Smiley, Radwaste Foreman
G. Van Middlesworth, Plant Manager
T. Vine, Radwaste Supervisor
D. Wilson, Assistant Vice President

INSPECTION PROCEDURES USED

IP 86750: Solid Radioactive Waste Management and Transportation of Radioactive
Materials
IP 92904: Follow-up Plant Support

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-331/98017-01	IFI	Radioactive shipping training for RP technicians (Section R4.1).
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Closed

50-331/98007-01	VIO	Inadequate evaluation of radiological hazards incident to operational events (Section R8.1).
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50-331/98007-03	VIO	Failure to follow RWP during torus diving (Section R8.2).
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50-331/98007-04	VIO	Failure to post a HRA within the torus (Section R8.3).
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50-331/98007-05(a,b)	VIO	Failure to adhere to RP procedures (Section R8.4).
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50-331/98007-06(a-d)	VIO	Failure to wear EDs in radiological areas (Section R8.5).
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Discussed

None.

LIST OF ACRONYMS USED

CFR	Code of Federal Regulations
CRD	Control Rod Drive
DAW	Dry Active Waste
DOT	Department of Transportation
DRS	Division of Reactor Safety
ED	Electronic Dosimeter
HPP	Health Physics Procedure
HRA	High Radiation Area
IFI	Inspection Follow-up Item
IP	Inspection Procedure
LSA	Low Specific Activity
NRC	Nuclear Regulatory Commission
PCP	Process Control Program
RP	Radiation Protection
RP&C	Radiological Protection and Chemistry
RPM	Radiation Protection Manager
RWCU	Reactor Water Cleanup System
RWP	Radiation Work Permit
TS	Technical Specification
VIO	Violation

DOCUMENTS REVIEWED

Duane Arnold Energy Center Instructor Guide, "Radioactive Material Receipt and Transfer, 30075," dated December 2, 1997. Duane Arnold Energy Center Instructor Guide, "Recertification Training, 70001-HM704W," dated May 21, 1998.

Duane Arnold Energy Center Instructor Guide, "Recertification Training, 70001-HM704W," dated May 21, 1998.

Duane Arnold Energy Center Instructor Guide, "Recertification Training, 70001-HM704W," dated August 14, 1998.

Form RW-I-2, "Container Accountability Form," performed December 30, 1997, March 6, 1998; July 7, 1998; and September 28, 1998.

Memorandum NG-98-1761 from Robert Hite, RFM, to File, dated October 13, 1998.

Memorandum from Frank Parks, Radwaste Shipping Coordinator, to Russ Perry, Health Physics Supervisor, dated March 22, 1996.

Memorandum NG-98-1458 from Russ Perry, Health Physics Supervisor, to health physics technicians and staff, dated August 19, 1998.

Procedures:

ACP 1411.13 (Revision 6), "Control of Locked High Radiation Areas;"

HPP 3102.02 (Revision 4), "ALARA Job Planning;"

HPP 3104.07 (Revision 5), "Diving Operations Within Radiological Areas;"

RWH 3410.1 (Revision 6), "Process Control Program for Wet Radioactive Wastes;"

RWH 3406.01 (Revision 4), "Waste Classification and Characterization;"

RWH 3406.6 (Revision 5), "Characterizing Radioactive Material for Transport;"

RWH 3406.8 (Revision 4), "Packaging Radioactive Material for Shipment;"

RWH 3406.9 (Revision 5), "Marking and Labeling for Radioactive Material and Radwaste Packages;"

RWH 3406.10 (Revision 5), "Placarding of Radioactive Material Loads;"

RWH 3409.2 (Revision 7), "Sampling Instructions and Analysis of Radwaste Streams;"

RWH 3413.4 (Revision 1), "Quarterly Inspections of Interim On-Site Storage Vaults;"

STP NS49002 (Revision 1), "LPCI Inject Check Valve Full Flow Test;" and

WG 10 (Revision 3), "Surveillance Test Procedure Writer's Guide."

RDA Calculation No. 96-016-R, "10 CFR 61 Compliance Data Technical Basis for DAEC 'Torus Sludge,'" dated December 17, 1996.

RDA Calculation No. 97-017-R, "10 CFR 61 Compliance Data Technical Basis for DAEC Dry Active Waste (DAW)," dated December 11, 1997.

RDA Calculation No. 98-001-R, "10 CFR 61 Compliance Data Technical Basis for DAEC Condensate Resin," dated February 12, 1998.

RDA Calculation No. 98-007-R, "Validation of 10 CFR 61 Reactor Coolant Crud Sample 97-458 by Comparison Between In-House and Off-Site Vendor Laboratories," dated April 7, 1998.