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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

June 12, 1980

Docket No. 50-313

Mr. William Cavanaugh, III  
Vice President, Generation  
and Construction  
Arkansas Power & Light Company  
P. O. Box 551  
Little Rock, Arkansas 72203

Dear Mr. Cavanaugh:

Recent restrictions and reduced allocations at commercial burial sites have caused numerous licensees to actively consider increased on-site storage. Several licensees are currently storing waste on a temporary basis and proposing to establish new facilities for longer term storage. If on-site storage is necessary, the licensee must assure that the design and operation of the proposed facilities are adequate to maintain public health and safety, minimal risk to operating personnel, and present a minimal environmental impact.

Any decision to incorporate on-site storage requires a 10 CFR 50.59 safety review of the areas of: (1) Radioactive Material and Effluent Control, (2) Radiation Dose Control for Both On-site and Off-site Individuals, and (3) Accident Prevention and Control. Enclosed is a draft NRC Licensing Position for "Safety Considerations for Temporary On-Site Storage". This draft is forwarded for your information and use in evaluating low-level waste storage criteria.

The NRC is presently evaluating both temporary and long term on-site storage and its implications. Currently, 10 CFR 50.59 requires that you furnish a report containing a brief description and summary of the safety evaluation for each 10 CFR 50.59 change to your facility. The proposed model Appendix I generic Technical Specifications (NUREG-0472 and 0473) contained guidance on the desired detail necessary in that report for radwaste systems. In the interim, until Appendix I Technical Specifications are incorporated in your operating license, you are requested to include reviews for on-site storage additions in the monthly operating report following the period in which the evaluation was completed. This report should detail the major additions/changes and contain a summary of the safety evaluation. This summary should include as a minimum your evaluation of each of the safety review areas described herein, including consideration of the guidance provided in the enclosed draft Licensing Position, man-rem impacts, anticipated radiological release assessments, final disposition of waste, and final conclusion of the 50.59 evaluation.

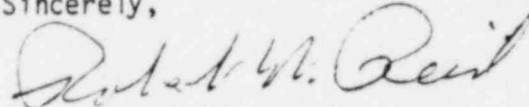
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Mr. William Cavanaugh, III

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No formal response is required concerning this letter unless waste storage facilities are modified. Comments, however, are invited concerning the enclosed draft Licensing Position.

Sincerely,

A handwritten signature in cursive script, reading "Robert W. Reid".

Robert W. Reid, Chief  
Operating Reactors Branch #4  
Division of Licensing

Enclosure:  
Draft Licensing Position

cc w/enclosure:  
See next page

Arkansas Power & Light Company

cc w/enclosure(s):

Mr. David C. Trimble  
Manager, Licensing  
Arkansas Power & Light Company  
P. O. Box 551  
Little Rock, Arkansas 72203

Mr. James P. O'Hanlon  
General Manager  
Arkansas Nuclear One  
P. O. Box 608  
Russellville, Arkansas 72801

Mr. William Johnson  
U. S. Nuclear Regulatory Commission  
P. O. Box 2090  
Russellville, Arkansas 72801

Mr. Robert B. Borsum  
Babcock & Wilcox  
Nuclear Power Generation Division  
Suite 420, 7735 Old Georgetown Road  
Bethesda, Maryland 20014

Troy B. Conner, Jr., Esq.  
Conner, Moore & Corber  
1747 Pennsylvania Avenue, N.W.  
Washington, D.C. 20006

Arkansas Polytechnic College  
Russellville, Arkansas 72801

Honorable Ermil Grant  
Acting County Judge of Pope County  
Pope County Courthouse  
Russellville, Arkansas 72801

Mr. Paul F. Levy, Director  
Arkansas Department of Energy  
3000 Kavanaugh  
Little Rock, Arkansas 72205

Director, Technical Assessment  
Division  
Office of Radiation Programs  
(AW-459)  
U. S. Environmental Protection Agency  
Crystal Mall #2  
Arlington, Virginia 20460

U. S. Environmental Protection Agency  
Region VI Office  
ATTN: EIS COORDINATOR  
1201 Elm-Street  
First International Building  
Dallas, Texas 75270

Director, Bureau of Environmental  
Health Services  
4815 West Markham Street  
Little Rock, Arkansas 72201



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SAFETY CONSIDERATIONS FOR TEMPORARY ON-SITE STORAGE OF LOW LEVEL RADIOACTIVE WASTE

I. Introduction

The objective of this technical position is to provide guidance to the Licensees considering additional on-site low level radioactive waste storage capabilities. The duration of the intended storage, the type and form of waste, and the magnitude of radionuclides present will dictate the safeguards and the level of complexity required to assure public health and safety, and minimal risk to operating personnel. The longer the intended storage period, the greater the degree of controls that will be required for radiation protection and accident prevention. For purposes of this document, the duration of temporary material storage is to be up to four (4) years. The magnitude of the on-site storage safety hazard is predicated on the type of waste being stored, the amount of radionuclides present, and how readily they might be transported into the environment. In general, it is preferable to store radioactive material in solid form. Under some circumstances, however, temporary storage in a liquid form may be desirable or required. The specific design and operation of any storage facility will be significantly influenced by the various waste forms, consequently, this document addresses wet waste, solidified wet waste and dry low level radioactive waste.

II. General Information

Prior to any implementation of additional on-site storage, substantial safety reviews and environmental analysis need to be conducted to assure adequate public health and safety, and minimal environmental impact. The acceptance criteria and performance objectives of any proposed storage facility, or area, will need to meet minimal requirements in areas of design considerations, operational considerations, safety considerations and policy considerations. For purposes of this branch position the major emphasis will be on safety considerations in the storing, handling and eventual disposition of the radioactive waste. Design and operational acceptability will be based on minimal requirements which are defined in existing SRP's, Regulatory Guides, and industry standards for proper management of radioactive waste. Policy considerations for waste minimization and volume reduction will also have to be integrated into the waste management plan and the on-site storage alternative. Additional considerations for ALARA, decontamination, and decommissioning of the temporary storage facility also need to be integrated into the design and operation of the proposed waste storage facility. Integration of waste

volume reduction and eventual disposal should be performed as early as possible because future requirements for waste forms may make stored wastes unacceptable for final disposition.

### III. Wet Radioactive Waste Storage

- (a) Wet radioactive waste will be defined as any liquid or liquid/solid slurry. For storage considerations, wet waste is further defined as any waste which does not meet January 1, 1981 burial requirements for solidified waste (i.e., < 0.5% free water by volume of container or < 1.0 gallon per container whichever is less).
- (b) The facility, supporting structure and tanks should be designed to prevent uncontrolled releases of radioactive materials due to spillage or accident conditions.
- (c) The following design objectives and criteria are applicable for wet radioactive waste facilities.
  - (1) Structures that house liquid radwaste storage tanks should be designed to seismic criteria as defined in Standard Review Plan (NUREG 75/087 - Section 11.2). Foundations and walls shall also be designed and fabricated to contain the liquid inventory which might be released during a container/tank failure.
  - (2) All tanks or containers should be designed to withstand the corrosive nature of the wet waste stored. The duration of storage under which the corrosive conditions exist shall also be considered in the design.
  - (3) All storage structures should have curbs or elevated thresholds with floor drains and sumps to safely collect wet waste assuming the failure of all tanks or containers. Provisions should be incorporated to route spilled wet waste to the radwaste treatment systems.
  - (4) All tanks and containers shall have provisions to monitor liquid levels and to alarm potential overflow conditions.
  - (5) The quantity of radioactive material allowed and the shielding configurations will be dictated by the dose rate criteria for both the site boundary and unrestricted areas on-site. The 40 CFR 190 limits will restrict the annual dose from direct radiation and effluent release to the Public (individual) to less than 25 mrem per year to the whole body from all sources of the Uranium fuel cycle; therefore, off-site doses from on-site

storage must be sufficiently low to account for other sources (e.g., < 1 mrem/year). On-site dose limits associated with temporary storage will be controlled per 10 CFR Part 20 including the ALARA principle of 10 CFR 20.1.

- (6) All potential release pathways of radionuclides (e.g., evolved gases, breach of container, etc.) shall be controlled and monitored as per 10 CFR 50 Appendix A (General Design Criteria 60 and 64). Surveillance programs should incorporate adequate methods for monitoring breach of container integrity or accidental releases.
- (7) All temporarily stored wet waste will require additional reprocessing prior to shipment off-site; therefore, provision should be established to integrate the required treatment with the waste processing and solidification systems. The interface and associated systems should be designed and tested in accordance with the codes and standards described in NUREG-75/087 Section 11.

#### IV. Solidified Radioactive Waste Storage

- (a) Solidified radwaste for storage purposes shall be defined as that waste which meets January 1, 1981 burial site solidified waste criteria. Therefore, solidified radwaste will be identified as wet waste (e.g., evaporation bottoms, resins, and sludge) which is solidified and contains < 0.5% free water (by container volume) or 1.0 gallon of liquid (in the container), whichever is less. For purposes of this document resins or filter sludges dewatered to the above criteria will be defined under this waste classification/criteria.
- (b) Dewatered resins and filter media with radioactivity levels above 1  $\mu\text{Ci/cc}$  (>5 yr. half-life) which are disposed of after July 1, 1981, will be required to be solidified or stored in high integrity containers (e.g., reinforced concrete). Any storage plans should address container protection as well as any reprocessing requirements for eventual shipment and burial.
- (c) Casks, tanks, and liners containing solidified radioactive waste should be designed with good engineering judgment to preclude or reduce the occurrence of uncontrolled releases of radioactive materials due to handling, transporting or storage. Accident mitigation and control for design basis events (e.g., fire, flooding, tornadoes, etc.) must be evaluated and protected against unless otherwise justified.



- (d) The following design objectives and criteria are applicable for solidified waste storage containers and facilities:
- (1) All solidified radwaste should be located in restricted areas where effective material control accountability can be maintained. While structures are not required to meet seismic criteria, protection should be afforded to insure the radioactivity is contained safely by use of good engineering judgment, such as the use of curbs and drains to contain spills of dewatered resins or sludges.
  - (2) Container material selection should conform to requirements established in NUREG-75/087 (Section 11). If liquids exist which are corrosive, proven provisions should be made to protect the container (i.e., special liners or coatings) and, or neutralize the excess liquids. If deemed appropriate and necessary, highly non-corrosive materials (e.g., stainless steel) should be used. Potential corrosion between the solid waste forms and the container should also be considered. In the case of dewatered resins, highly corrosive acids and bases can be generated which will significantly reduce the longevity of the container. The Process Control Program (PCP), should implement steps to assure the above does not occur, and provisions on container material selection and precoating should be made to insure that container breach does not occur during temporary storage periods.
  - (3) Potential release pathways of all radionuclides present in the solidified waste form shall be monitored as per 10 CFR 50 Appendix A. Surveillance programs shall incorporate adequate methods for detecting failure or container integrity and measuring releases to the environment. For outside storage, periodic direct radiation and surface contamination monitoring shall be conducted to insure that levels are below limits specified in 10 CFR 20.202, 20.205, and 49 CFR 173.397. All containers should be decontaminated to these levels or below before storage.
  - (4) Provision should be made for additional reprocessing or repackaging due to container failure and/or, as required for final transporting and burial as per DOT and burial site criteria. Contamination isolation and decontamination capabilities should be developed. Whereby significant handling and personnel exposure can be anticipated, ALARA methodology should be incorporated as per Regulatory Guides 8.8 and 8.10.

- (5) Procedures should be developed and implemented for early detection, prevention and mitigation of accidents (e.g., fires). Storage areas and facility designs should incorporate good engineering features and contingencies so as to handle accidents and provide safeguard systems such as fire detectors and suppression systems, (e.g., smoke detector and sprinklers), personnel training and administrative procedures to insure both control of radioactive materials and minimum personnel exposures. Fire suppression devices may not be necessary if combustible materials are minimal in the area.
- (6) Provisions should be incorporated for collecting liquid drainage including provisions for sampling all collected liquids. Routing of the collected liquids should be to radwaste systems if contamination is detected or to normal discharge pathways if the water ingress was from external sources and remained uncontaminated.
- (7) Low level solidified waste stored in outside areas should be held securely by installed hold down systems. The hold down system should secure all containers during severe environmental conditions up to and including the design basis event for this waste storage facility.
- (8) Container integrity should be assured against corrosion from the external environment; external weather protection should be included where necessary and practical. Storage containers should be raised off storage pads where water accumulation can be expected to cause external corrosion and possible degradation of container integrity.
- (9) The quantity of radioactive material allowed and the shielding configurations will be dictated by the dose-rate criteria for both the site boundary and unrestricted area on-site. The 40 CFR 190 limits will restrict the annual dose from direct radiation and effluent releases to the Public (individual) to less than 25 mrem per year to the whole body from all sources of the Uranium fuel cycle; therefore, off-site doses from on-site storage must be sufficiently low to account for other sources (e.g., < 1 mrem/year). On-site dose limits associated to temporary storage will be controlled per 10 CFR Part 20 including the ALARA principle of 10 CFR 20.1.



- (10) Total curie limits should be established based on the design of the storage area and the safety features provided.
- (11) Inventory records of waste types, contents, dates of storage, shipment, etc., should be maintained.

V. Low Level Dry Waste Storage

- (a) Low level dry waste is classified as contaminated material (e.g., paper, trash, air filters) which contains sources of radioactive material that is dispersed in small concentrations throughout large volumes of inert material which contain no free water. Generally, this consists of dry material such as rags, clothing, contaminated materials and small equipment (i.e., tools and instruments) which cannot be easily decontaminated.
- (b) Licensees should implement controls to segregate and minimize the generation of Low Level Dry Waste to lessen the impact on waste storage. Integration of Volume Reduction (VR) hardware should be considered to minimize the need for additional waste storage facilities.
- (c) The following design objectives and criteria are applicable for low level dry waste storage containers and facilities.
  - (1) All dry or compacted radwaste should be located in restricted areas where effective material control and accountability can be maintained. While structures are not required to meet seismic criteria, protection should be afforded to insure the radioactivity is contained safely by use of good engineering judgment.
  - (2) The waste container should be designed to insure radioactive material containment during normal and abnormal occurrences. The waste container materials should not support combustion. The packaged material should not cause fires through, spontaneous chemical reactions, retained heat, etc.
  - (3) Potential release pathways of all radionuclides present in the solidified waste form shall be monitored as per 10 CFR 50 Appendix A. Surveillance programs shall incorporate adequate methods for detecting failure of container integrity and measuring releases to the environment. For outside storage periodic direct radiation and surface contamination monitoring shall be conducted to insure that levels are below limits specific in 10 CFR 20.202, 20.205, and 49 CFR 173.397. All containers should be decontaminated to these levels or below before storage.

- (4) Containers should generally comply with the criteria of 10 CFR 71 and 49 CFR 170 to minimize the need for repackaging for shipment.
- (5) Increased container handling and personnel exposure can be anticipated, consequently, all ALARA methodology should be incorporated per Regulatory Guide 8.8 and 8.10.
- (6) The quantity of radioactive material allowed and the shielding configurations will be dictated by the dose-rate criteria for both the site boundary and unrestricted areas on-site. The 40 CFR 190 limits will restrict the annual dose from direct radiation and effluent release to the Public (individual) to less than 25 mrem per year to the whole body from all sources of the Uranium fuel cycle; therefore, off-site doses from on-site storage must be sufficiently low to account for other sources (e.g., < 1 mrem/year). On-site dose limits associated to temporary storage will be controlled per 10 CFR Part 20 including the ALARA principle of 10 CFR 20.1.
- (7) Total curie limits should be established based on the design of the storage area and the safety features provided.
- (8) Provisions should be incorporated for collecting liquid drainage including provisions for sampling all collected liquids. Routing of the collected liquids should be to radwaste systems if contamination is detected or to normal discharge pathways if the water ingress was from external sources (e.g., rain water or moisture) and remained uncontaminated.
- (9) Low-level waste stored in outside areas should be held securely by installed hold down systems. The hold down system should secure all containers during severe environmental conditions up to and including the design basis event for this waste storage facility.
- (10) Container corrosion should be assured against from both the internal and external environment. Special internal liners and external weather protection should be included where necessary and practical. Storage containers should be raised off storage pads where water accumulation can cause external corrosion and resultant loss of container integrity.
- (11) Inventory records of waste types, contents, dates of storage, shipment, etc., should be maintained.