CW 5-26-99

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E. Required Information

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I. Reviewers

	Yes	Print	Signature	Public Y/N (If N, complete J)
General Counsel DOE	☑	R. Southworth		Y / N
Office of External Affairs	☐			Y / N
DOE-RL	☐			Y / N
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Application of "Nuclear Regulatory Commission Regulation Equivalency" to Construction of New DOE Nuclear Facilities

G.E. Bishop
U.S. Department of Energy, Richland, WA

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Application of "Nuclear Regulatory Commission Regulation Equivalency" to Construction of New DOE Nuclear Facilities

by

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Abstract:

The Spent Nuclear Fuels Project (SNFP) Office of the Department of Energy (DOE), Richland Operations Office, is charged with moving 2,100 metric tons of spent nuclear fuel elements left over from plutonium production into semi-permanent storage at DOE's Hanford site in Washington state. In anticipation of eventual NRC regulation, the DOE decided to impose NRC requirements on new SNFP facility design and construction, specifically for the Cold Vacuum Drying Facility (CVDF) and the Canister Storage Building (CSB). The SNFP implemented this policy of "NRC equivalency" with the goal of achieving a level of nuclear safety equivalent to that of NRC-licensed fuel processing facilities. Appropriate features of the NRC licensing process were adopted. However, the SNFP maintained applicable DOE requirements in tandem with the NRC regulations. Project work is continuing, with the first fuel movement scheduled for November, 2000.

This paper presents the SNFP's experience in implementing the policy of "NRC equivalency". This paper presents conclusions from this experience, along with recommendations for other sites who might consider adopting a similar regulatory policy. Features essential to successful application of NRC requirements are noted as well as pitfalls to be avoided. Substantial benefit

will be gained from this presentation by any DOE site considering such a policy. Taking ownership of a DOE site may mean taking charge of NRC regulations for that site.

Background:

The Department of Energy's Hanford site in south-central Washington produced plutonium for nuclear weapons for forty-five years. At the end of Hanford's production mission in 1989, approximately 2,100 metric tons (4,630,000 pounds) of spent irradiated fuel elements were left unprocessed in 1950's era concrete basins near the Columbia River. Proximity of the basins to the Columbia River represented a significant hazard. In 1992, Secretary of Energy James Watkins terminated all further plutonium recovery. As a consequence, means had to be found to safely remove approximately 105,000 fuel elements from the basins to a new storage facility. This challenge was assigned to the DOE's Richland Operations Office, specifically the Spent Nuclear Fuels Division. This Division formed the Spent Nuclear Fuels Project (SNFP) with the site contractor.

Following technical evaluation, the SNFP decided on a strategy to move and store the fuel elements. First, the elements will be mechanically cleaned and installed into new stainless steel baskets that will be stacked into stainless steel canisters called multicanister overpacks or MCO's. These overpacks will be transferred to a new facility, the cold vacuum drying facility, where water will be removed from the MCO. The sealed MCO will then be transferred to another new storage facility, the canister storage building, where it will be

housed pending final disposal at the high-level waste burial facility in Nevada. See Figure One. This strategy has received wide-spread public and government support.

Thus, the Hanford SNFP is constructing two unique facilities unlike any others built before by DOE: the cold vacuum drying facility and the canister storage building. While some limited below-grade work had been done on the canister storage building as part of another DOE project, both buildings are essentially new. Due to the perception of risk posed by the basins' proximity to the Columbia River, the project schedule is "fast-track"--ie, safety analysis, procurements and construction are proceeding in parallel with engineering design.

As the decay heat load of an MCO is low (worst case is < 800 watts), pressurization and gas generation inside the MCO is the fundamental safety concern. Gas generation and consequent pressurization primarily comes from decomposition of water into hydrogen and oxygen. The MCO internal pressure can thus be kept to a minimum by minimizing the volume of water inside the MCO.

Throughout the mid-nineties, the US Congress and other parties proposed to transfer regulatory responsibility and enforcement of DOE facilities from the DOE to the NRC or other agencies. This concept has gone so far that the 1999 fiscal year appropriation bill for DOE (Title III) states:

> The Department is directed to ensure that all nuclear facilities for which construction begins in the year 2000 and beyond, with the

> exception of those defense nuclear facilities...deemed...critical to national security needs, are constructed in accordance with NRC licensing standards.

The DOE began a program to phase in NRC regulation at selected pilot sites in 1996. It was in this environment that the DOE decided to proceed with applying NRC requirements to the SNFP.

Program Development:

Congress and other public venues expressed concern that DOE could not construct safe processing and storage facilities that meet modern nuclear standards. In response to these apprehensions, the Assistant Secretary for Environmental Management, Thomas Grumbly, established a regulatory policy in July, 1995, that:

> the SNFP will achieve nuclear safety equivalence to comparable Nuclear Regulatory Commission (NRC) licensed facilities. This will be accomplished by applying technical requirements based on those applied by the NRC to comparable licensed facilities and by adopting appropriate features of the NRC licensing process, in addition to applicable DOE Orders and requirements.

(Appendix A provides copies of the Grumbly memorandum and related information.)

Three objectives guide the SNFP's policy of NRC equivalency:

1. to achieve a set of requirements that are technically defensible and cost-effective;

2. to achieve in the design and construction of new SNFP facilities a level of nuclear safety comparable to that of NRC licensed commercial nuclear facilities; and
3. to enhance public understanding and confidence in the safety of the new facilities by following an enhanced regulatory strategy.

To head off potential confusion, the SNFP formally defined certain key phrases contained in the three program objectives. The term "safety comparable to that of NRC-licensed commercial nuclear facilities" means invoking technical and administrative requirements on the project that:

1. meet the nuclear safety objectives of NRC regulations for fuel treatment and storage facilities, including requirements on radiation exposure, safety analyses, design, and construction; and
2. meet the objectives of the major elements of the NRC licensing process, including formally documenting design and safety analyses, documenting independent technical reviews, and providing for public involvement.

"Requirements" means only design and construction measures specifically mandated by NRC regulations. This is a key feature of the policy. The policy has not examined NRC regulations covering facility operations or preparation for operation.

"Comparable facilities" means spent nuclear fuel treatment and storage facilities.

Program Process:

The project contractor, the Westinghouse Hanford Company at the time, identified a set of NRC regulations for adoption by the SNFP. To compile the list, the contractor conducted a through review of all NRC documents' base. This base consisted of:

- 10 CFR Parts 0-199;
- NUREG's;
- Standard Review Plans;
- Generic Letters;
- Regulatory Guides;
- NRC inspection and enforcement bulletins and notices.

The contractor compared this list of tentative regulations to existing DOE requirements to identify areas in which existing DOE requirements mandated by contract significantly differed from NRC regulations. The SNFP did not invoke NRC regulations less conservative than corresponding DOE requirements. That is, NRC regulations do not relax existing DOE requirements already invoked by contract on the SNFP contractor. (DOE requirements are listed in the SNFP Standards/Requirements Identification Documents.) External perception to the contrary, careful technical comparison of DOE requirements to NRC regulations revealed that NRC regulations were seldom more conservative than DOE requirements for spent fuel processing and storage facilities. In fact, following careful comparison of DOE to NRC requirements, the SNFP adopted only twenty-nine actual NRC requirements. These requirements are listed in Appendix B.

The DOE established a formal process to approve the set of selected requirements. Approval used a three-tier review and approval process:

- tier one: development and recommendation from the contractor that the DOE approve the candidate listing of NRC requirements;
- tier two: approval of the candidate listing of NRC requirements by the DOE;
- tier three: concurrence with the set of requirements by a qualified technical body independent of the DOE.

DOE Approval:

The SNFP established a Regulatory Requirements Team (RRT) to assist in the selection and approval of appropriate NRC regulations. The Team is comprised of DOE and government support services staff who are thoroughly familiar with both NRC and DOE regulatory requirements. The number of RRT members varies and is presently six. The RRT provides DOE approval of the selected NRC regulations.

The DOE office of Environment, Safety, and Health (EH) provides independent oversight of the selection process for the NRC regulations.

External Concurrence:

However, early on, the SNFP saw the need for an external review of the selected NRC regulations in order to ensure that this final list was complete, defensible, and technically sound. Due to the critical role this body would play in the final set of NRC requirements, the DOE recognized that this body

must be independent of the SNFP. An Independent Review Panel (IRP) was therefore chartered to provide high-level external oversight of the regulatory policy. The IRP concurred with the final list of NRC regulations adopted by the SNFP. The DOE selected three individuals with significant NRC regulatory experience to serve on the Independent Review Panel. A formal charter prescribes their responsibilities. The IRP reports directly to the Richland Operations Office Manager.

Both the RRT and the IRP play crucial roles in implementing a policy of NRC equivalency. No DOE site should consider invoking NRC requirements without first establishing similar groups similarly empowered.

Exceptions exist with the policy of "NRC equivalency." The policy does not apply to environmental, OSHA, chemical safety, and other non-nuclear safety issues. The policy does not and was not intended to be applied to existing DOE facilities, such as the basins presently holding the fuel elements. In effect, the policy applies only to the cold vacuum drying facility and the canister storage building.

Project Experience:

Early-on, the SNFP found that fundamental differences exist between DOE and NRC approaches to nuclear-safety regulation. The DOE prevents and mitigates accidents using a "risk management" approach. Risk is defined as the product of an accident's consequence times its probability. Thus, DOE considers the probability (or estimated annual frequency) that an accident could occur in determining preventive and mitigative measures. The NRC uses a "consequence"

approach that does not consider an accident's probability. NRC accident release limits are the same regardless of accident frequency. The DOE invokes consensus national codes to provide technical detail in requirements (eg, safety class structures shall be built to AISC N690 standards). The NRC often provides prescriptive technical detail and direction within the body of their regulations themselves.

DOE and NRC definitions of fundamental terms are not the same. For example, the NRC uses the word "containment" for the principle of surrounding nuclear material with barriers to its release. The DOE uses the word "confinement". While similar in intent, the terms are not identical and can cause confusion when overlaying NRC requirements over existing DOE requirements. NRC requirements are often fundamentally different in basic concept from DOE requirements. For example, the NRC concept of "important to safety" defined in 10 CFR 72.3 is not related to the DOE definition of "safety class" items, defined in DOE Order 6430.1A, section 1300-3.2.

The outcome of the regulatory policy is that the SNFP established two different sets of requirements:

1) DOE requirements already in place via contract (eg, DOE Order 6430.1A); and

2) the additional parallel "NRC-equivalent" requirements.

The project must meet both sets of requirements.

Implementation Complications:

Implementing both sets of requirements, DOE and NRC, is often a classic case of fitting a square peg into a round hole. While the concept of NRC equivalency may appear direct and clear from a detached global perspective, bridging two different sets of requirements proved difficult, especially at the level of equipment design. Examples of problems encountered while implementing NRC requirements are provided below.

Both DOE and NRC requirements bases--DOE orders or 10 CFR--are "inbred" in that both systems refer to other portions of the requirements base for additional requirements. DOE orders (eg, DOE Order 6430.1A, section 1300-3.2) may cite other DOE orders for additional direction, interpretation, or guidance that modify, elaborate, or refine the particular requirement. NRC regulations do the same thing. Indeed, the NRC's requirements base is actually much larger than DOE's since the NRC may refer to a whole series of Reg Guides, NUREG's, or Standard Review Plans to which the DOE does not have a counterpart. Whole sets of additional requirements could be invoked by such documents, which, because the requirements are cited within the regulation itself, the SNFP considered to be fully binding. The author calls these "hidden" secondary citations Stealth requirements.

The SNFP regulatory policy objectives strike a fine balance among distinct and unrelated forces. Safety requirements must be both realistic and at the same time economical. Economics thus competes with public (political) perception of the need for that requirement irrespective of its cost. Disparate forces

and perspectives have pulled the SNFP regulatory policy in different directions since the policy's inception in 1995.

Project experience has shown that the meaning of "nuclear safety equivalence" is ambiguous and has required substantial interpretation. Without a precise definition of "nuclear safety equivalence" which is steadfastly adhered to, the SNFP frequently found that implementation of an NRC requirement pitted the opinion of the engineering staff against the opinion of the safety analysis staff. The contractor's lack of experience in a prescriptive regulatory environment exacerbated this fundamental problem. Too often, identified requirements were overlooked by facility design and not implemented at all. By the time the oversight was noticed during review of the facility's safety basis (its safety analysis report), invoking the requirement was difficult due to project cost and schedule constraints.

Showing that an NRC requirement is actually met often proved difficult and confrontational with the contractor. Implementing "stealth" requirements invoked within the body of an adopted NRC requirement has further added to disputes. Resolution of what a particular NRC requirement means and how it is then to be met has often required assessment and decision by the RRT which led to an interpretation of the requirement's intent and wording. The IRP must concur with the interpretation. Resolution of such conflicts conclusively demonstrates the necessity for both the RRT and IRP.

Experience has shown that balancing the implementation of novel NRC requirements with an accelerated project schedule is vastly more challenging than had been expected.

Implementation Problems:

The fundamentally different approach to safety regulation between the DOE and the NRC led to instances of confusion in showing that an NRC requirement was met. The contractor's lack of experience in a regulatory environment has also caused confusion. As a result, not all citations of a particular regulation were properly invoked in a timely manner. Evidence that a citation has been met was not readily available in all cases for either facility. When the contractor failed to properly implement a requirement, the DOE found itself in the role (familiar to commercial nuclear power plants) of "back-fitting" the existing project design to meet the neglected NRC requirement. Back-fitting a requirement to SNFP equipment already designed and sometimes even procured has been required. Such back-fits are expensive in cost and time. Occasionally, such a back-fit was so expensive that the DOE was forced to seek alternative means to demonstrate compliance to a requirement. In these instances, the affected equipment was shown to meet other requirements "equivalent" to those required by the NRC which should have been met, but were not specifically met. Thus, the actual requirements to be met changed in some instances.

Three significant examples illustrating different problems experienced with implementing NRC requirements are provided.

Canister Storage Building (CSB) Natural Hazards Design:

The SNFP adopted NRC criteria for natural hazards (eg, tornadoes) to the design of the CSB. These are contained in Reg Guide 1.76, "Design Basis Tornado for Nuclear Power Plants", SECY-93-087, "Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor

(ALWR) Designs", and NUREG/CR-4461, "Tornado Climatology of the Contiguous US". The NRC criteria are more rigorous and thus require a stronger building than the site natural hazards criteria previously used at Hanford. The contractor did not impose the NRC requirements during design of the building.

DOE discovered that the NRC requirement had not been invoked by the building design. Because the CSB construction cost estimate had been estimated using the older site criteria, applying the NRC natural hazards criteria resulted in a marked increase in the building's cost. This additional cost could have been almost entirely avoided by timely implementation of the natural hazards requirements at the time design was initiated. When the additional construction cost became known, the contractor tried to abandon the NRC criteria. This attempt was ultimately rejected by DOE and the NRC natural hazards criteria were incorporated into the CSB's design.

CSB Tube Material:

The MCO is stored inside a steel pipe (called a tube, although it is not thin as typical tubes) that provides secondary confinement within the CSB. The tube could pressurize to ~80 psi by release of material from the MCO through a pressure relief device being considered for the MCO at the time. The SNFP adopted NRC Reg Guide 1.26, "Quality Group Classifications and Standards for Water, Steam, and Radioactive Waste Containing Components of Nuclear Power Plants," to guide selection of the proper code class from ASME III to the tube's design. Applying the Reg Guide, the tube met Group C's classification standards and therefore should be fabricated to ASME III, subsection ND. In addition, as the tube was also safety-class per DOE Order 6430.1A, that Order

stipulated that the piping be made to ASME III criteria. Thus, both NUREG 1.26 and DOE Order 6430.1A, section 1300-3.2 required that the tube be fabricated and assembled to ASME III. However, the contractor specified the tube material to API 5L standards and then issued the procurement order. The contractor had not passed the piping code requirements from the NUREG and Order 6430.1A down to the procurement sub-contractor. As a result, the SNFP devoted extensive time and resources demonstrating that the procured tube material met ASME III requirements. This effort required the services of ASME code and material experts and metallurgical analysis of the tube material. Eventually, the material was accepted for use. A subsequent change in the tube's safety functions removing the possibility of pressurization obviated the ASME III requirements. However, the problems encountered clearly illustrate the absolute necessity of ensuring that the contractor has fully integrated safety requirements downward through their entire organization so that all subcontractors are aware of the requirements prior to the solicitation of procurement bids.

Cold Vacuum Drying Facility (CVDF) Piping Code:

Free water inside the MCO is removed in the CVDF. The de-watering piping is connected to the MCO and in effect forms a confinement boundary with the MCO shell. The SNFP adopted NRC Reg Guide 1.26, "Quality Group Classifications and Standards for Water, Steam, and Radioactive Waste Containing Components of Nuclear Power Plants," to guide selection of the proper code class from ASME III to the piping. Applying the Reg Guide, the piping met Group C's classification standards and therefore should be fabricated to ASME III, subsection ND. In addition, as the piping is also safety-class per DOE Order

6430.1A, that Order stipulated that the piping be made to ASME III criteria. Thus, both NUREG 1.26 and DOE Order 6430.1A, section 1300-3.2 required that the piping be fabricated and assembled to ASME III. Applying NUREG 1.26, Group C and DOE Order 6430.1A, section 1300-3.2 led to the designation that the CVDF piping be ASME III, subsection ND out to the second isolation valve. However, the contractor ordered this piping to ASME B31.3 standards. As a result, once again, the SNFP devoted time and resources to justify the code used by the procurement order. Eventually, ASME B31.3 was accepted with additional fabrication inspections.

Implementation Lessons Learned:

Project managers should not assume they are immune to the implementation problems encountered by the SNFP at Hanford. The following valuable lessons are noteworthy:

1. *Determine the costs of implementing safety requirements (either DOE or NRC) at the time the requirements are chosen for implementation.*
2. *Ensure that all levels of the contractor's organization fully understand the chosen requirements, the feasibility of their implementation, and their associated costs.*
3. *Ensure that all levels of a contractor's organization are aware of all contractual requirements, whether they be from the DOE, the NRC, or any other chosen regulatory agency.*
4. *Ensure that all levels of a contractor's organization fully implement the set of chosen requirements. The contractor must seek clarification if questions or conflicts concerning*

implementation arise, before they proceed with design or procurement. Do not assume that things will "just work themselves out." Complacency can be calamitous.

5. *Establish safety classification and relevant code requirements ahead of any other equipment activity, and particularly before detailed design work or procurement.*

Conclusions:

The 1999 fiscal year appropriation bill for DOE (Title III) states that the DOE must apply NRC licensing standards to all new construction beginning in 2000. The authorization bill then makes the following pregnant counsel:

> The Department should ensure that this requirement does not result in a program requirement to meet two separate sets of standards (both NRC and DOE), but should ensure a smooth transition for meeting NRC standards.

The SNFP has found that implementing NRC requirements on top of DOE requirements is often contentious and costly, both in terms of money and schedule. Other than public perception, obvious benefit is unclear and no major improvement in over-all project safety is obvious by implementing NRC requirements above and beyond those already required by the DOE. This then suggests that the key to safe facility construction lies with rigorous and competent implementation of sound safety requirements, no matter their source, rather than the pedigree of the requirements themselves.

Applying dual sets of DOE and NRC requirements can work for a DOE project. However, fundamental technical differences exist between the sets of requirements. Any project considering such a policy should do so only after careful assessment of the impacts weighed against the benefits.

The SNFP has found that establishing separate bodies for the approval and adjudication of NRC requirements is essential for any such program to succeed.

Recommendations:

A careful and methodical cost-benefits analysis of applying NRC regulations to a DOE project should be done before invoking such requirements. Substantial economic impact can occur to a project from applying NRC regulations. Understanding the degree of this impact is crucial in making an informed objective decision. Political expediency should not drive this decision.

Applying selected NRC requirements is much harder than simply invoking 10 CFR in toto for a project.

Applying DOE requirements in tandem with NRC regulations should be avoided. That is, a project should choose either to follow DOE requirements or NRC requirements, only. It is much simpler and efficient to invoke either DOE or NRC requirements, alone.

Spent Nuclear Fuel Project Process

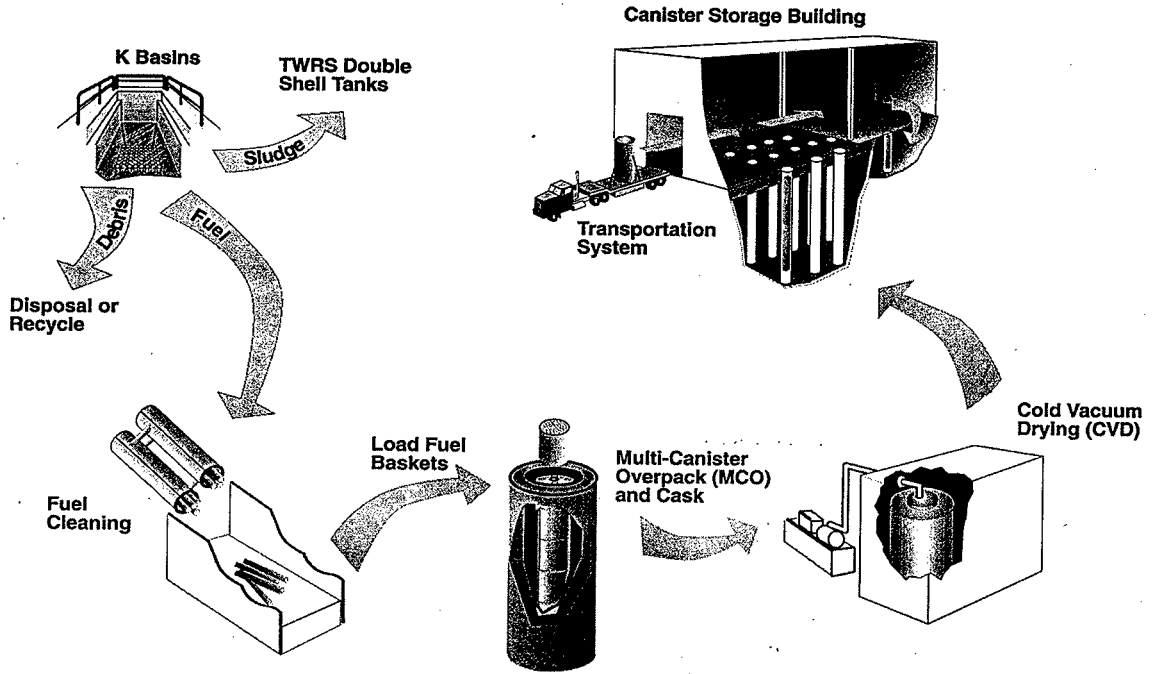

FIGURE ONE

ted States Government

APPENDIX
Department of Energy

nemorandum

DATE: July 20, 1995

REPLY TO ATTN OF: EM-36

SUBJECT: Concurrence with K-Basins Spent Nuclear Fuel Project Policy on Nuclear Safety Requirements

TO: Manager, DOE Richland Operations Office

As requested in your subject memorandum dated May 24, 1995, I am concurring with the K-Basins Spent Nuclear Fuel Project Regulatory Policy and its implementation using an Independent Review Panel. This policy has been reviewed and concurred with by the Office of Environment, Safety and Health.

In implementing this policy, the Richland Operations Office must ensure that the processes and requirements are both technically defensible and cost-effective.

If you have any questions, please contact me at 202-586-7710.

Thomas P. Grumbly
Assistant Secretary for
Environmental Management

Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

95-SFD-167

SEP 12 1995

President
Westinghouse Hanford Company
Richland, Washington

Dear Sir:

IMPLEMENTATION OF THE K BASINS SPENT NUCLEAR FUEL PROJECT (SNFP) REGULATORY POLICY

On July 20, 1995, Thomas P. Grumbly, Assistant Secretary for Environmental Restoration and Waste Management, concurred with the U.S. Department of Energy (DOE), Richland Operations Office (RL), K Basins SNFP Regulatory Policy. Tara O'Toole, Assistant Secretary for Environment, Safety and Health, has also concurred with the policy. The regulatory policy, which was prepared by an integrated team of Westinghouse Hanford Company (WHC), RL, and DOE Headquarters (EM and EH) personnel, establishes a challenging and aggressive safety policy for all new facilities that will be constructed by the SNFP to support our path forward.

Included as an enclosure to this letter is a copy of the policy to ensure that WHC management and staff, including subcontractors, involved with the SNFP are informed of this policy. By this letter, WHC is directed to provide, where relevant, copies of the policy to all affected SNFP personnel. RL would also encourage WHC to establish a forum wherein WHC employees have an opportunity to discuss any questions they may have with the individuals from your staff who collaborated in the formulation of the policy. Finally, WHC is directed to immediately integrate this policy into all WHC SNFP planning, design, implementation, and management activities.

If you have specific questions regarding this matter, please feel free to contact me on 376-7465 or Mr. Robert G. Holt, of my staff, on 376-9989.

Sincerely,

Elizabeth D. Sellers, Director
Spent Nuclear Fuels Project Division

SFD:RGH

Enclosure

cc w/encl:
J. C. Fulton, WHC

K BASIN SPENT NUCLEAR FUEL PROJECT - REGULATORY POLICY

Introduction

The Department of Energy (DOE) has established a program to move the Spent Nuclear Fuel (SNF) presently stored in K Basins to a new storage facility located in the 200 East Area of the Hanford Site. New facilities will be designed for safe conditioning and interim storage of the fuel.

The purposes of this document are to establish the DOE policy regarding regulatory requirements for the design and construction of the new facilities, to define terms, to identify key roles and responsibilities, and to outline the overall approach to be followed in implementing this regulatory policy.

DOE Policy for Safety of New Facilities

It is DOE's policy that the K Basin Spent Nuclear Fuel Project (SNFP) will achieve nuclear safety equivalence to comparable Nuclear Regulatory Commission (NRC)-licensed facilities. This will be accomplished by applying technical requirements based on those applied by the NRC to comparable licensed facilities and by adopting appropriate features of the NRC licensing process, in addition to applicable DOE Orders and requirements.

Policy Objectives

DOE has established this policy for three primary reasons:

- To achieve a set of requirements that are technically defensible and cost-effective.
- To achieve in the design and construction of new SNFP facilities a level of nuclear safety comparable to that of NRC licensed commercial nuclear facilities.
- To enhance public understanding and confidence in the safety of the new facilities by following an enhanced regulatory strategy.

Definitions

1. Safety Equivalence to NRC-Licensed Facilities

For the purpose of this policy, "safety equivalence to NRC-licensed facilities" is established for SNFP facilities by conformance to technical and administrative requirements as follows:

- Technical requirements which meet the nuclear safety objectives of NRC regulations for fuel treatment and storage facilities. These include requirements regarding radiation exposure limits, safety analysis, design and construction.

- Administrative requirements which meet the objectives of the major elements of the NRC licensing process. These include formally documented design and safety analyses, independent technical review, and opportunity for public involvement.

2. NRC Requirements for Comparable Facilities

The term "requirements" means design and construction measures which are specifically mandated by NRC regulations. Regulatory guidance and precedents, which are illustrative of implementation of the regulations, are considered optional rather than mandatory. The term "comparable facilities" in this case means SNF treatment and storage facilities.

Responsibilities

Overall DOE safety authority is held by the Secretary of Energy; for the K-Basin SNFP this authority is delegated to the Manager, RL. For implementation of this policy, roles and responsibilities are as outlined in the following table:

REGULATORY FUNCTION	RESPONSIBILITY	VEHICLE
Approval of this Policy	• RL approve • EM, and EH concur	Action Memorandum
Develop Regulatory Requirements	Contractor, with Regulatory Requirements Team (RRT)	Requirements identification process
Approve Regulatory Requirements	• RL approve • EM, and IRP concur • EH-O[2]	Regulatory Requirements Document, approved and controlled
Prepare and Issue Safety Analysis Report (SAR) and Technical Safety Requirements (TSRs)	• Contractor prepare • RL-SNFP review and issue	SAR/TSR transmittal
SAR Technical Review	• RL Technical Review Team[1] • EH-O[2] • IRP	Report documenting review process, findings, and resolution
SAR Approval	• RL approve • IRP concur	Approval Memorandum
Operational Readiness Review (ORR) and authorization to operate	• EH-O[2] • RL authorize operation	Action Memorandum based on readiness review
Public and Interested Group Reviews	SNFP	SNFP Communication Strategy
Inspection and Enforcement	EH	Inspection plan

[1] *The RL Technical Review team will be convened by RL's Office of Quality, Safety, and Health (RL-QSH) and will include technical specialists in the field of facility nuclear safety, from EH-T and other organizations as appropriate.*

[2] *Within EH, two organizational units serve separate and distinct functions. One of these, designated as EH-T, provides technical support; the other, designated as EH-O, provides independent oversight.*

The Process

This policy is to be applied to matters of nuclear safety (including radiological control issues) for new SNFP facilities. Its primary focus is on design and construction issues, and preparation for operations. The policy does not apply to environmental, OSHA, chemical accident safety, and other non-nuclear safety issues. (These are covered elsewhere by DOE Orders and statutory requirements.) Similarly, the kinds of life-of-facility oversight (e.g., operator training, performance assessment) applied by the NRC to their licensed facilities are not covered by this policy.

The major elements of the process are as follows:

- Proposed regulatory requirements will be developed by the contractor with the help of a Regulatory Requirements Team (RRT) comprised of individuals thoroughly familiar with the NRC and DOE regulatory requirements. DOE-RL will approve the requirements, with EM, EH, and IRP concurrence.

  The requirements development process will include high level screening of NRC regulations (10 CFR parts 0-199) to select those applicable to the SNF facilities, comparison with DOE requirements to identify significant areas of difference, and compilation of the composite set of requirements to be applied to the SNFP. NRC regulatory guidance will be used as needed to clarify the intent of those regulations and to provide insight into suitable methods of implementation. Engineering analysis will be utilized where necessary to develop new (or modified) requirements in areas where neither NRC or DOE requirements explicitly address K Basin SNFP technical issues.

- A Safety Analysis Report (SAR) and Technical Safety Requirements (TSRs) will be developed, formally documenting the proposed SNFP design implementation of the established requirements. The SAR and TSRs will be submitted by Contractor to the RL Technical Review Team and the IRP for review and comment.

- DOE independent oversight of this process will be provided by EH Oversight (EH-0). EH-0 will perform the responsibilities outlined in DOE Order 5480.23 (Safety Analysis Report) and DOE 5480.31 (Start up and Restart of Nuclear Facilities).

- EH technical support (EH-T) will provide technical support resources to supplement the resources of DOE-RL and EM in the development and review or safety documentation and technical requirements.

- Based on successful results, DOE-RL will authorize construction (KD-3), and then operation (KD-4), of the facilities, in accordance with DOE Order 4700.1.

DOE requirements are not set aside or superseded by this process; rather, along with applicable NRC regulations, they comprise the basis for SNFP facility design and construction.

Independent Review Panel

Beyond the independent oversight afforded by the DOE-EH involvement in the project as outlined above, an Independent Review Panel (IRP) will be convened by DOE to provide high level, external oversight of the implementation of this policy.

It is anticipated that this IRP will comprise three members selected for their stature, technical capability and experience applicable to the SNFP, and supported by staff as required. The IRP charter will include:

- evaluation and concurrence with the SNFP regulatory approach and methodology.
- evaluation and concurrence with the technical requirements established by the project.
- evaluation and concurrence with the SAR
- advice to DOE-RL, with respect to final approval to operate the SNFP facilities.

The IRP's input must be considered and formally resolved by the Manager, RL, as a prerequisite to finalization of requirements, approval of the SAR, and authorization to operate facilities.

Conclusion

The intended outcome of this policy is to ensure that SNFP designs meet the nuclear safety objectives of the applicable NRC requirements. Rugged, conservative designs, with clear capability to accommodate postulated accidents, will provide the best confidence that the SNFP designs are equivalent to NRC licensed ones, from a nuclear safety standpoint.

SPENT NUCLEAR FUEL PROJECT PATH FORWARD

ADDITIONAL NRC REQUIREMENTS

~~September~~ ~~January~~ 1998

Spent Nuclear Fuel Project Path Forward

Additional NRC Requirements

Contents

Spent Nuclear Fuel Project Path Forward

Additional NRC Requirements

I. Introduction and Purpose

The U.S. Department of Energy (DOE), established in the "K Basin Spent Nuclear Fuel Project - Regulatory Policy," dated August 4, 1995 (hereafter referred to as the Policy), the requirement for new Spent Nuclear Fuel (SNF) Project facilities to achieve "nuclear safety equivalency" to comparable U.S. Nuclear Regulatory Commission (NRC)-licensed facilities. An evaluation was performed to identify any additional NRC requirements needed, in combination with the existing and applicable DOE requirements, to establish nuclear safety equivalency. The results (titled "Actions for Consideration") and process used to identify these NRC requirements were documented in WHC-SD-SNF-DB-002, *Spent Nuclear Fuel Project Path Forward Nuclear Safety Equivalency to Comparable NRC-Licensed Facilities.*

This document, *Spent Nuclear Fuel Project Path Forward, Additional NRC Requirements*, presents the SNF Project's position on each Action for Consideration, with exception to the design earthquake, and transforms those identified for implementation into a requirements format. At this time the issue of the appropriate design earthquake is addressed in detail in a separate document, WHC-SD-SNF-DB-004, *Spent Nuclear Fuel Project Seismic Design Criteria, Nuclear Regulatory Commission Equivalency Evaluation Report.*

II. Scope

In accordance with the Policy, the scope of potentially applicable NRC technical requirements encompasses the design and construction measures (as opposed to also including preoperational or operational measures) mandated by the NRC regulations as defined, for the purposes of this evaluation, in Title 10, *Code of Federal Regulations*, Parts 0 through 199, revised as of January 1, 1995. In addition, NRC guidance (located in NRC public document rooms as of September 18, 1995) that may have direct application to SNF Project design and construction activities, was reviewed as a prudent step in implementing the Policy's objectives.

In implementing the Policy, nuclear safety equivalency is being established on a one-time basis with respect to the NRC regulations and guidance, based on the dates in the preceding paragraph. Future changes to DOE requirements used to establish nuclear safety equivalency (e.g., if DOE 5480.7A was reissued as DOE 5480.7B)need to be reviewed to ensure that nuclear safety equivalency has been preserved through the use of the new order, or the relevant historical DOE requirements, now deleted in the new order, would need to be specifically identified as a separate SNF Project-specific requirement and

implemented accordingly. This latter control must be applied to Project Hanford Management Contractor procedures and instructions as well where such documents were used to establish nuclear safety equivalency.

Further, the additional NRC requirements identified herein apply to the Canister Storage Building (CSB) and Cold Vacuum Drying (CVD) facility~~, and Hot Conditioning System (HCS, also referred to as the CSB Annex)~~. In addition, three selected additional NRC requirements (items 16, 18, and 27 in Table 1) also apply to the K Basin Fuel Retrieval System (FRS) and post-FRS fuel handling activities to the point the multi-canister overpack (MCO) cask is on the transport vehicle. These requirements are relevant to meeting the fuel end-point criteria that are important to downstream fuel conditioning processes (e.g., the amount of retained sludge after fuel cleaning), or are important to compliance with NRC nuclear safety requirements in later activities (i.e., a $K_{eff} \leq 0.95$). DOE requirements apply to all SNF Project activities.

III. Results

The additional NRC requirements were consolidated into 29 items. All items will be implemented to comply with NRC regulations with exception to the design earthquake, which is being implemented in a manner that establishes equivalence in safety, as opposed to direct equivalence to the regulation. As mentioned above, the seismic issue is presented in detail in WHC-SD-SNF-DB-004.

Table 1 identifies the disciplines responsible for implementation of the requirements (e.g., civil structural and mechanical) to help facilitation by the end user. Where the table includes references, this does not imply that the identified additional NRC requirements and related DOE requirements necessarily satisfy the requirements of the references, or even that the SNF Project Path Forward must satisfy the requirements of the references. It simply notes where the basic issue is raised and where the reader may refer to WHC-SD-SNF-DB-002, and NRC regulations and guidance for related information.

Recognizing that the designs and safety analyses of the CSB and CVD facility ~~and HCS~~ will evolve further and be refined as the engineering progresses (e.g., the number and nature of active and passive systems and the safety-class designation of systems and components), the SNF Project may need to revisit the results (additional NRC requirements) of this document and make revisions as appropriate with DOE approval.

Table 1. Additional NRC Requirements.

Responsible Discipline (Applicability)	Additional NRC Requirements	Related DOE/PHMC References
1. Civil/Structural and Mechanical (CSB, CVD~~, HCS~~)	The final designs of the CSB and CVD facility~~, and HCS~~ shall be reevaluated to reconfirm that DOE Orders 5480.7A and 6430.1A provide adequate fire protection requirements to achieve nuclear safety equivalence. Aspects of the designs to reconfirm are the use of a passive cooling system for MCO cooling in the CSB and the lack of safety-class prevention or mitigation systems in the CSB and CVD facility~~, or HCS~~. For additional information, refer to WHC-SD-SNF-DB-002, *Spent Nuclear Fuel Project Path Forward Nuclear Safety Equivalency to Comparable NRC-Licensed Facilities*, Table 5.b, and 10 CFR 50.48, and 10 CFR 50, Appendix R. Further, fire protection requirements considered for incorporation into the design of the CSB and CVD facility~~, and HCS~~ should take into account the implementation of 10 CFR 72.122© to date for licensed independent spent fuel storage installations. (References: 10 CFR 50.48, "Fire Protection," Part 50, Appendix R, "Fire Protection for Nuclear Power Facilities Operating Prior to January 1, 1979," and 10 CFR 72.122(c), "Protection against Fires and Explosions")	DOE 5480.7A DOE 6430.1A
NOTE: Only the lead responsible disciplines are listed. It is assumed these disciplines will coordinate efforts of additional support disciplines as needed.		

Table 1. Additional NRC Requirements.

Responsible Discipline (Applicability)	Additional NRC Requirements	Related DOE/PHMC References
2. Civil/Structural and Mechanical (CSB, CVD~~, HCS~~)	Adopt the seismic criteria outlined in WHC-SD-SNF-DB-004, *Spent Nuclear Fuel Project Seismic Design Criteria, Nuclear Regulatory Commission Equivalency Evaluation Report* for the design of the CSB and CVD facility~~, and HCS~~. Incorporate a design basis tornado (including translational velocity, rotational velocity, and pressure differential) and tornado missile for safety-class SSCs into the designs of the CSB and CVD facility~~, and HCS~~ taking into consideration the most recent version of NRC Regulatory Guide 1.76, *Design Basis Tornado for Nuclear Power Plants*, SECY-93-087, *Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Light-Water Reactor (ALWR) Designs*, and NUREG/CR-4461, *Tornado Climatology of the Contiguous United States* (potential revisions to Standard Review Plan 3.5.1.4, Revision 2, *Missiles Generated by Natural Phenomena*). Refer to WHC-SD-SNF-DB-002, *Spent Nuclear Fuel Project Path Forward Nuclear Safety Equivalency to Comparable NRC-Licensed Facilities*, Table 5.c, and to 10 CFR 72.24 and 72.122, for related information. The designs of (1) the CSB ~~and HCS~~ and (2) K Basins and the CVD facility shall ensure that sharing of common utilities and services and physical interaction between the facilities do not impair the capability of either facility to perform its safety functions.	DOE 5480.28 and companion standards DOE 6430.1A SDC 4.1, Rev.12
2. Civil/Structural and Mechanical (Continued)	Incorporate the ability for ready retrieval of MCOs into the design of the CSB. (References: Title 10, *Code of Federal Regulations,* Sections 72.24, "Contents of application: Technical information," 72.90, "General considerations," 72.92, "Design basis external natural events," 72.102, "Geological and seismological characteristics," 72.122, "Overall requirements," and 72.212, "Conditions of general license issued"; NRC Regulatory Guides 1.60, *Design Response Spectra for Seismic Design of Nuclear Power Plants* [Revision 1], 1.61, *Damping Values for Seismic Design of Nuclear Power Plants* (Revision 0), and 3.48, *Standard Format and Content for the Safety Analysis Report for an Independent Spent Fuel Storage Installation (Dry Storage)* [Revision 1]; and SECY-93-087, *Policy, Technical, and Licensing Issues Pertaining to Evolutionary and Advanced Designs*)	

Table 1. Additional NRC Requirements.

Responsible Discipline (Applicability)	Additional NRC Requirements	Related DOE/PHMC References
3. Electrical (CSB, CVD~~, HCS~~)	In the event that safety-class electrical equipment may be required and may be exposed to harsh environments for the CSB and CVD facility~~, and HCS~~ during off-normal or postulated accident conditions, the following are additional NRC requirements. Ensure that the electrical equipment qualification program includes the requirements of 10 CFR 50.49 that are missing from DOE 6430.1A~~, and~~ HNF-PRO-097, *Engineering Design and Evaluation*, and HNF-PRO-704, *Hazard and Accident Analysis Process*~~, WHC-CM-4-46, *Safety Analysis Manual*, Section 9.0, "Safety Classification of Structures, Systems, and Components," Appendix B, "Design Criteria."~~ For safety-class equipment, non-safety class equipment that could, upon failure, adversely impact safety-class equipment in performance of its safety function, and certain post-accident monitoring equipment, as described in NRC Regulatory Guide 1.97, these requirements include (1) review of 10 CFR 50.49(e)(5) and Regulatory Guide 1.89 during the design process to determine the aging requirements for such electrical equipment, and (2) testing requirements provided in 10 CFR 50.49(f)(1-4). For additional information, refer to WHC-SD-SNF-DB-002, *Spent Nuclear Fuel Project Path Forward Nuclear Safety Equivalency to Comparable NRC-Licensed Facilities,* Table 5.b, 10 CFR 50.49, and Attachment A, "Detailed Evaluations, Environmental Qualification of Electrical Equipment." (References: 10 CFR 50.49, "Environmental qualification of electrical equipment," and NRC Regulatory Guides 1.89, *Environmental Qualification of Certain Electrical Equipment Important to Safety for Nuclear Power Plants* [Revision 1], and 1.97, *Instrumentation for Light Water Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident* [Revision 3])	DOE 6430.1A DOE-STD-3009-94 ~~WHC-CM-4-46, Section 9.0~~ HNF-PRO-097 HNF-PRO-704
4. Electrical (CSB, CVD~~, HCS~~)	Include in the SNF Project Path Forward Integrated Safety Management Plan or the SAR Preparation Plans, the requirement for the SARs that address the CSB and CVD facility~~, and HCS~~ to evaluate a loss of ac power to the facility. The design of the CSB and CVD facility~~, and HCS~~ should respond as needed for accident prevention and mitigation. (References: 10 CFR 50.63, "Loss of all alternating current power")	DOE 5480.23 DOE 6430.1A DOE-STD-3009-94

Table 1. Additional NRC Requirements.

Responsible Discipline (Applicability)	Additional NRC Requirements	Related DOE/PHMC References
5. Electrical (CSB, CVD~~, HCS~~)	For the CSB and CVD facility~~, and HCS~~, incorporate the requirements of IEEE Standard 484-1987, *IEEE Recommended Practices for Installation Design and Installation of Large Lead Storage Batteries for Generation Stations and Substations,* into the design and installation of safety-class batteries. (References: NRC Regulatory Guide 1.128, *Installation Design and Installation of Large Lead Storage Batteries for Nuclear Power Plants* [Revision 1])	DOE 6430.1A
6. Electrical (CSB, CVD~~, HCS~~)	For the CSB and CVD facility~~, and HCS~~, incorporate the requirements of IEEE Standard 535-1986, *IEEE Standard for Qualification of Class 1E Lead Storage Batteries for Nuclear Power Generating Stations*, for the qualification of safety-class lead storage batteries. (References: NRC Regulatory Guide 1.158, *Qualification of Safety-Related Lead Storage Batteries for Nuclear Power Plants* [Revision 0])	DOE 6430.1A
7. Instrumentation and Controls (CSB, CVD~~, HCS~~)	For the CSB and CVD facility~~, and HCS~~, incorporate into the design for safety-class instrumentation and control systems, the requirements of IEEE Standard 603-1991, *IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations.* (References: 10 CFR 50.55a, "Codes and standards," and NRC Regulatory Guide 1.153, *Criteria for Power, Instrumentation, and Control Portions of Safety Systems* [Revision 0])	DOE 6430.1A

Table 1. Additional NRC Requirements.

Responsible Discipline (Applicability)	Additional NRC Requirements	Related DOE/PHMC References
8. Instrumentation and Controls (CSB, CVD~~, HCS~~)	For the CSB and CVD facility~~, and HCS~~, incorporate the requirements of ANSI/ANS-8.3-1986, *Criticality Accident Alarm System*, into the design. (Note: using the MCO design, which includes the basket configuration, and the quantities and form of the K Basin fuel, evaluate these features as a basis for not incorporating criticality accident alarm systems in the CSB and CVD facility~~, and HCS~~, based on demonstrating through safety analyses documented in the associated SARs that criticality is not possible. As the design progresses, reconfirm the evaluation results.) Refer to WHC-SD-SNF-DB-002, *Spent Nuclear Fuel Project Path Forward Nuclear Safety Equivalency to Comparable NRC-Licensed Facilities*, Table 6.a, and NRC Regulatory Guide 8.12 for additional information. (References: NRC Regulatory Guides 8.5, *Criticality and Other Interior Evacuation Signals* [Revision 1], and 8.12, *Criticality Accident Alarm Systems* [Revision 2], and 10 CFR 70.24, "Criticality accident requirements," and 10 CFR 72.124, "Criteria for nuclear criticality safety")	DOE 5480.24 DOE 6430.1A ~~WHC-CM-4-29 (manual - rev. 4/17/95)~~ HNF-PRO-546
9. Instrumentation and Controls (CSB, CVD~~, HCS~~)	For the CSB and CVD facility~~, and HCS~~, review the NRC guidance of NUREG-0700 and Standard Review Plan 18.1 against DOE 6430.1A, Section 1300-12.4 and the DOE draft standard, *Human Factors Engineering Design Criteria: Volume I, General Criteria*, to identify appropriate additional NRC guidance for design of these facilities. The reviews should give consideration to the differences in complexity between power reactor control rooms and those of the CSB and CVD facility~~, and HCS~~. (References: NUREG-0700, *Guidelines for Control Room Design Reviews*, and Standard Review Plan 18.1, *Control Room* [Revision 0])	DOE 6430.1A
10. Mechanical (CSB, CVD~~, HCS~~)	For the CSB and CVD facility~~, and HCS~~, use NRC Regulatory Guide 1.26 to assist in assigning the appropriate code class to ASME *Boiler and Pressure Vessel Code*, Section III systems and components. (References: NRC Regulatory Guide 1.26, *Quality Group Classifications and Standards for Water, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants* [Revision 3])	DOE 6430.1A

Table 1. Additional NRC Requirements.

Responsible Discipline (Applicability)	Additional NRC Requirements	Related DOE/PHMC References
11. Mechanical (CSB, CVD~~, HCS~~)	For the CSB and CVD facility~~, and HCS~~, review the NRC positions in Regulatory Guides 1.84 and 1.85 on ASME *Boiler and Pressure Vessel Code*, Section III code cases before using such code cases for safety-class applications. The NRC positions on applicable code cases should be used in the designs. Where no NRC position is stated in regards to the acceptance of a code case, that code case may be used as approved by the code committee. (References: NRC Regulatory Guides 1.84 and 1.85 [both Revision 30], *Design and Fabrication Code Case Acceptability ASME Section III, Division 1*, and *Materials Code Case Acceptability ASME Section III, Division 1*)	DOE 6430.1A
12. Mechanical (CSB, CVD~~, HCS~~)	For the CSB and CVD facility~~, and HCS~~, ensure the requirements of ANSI/ANS N509-1989, *Nuclear Power Plant Air-Cleanup Units and Components*, and ANSI/ANS N510-1989, *Testing of Nuclear Air Treatment Systems*, are incorporated into the design of safety-significant and non-safety class HVAC systems used to achieve onsite radiological limits or to implement the principals of ALARA. (References: NRC Regulatory Guide 1.140, *Design, Testing, and Maintenance Criteria for Normal Ventilation Exhaust System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants* [Revision 1])	DOE 6430.1A
13. Mechanical (CSB, CVD~~, HCS~~)	For the CSB and CVD facility~~, and HCS~~, incorporate the design requirements of ANSI/ANS-57.1, *Design Requirements for Light Water Reactor Fuel Handling System*, and ANSI/ANS-57.2, *Design Requirements for Light Water Reactor Spent Fuel Storage Facilities at Nuclear Power Plants*. (This only applies to new facilities that will include the capabilities to lift MCOs or MCO casks, not to K Basins.) (References: NRC Standard Review Plan 9.1.5, *Overhead Heavy Load Handling Systems* [Revision 0]; NUREG-0554, *Single Failure Proof Cranes for Nuclear Power Plants*; and NUREG-0612, *Control of Heavy Loads at Nuclear Power Plants, Resolution of Generic Technical Activity A-36*)	DOE 6430.1A

Table 1. Additional NRC Requirements.

Responsible Discipline (Applicability)	Additional NRC Requirements	Related DOE/PHMC References
14. Mechanical (CSB, CVD~~, HCS~~)	For the CSB and CVD facility~~, and HCS~~, incorporate applicable design requirements of NRC Generic Letters 88-14, 89-10 and 89-13 into safety-class instrument air systems, motor-operated valves, and open-cycle cooling water systems, respectively. (References: NRC Generic Letters 88-14, *Instrument Air Supply System Problems Affecting Safety-Related Equipment*; 89-10, *Safety-Related Motor-Operated Valve Testing and Surveillance 10 CFR 50.54(f)*, with supplements; and 89-13, *Service Water System Problems Affecting Safety-Related Equipment*)	DOE 6430.1A
15. Programs/Management (CSB, CVD~~, HCS~~)	For the CSB and CVD facility~~, and HCS~~, incorporate a requirement into safety-class procurement specifications that requires suppliers to report defects and noncompliances in items or services. The requirement should be similar to the following: Safety-class equipment and/or services furnished under this order are subject to reporting of defects. If equipment and/or services contain defects that could cause a substantial safety hazard, then immediate reporting to the Buyer is required unless the Seller has actual knowledge that the Buyer has been adequately informed of such defect. The Seller shall evaluate identified or suspected defects. If the Seller's evaluation determines a defect does exist that could cause a substantial safety hazard, then the Seller shall notify the Buyer as soon as practicable and, in all cases, within 5 working days following completion of the evaluation. If the Seller determines that it does not have the capability to perform the evaluation, the Seller may request the buyer to cause an evaluation to be performed. Seller's request shall be effected within 5 working days of this determination. If the Seller elects to have the Buyer perform the evaluation, then all necessary and pertinent information and correspondence shall be sent to the Buyer. Results of evaluations by the Buyer will be transmitted to the Seller. (References: 10 CFR 21, "Reporting of Defects and Noncompliance")	~~WHC-CM-2-1~~ ~~WHC-CM-4-2~~ HNF-PRO-298

Table 1. Additional NRC Requirements.

Responsible Discipline (Applicability)	Additional NRC Requirements	Related DOE/PHMC References
16. Programs/Management (DOE Action - CSB, CVD, ~~HCS~~ and K Basin FRS and post-FRS fuel handling activities)	Before implementation, the DOE-Richland Operations Office will review and approve any changes to WHC-SP-1131, *Quality Assurance (QA) Program and Implementation Plan*, for the SNF Project that could be interpreted as decreasing the Quality Assurance Program's existing commitments for the SNF Project. (Note: HNF-SP-1228, *Quality Assurance Program Implementation Plan for Nuclear Facilities*, is in the process of being revised for subsequent approval by DOE-RL. Nuclear facility lists and descriptions from WHC-SP-1131 are being relocated to ES&H nuclear safety documents. WHC-SP-1131 remains in effect until DOE-RL approval is secured for HNF-SP-1228 and facility lists and descriptions are relocated to ES&H nuclear safety documents.) (References: 10 CFR 50.54(a), "Conditions of licenses [Quality Assurance Provisions]")	10 CFR 830.120
17. Programs/Management (CSB, CVD~~, HCS~~)	Implement the PHMC Occurrence Reporting System for the design and construction of the CSB and CVD facility~~, and HCS~~. (References: 10 CFR 50.55(e), "Conditions of construction permits")	DOE 5000.3B ~~WHC-CM-1-5, Section 7.1, Rev.0~~ HNF-PRO-060

Table 1. Additional NRC Requirements.

Responsible Discipline (Applicability)	Additional NRC Requirements	Related DOE/PHMC References
18. Programs/Management (CSB, CVD, ~~HCS~~ and K Basin FRS and post-FRS fuel handling activities)	For the CSB, CVD facility, ~~HCS,~~ and K Basin FRS and post-FRS fuel handling activities, ensure the appropriate quality requirements in existing PHMC procedures and instructions remain in effect (e.g., in SNF Project-specific documents). These procedures and instructions and the subject requirements are identified in WHC-SD-SNF-DB-002, *Spent Nuclear Fuel Project Path Forward Nuclear Safety Equivalency to Comparable NRC-Licensed Facilities*, Attachment A, "Detailed Evaluations, Quality Assurance Criteria." (References: 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," and 10 CFR 72, Subpart G, "Quality Assurance")	10 CFR 830.120 DOE 4700.1 WHC-CM-4-2 ~~QR 1.0, Rev.4~~ ~~QR 3.0, Rev.5~~ ~~QR 4.0, Rev.4~~ ~~QR 7.0, Rev.4~~ ~~QR 9.0, Rev.4~~ ~~QR 10.0, Rev.3~~ ~~QR 14.0, Rev.5~~ QI 7.2, Rev.5 HNF-MP-599 HNF-PRO-297 ~~WHC-CM-4-46, Section 9.0~~ ~~WHC-CM-6-1 (manual rev. 8/8/95)~~ HNF-PRO-097 HNF-PRO-227 HNF-PRO-239 through HNF-PRO-244 HNF-PRO-317 ~~HNF-PRO-439~~ through HNF-PRO-448 HNF-PRO-488 ~~WHC-IP-1026 (manual rev. 7/10/95)~~ (Note: In accordance with HNF-MD-039, Revision 1, WHC-CM-4-2 remains in effect as a reference document for screening potential Price-Anderson Amendment Act noncompliances and to support safety basis documents.

Table 1. Additional NRC Requirements.

Responsible Discipline (Applicability)	Additional NRC Requirements	Related DOE/PHMC References
19. Programs/Management (CSB, CVD~~, HCS~~)	Institute a process to identify safety-class equipment that has been identified in the commercial nuclear power industry, via NRC Inspection and Enforcement Bulletins and Notices, as being potentially defective. Ensure the areas of vendor and subcontractor quality assurance records and control of safety-class purchased material, equipment, and services receive emphasis during SNF Project audits, surveillances, and assessments. (References: IEN 95-29 and a number of NRC Inspection and Enforcement Bulletins and Notices addressing procurement of potentially defective equipment)	~~PHMC Procurement clauses~~ HNF-PRO-268 HNF-PRO-301 HNF-PRO-298 HLAN Quality Clauses (located on HLAN) HNF-1613, EP-5.3
20. Radiological Protection (CSB, CVD~~, HCS~~)	For the CSB and CVD facility~~, and HCS~~, incorporate control devices for access to high-radiation areas that conform to the requirements of 10 CFR 20.1601. 10 CFR 20.1601 requires control devices to all high-radiation areas, defined in Section 20.1003 to be 0.1 rem in 1 hour at 30 cm, whereas 10 CFR 835 does not require incorporation of control devices until the dose rate in an accessible area reaches 1 rem in 1 hour at 30 cm. Control devices are hardware features, such as alarms or locked entryways, as opposed to administrative controls. For the CSB and CVD facility~~, and HCS~~, incorporate into the design the 10 CFR 20.1301 hourly dose limit of 0.002 rem to the public for any unrestricted area from external sources during normal operations and anticipated occurrences. (References: 10 CFR 20, "Standards for Protection Against Radiation," and 10 CFR 72.126, "Criteria for radiological protection")	10 CFR 835 DOE 5480.11 Hanford Site Radiological Control Manual (HSRCM-1)

Table 1. Additional NRC Requirements.

Responsible Discipline (Applicability)	Additional NRC Requirements	Related DOE/PHMC References
21. Radiological Protection (CSB, CVD~~, HCS~~)	Apply the radiological exposure criteria of 10 CFR 72.104 to the design and safety analyses of the CSB and CVD facility~~, and HCS~~. These criteria apply during normal operations and anticipated occurrences to any real individual of the public. These annual dose-equivalent criteria are 25 mrem to the whole body, 75 mrem to the thyroid, and 25 mrem to any other critical organ. (Note: existing DOE requirements are 25 mrem to the whole body and 75 mrem to any critical organ.) (References: 10 CFR 72.100, "Defining potential effects of the ISFSI or MRS on the region"; 10 CFR 72.104, "Criteria for radioactive materials in effluents and direct radiation from an ISFSI or MRS"; and 10 CFR 72.126, "Criteria for radiological protection")	DOE 5400.5 DOE 5480.23 DOE 6430.1A DOE-STD-3009-94

Table 1. Additional NRC Requirements.

Responsible Discipline (Applicability)	Additional NRC Requirements	Related DOE/PHMC References
22. Radiological Protection	This additional NRC requirement was deleted because of changing how the "important to safety" criteria of 10 CFR 72, are applied. Refer to item 29.	
23. Radiological Protection (CSB, CVD~~, HCS~~)	For the CSB and CVD facility~~, and HCS~~, incorporate the requirements of NRC Regulatory Guide 8.8 into the design. (Note: DOE 6430.1A-1540-99.0.6 references Regulatory Guide 8.8 for piping design considerations for systems that carry radioactive material.) (References: NRC Regulatory Guide 8.8, *Information Relative to Ensuring that Occupational Radiation Exposures at Nuclear Power Stations Will be as Low as Reasonably Achievable* [Revision 3])	DOE 5480.11 DOE 6430.1A 10 CFR 835 HSRCM-1
24. Safety Documentation (CSB, CVD~~, HCS~~)	Include in the SNF Project Path Forward Integrated Safety Management Plan the requirement to provide for the CSB SAR the information called for in 10 CFR 72.24 and NRC Regulatory Guide 3.48 that is not required in DOE 5480.23 and DOE-STD-3009-94 and that is unique to spent nuclear fuel storage. For further information, refer to WHC-SD-SNF-DB-002, *Spent Nuclear Fuel Project Path Forward Nuclear Safety Equivalency to Comparable NRC-Licensed Facilities*, Table 5.c, and 10 CFR 72.24. Further, as the Hanford Site evolves, public health and safety must be revisited, and probable uses of Hanford Site lands in the future should be considered in the design bases of the CSB and CVD facility~~, and HCS~~ at this time. Include in the SNF Project Path Forward Integrated Safety Management Plan the requirement to provide for the CVD facility ~~and HCS~~ SAR, in consideration of conditioning processes and safety features, relevant information called for in NRC Regulatory Guide 3.26 that is not required in DOE 5480.23 and DOE-STD-3009-94 and that is unique to the conditioning processes. (The review to identify any additional applicable information for the CVD facility ~~or HCS~~ SAR should not occur until the associated processes and safety features are better defined.) (References: 10 CFR 50.34, "Contents of an application: Technical information"; NRC Regulatory Guide 3.26, *Standard Format and Content of Safety Analysis Reports for Fuel Reprocessing Plants* [Revision 0]; NRC Regulatory Guide 3.48, *Standard Format and Content for the Safety Analysis Report for an Independent Spent Fuel Storage Installation (Dry Storage)* [Revision 1]; and 10 CFR 72.24, "Contents of an application: Technical information," and 10 CFR 72.98, "Identifying regions around an ISFSI or MRS site")	DOE 5480.23 DOE-STD-3009-94

Table 1. Additional NRC Requirements.

Responsible Discipline (Applicability)	Additional NRC Requirements	Related DOE/PHMC References
25. Safety Documentation (CSB, CVD~~, HCS~~)	For the CSB and CVD facility~~, and HCS~~, review the effluent monitoring requirements of, for example 10 CFR 20, 10 CFR 70.59 and 10 CFR 835, to provide the necessary monitoring instrumentation. (For the CSB, this may apply as a result of MCOs being vented at any time while in the CSB.) (References: 10 CFR 50.36a, "Technical specifications on effluents from power reactors," and 10 CFR 70, "Domestic Licensing of Special Nuclear Material")	DOE 5480.22 DOE 5480.23
26. Safety Documentation (CVD~~, HCS~~)	During final design of the CVD facility~~ and HCS~~, review (1) the conclusions of Attachment A, "Detailed Evaluations," to WHC-SD-SNF-DB-002, *Spent Nuclear Fuel Project Path Forward Nuclear Safety Equivalency to Comparable NRC-Licensed Facilities*, and (2) the general design criteria of 10 CFR 50, Appendix A, to determine whether NRC nuclear safety equivalency is achieved without application of any of the general design criteria of 10 CFR 50, Appendix A. (References: 10 CFR 50, Appendix A, "General Design Criteria for Nuclear Power Plants")	DOE 6430.1A
27. Safety Documentation (CSB, CVD, ~~HCS~~ and K Basin FRS and post-FRS fuel handling activities)	Incorporate a criticality safety value of 0.95 for k_{eff}. (This requirement applies at the point the spent fuel, in an MCO basket, is placed in an MCO.) (References: NRC Standard Review Plan 9.1.2, *Spent Fuel Storage* [Revision 3], and NUREG-0612, *Control of Heavy Loads at Nuclear Power Plants, Resolution of Generic Technical Activity A-36*)	DOE 5480.24 ~~WHC-CM-4-29 (manual rev. 4/17/95)~~ HNF-PRO-062 HNF-PRO-334 ~~HNF-PRO-430~~ HNF-PRO-517 HNF-PRO-537 through HNF-PRO-550 HNF-PRO-700 through HNF-PRO-705
28. Safety Documentation (CSB)	For the CSB, review ANSI/ANS-57.9-1992, *Design Criteria for an Independent Spent Fuel Storage Installation (Dry Type)*, to identify any additional requirements that would need to be incorporated into the design to demonstrate nuclear safety equivalency. (References: NRC Regulatory Guide 3.60, *Design of an Independent Spent Fuel Storage Installation (Dry Storage)* [Revision 0])	DOE 6430.1A

Table 1. Additional NRC Requirements.

Responsible Discipline (Applicability)	Additional NRC Requirements	Related DOE/PHMC References
29. Safety Documentation (CSB, CVD~~, HCS~~)	~~Identify SSCs "important to safety" in accordance with 10 CFR 72.3, as implemented through 10 CFR 72.106. Once SSCs "important to safety" have been identified, impose the requirements for safety-class SSCs as defined in WHC-CM-4-46, *Safety Analysis Manual*, Section 9.0, "Safety Classification of Structures, Systems and Components."~~ Identify SSCs "important to safety" in accordance with 10 CFR 72.3. Once SSCs are identified as having a function meeting the definition of important-to-safety, impose the requirements for SSCs important to safety specified in 10 CFR 72. A graded approach is applied to an SSC important to safety by using the guidance provided in NUREG/CR-6407, *Classification of Transportation Packaging and Dry Spent Fuel Storage Systems*, as follows. • **Category A - Critical to Safe Operation** SSCs in this category include those whose failure or malfunction could directly result in a condition adverse to public health and safety. Important-to-safety SSCs in this category are classified as safety class as defined in DOE Order 6430.1A, with the additional requirements therein. • **Category B - Major Impact on Safety** SSCs in this category include those whose failure or malfunction could result in a condition adversely affecting collocated worker health and safety. Note that from the definition of Category C, Category B is understood to include events that could significantly damage the MCO without severe impact to public health and safety. SSCs in this category are classified as safety significant as defined in DOE-STD-3009-94. • **Category C - Minor Impact on Safety** SSCs whose failure or malfunction would not significantly reduce the containment and would not be likely to create a situation adversely affecting public or collocated workers' health and safety. SSCs in this category are classified as safety class 3 (nonsafety) as defined in DOE Order 6430.1A.	DOE 6430.1A ~~WHC-CM-4-46 Section 9.0; Section 7.0 is superseded by 97-SFD-034 for the SNF Project~~ ~~HNF-PRO-097~~ HNF-PRO-704

Table 1. Additional NRC Requirements.

Responsible Discipline (Applicability)	Additional NRC Requirements	Related DOE/PHMC References
29. Safety Documentation (CSB) (Continued)	Worker safety issues are addressed through DOE Orders 6430.1A and 5480.23 and DOE-STD-3009-94. (References: 10 CFR 72.3, "Definitions," 10 CFR 72.106, "Controlled area of an ISFSI or MRS," and 10 CFR 72.122, "Overall requirements")	

ALARA = as low as reasonably achievable.
ASME = American Society of Mechanical Engineers.
CFR = *Code of Federal Regulations*.
CSB = Canister Storage Building.
CVD = Cold Vacuum Drying (Facility).
DOE = U.S. Department of Energy.
DOE-RL =U.S. Department of Energy, Richland Operations Office.
ES&H = Environment, Safety and Health.
FRS = fuel retrieval system.
~~HCS = Hot Conditioning System.~~
HLAN = Hanford Local Area Network
IEEE = Institute of Electrical and Electronic Engineering.
MCO = multi-canister overpack.
NRC = U.S. Nuclear Regulatory Commission.
PHMC = Project Hanford Management Contractor.
SAR = safety analysis report.
SNF = spent nuclear fuel.
SSC = structure, system, and component.