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1	1	Design Authority L. H. Goldmann 11/3/98			SNF Project Files R3-11
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1	1	Cog. Mgr. J. D. Cloud 10-11-98			
1	1	QA C R Hoover 10-13-98			
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18.	19.	20.	21. DOE APPROVAL (if required)
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ASME CODE REQUIREMENTS FOR MULTI-CANISTER OVERPACK DESIGN AND FABRICATION

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Abstract: The baseline requirements for the design and fabrication of the MCO include the application of the technical requirements of the ASME Code, Section III, Subsection NB for containment and Section III, Subsection NG for criticality control. ASME Code administrative requirements, which have not historically been applied at the Hanford site and which have not been required by the U.S. Nuclear Regulatory Commission (NRC) for licensed spent fuel casks/canisters, were not invoked for the MCO. As a result of recommendations made from an ASME Code consultant in response to DNFSB staff concerns regarding ASME Code application, the SNF Project will be making the following modifications:

- Issue an ASME Code Design Specification and Design Report, certified by a Registered Professional Engineer
- Require the MCO fabricator to hold ASME Section III or Section VIII, Division 2 accreditation
- Use ASME Authorized Inspectors for MCO fabrication

Incorporation of these modifications will ensure that the MCO is designed and fabricated in accordance with the ASME Code. Code Stamping has not been a requirement at the Hanford site, nor for NRC licensed spent fuel casks/canisters, but will be considered if determined to be economically justified.

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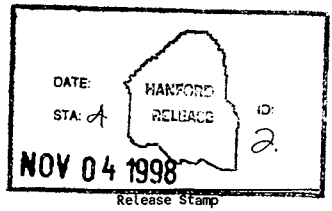
Release Approval Date



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Issue Closure Package

Issue: ASME Code Application

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SPENT NUCLEAR FUEL PROJECT

DISCUSSION OF ASME CODE REQUIREMENTS FOR MULTI-CANISTER OVERPACK DESIGN AND FABRICATION

I. INTRODUCTION

The Spent Nuclear Fuel (SNF) Multi-Canister Overpack (MCO) is a key component in the effort to move K Basins fuel to safe dry storage on the Hanford site. The MCO is used to contain and maintain fuel in a critically safe array during loading at the K Basins, drying operations at the Cold Vacuum Drying (CVD) Facility, transport to the Canister Storage Building (CSB), and interim storage at the CSB. The MCO interfaces with nearly every system and facility within the SNF Project. In order to ensure that the MCO will fulfill its intended functions, specific requirements have been established governing design and fabrication. Among those requirements is the selection and application of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. The extent to which the ASME Code requirements have been applied to the MCO Project has not been clearly described in project documentation. A straight forward explanation of the ASME Code requirements imposed on the MCO Project will assist both internal and external reviewers to understand the basis of the MCO design and fabrication.

The objective of this paper is to document the drivers behind selection and application of the ASME Code requirements for design and fabrication of the MCO, to address how those requirements were implemented, and to document recent changes to implementation of the ASME Code to better ensure compliance.

II. EXECUTIVE SUMMARY

The baseline requirements for the design and fabrication of the MCO include the application of the technical requirements of the ASME Code, Section III, Subsection NB for containment and Section III, Subsection NG for criticality control. ASME Code administrative requirements, which have not historically been applied at the Hanford site and which have not been required by the U.S. Nuclear Regulatory Commission (NRC) for licensed spent fuel casks/canisters, were not invoked for the MCO. As a result of recommendations made from an ASME Code consultant in response to DNFSB staff concerns regarding ASME Code application, the SNF Project will be making the following modifications:

- Issue an ASME Code Design Specification and Design Report, certified by a Registered Professional Engineer
- Require the MCO fabricator to hold ASME Section III or Section VIII, Division 2 accreditation

- Use ASME Authorized Inspectors for MCO fabrication

Incorporation of these modifications will ensure that the MCO is designed and fabricated in accordance with the ASME Code. Code Stamping has not been a requirement at the Hanford site, nor for NRC licensed spent fuel casks/canisters, but will be considered if determined to be economically justified.

III. FORMULATION OF DESIGN AND FABRICATION REQUIREMENTS

A. Drivers for Selection of the ASME Code

The technical requirements applicable to the MCO are contained in WHC-SD-SNF-FRD-016, *Spent Nuclear Fuel Multi-Canister Overpack Technical Functions and Requirements.* This document follows the systems engineering process of defining the mission of the MCO, listing the functions that must be performed to accomplish the mission, and identifying the requirements associated with each function. The identification of requirements applicable to the MCO is developed from a top-down allocation of requirements from the primary sources of law, regulations, and U.S. Department of Energy (DOE) orders and direction. There are three principal requirements in WHC-SD-SNF-FRD-016 that pertain to the selection and application of the ASME Boiler and Pressure Vessel Code to the design and fabrication of the MCO:

1. DOE Order 6430.1A General Design Criteria

In order to fulfill the function of providing primary containment, the MCO must comply with DOE Order 6430.1A, General Design Criteria. Since the MCO is designated as a safety class item, the requirements listed in Section 1300-3.2 of 6430.1A apply. Section 1300-3.2 states, in part, "Safety class items shall be designed to the ASME Boiler and Pressure Vessel Code (Section III, Class II [sic]) or to other comparable safety related codes and standards that are appropriate for the system being designed." (Note: Class II [sic] is Subsection NC).

2. Hanford Site Safety Analysis Manual, WHC-CM-4-46

The MCO Technical Functions and Requirements document also lists compliance with the Hanford site Safety Analysis Manual (previously WHC-CM-4-46). This manual, which implemented the safety related requirements from DOE orders and standards, contained guidance for selecting national codes and standards based on the safety classification of the structure, system, and component (SSC). For safety class process equipment

(vessels and tanks), ASME Section III was recommended. (This guidance was removed from the Safety Analysis Manual and is now found in Appendix B of HNF-PRO-097, Engineering Design and Evaluation).

3. Safety Equivalency to NRC Licensed Facilities

The DOE established in the K Basins Spent Nuclear Fuel Project - Regulatory Policy (hereafter referred to as the Policy), dated August 4, 1995, the requirement for new SNF Project facilities to achieve "nuclear safety equivalency" to comparable NRC licensed facilities (Reference 1). For that Policy, nuclear safety equivalency was defined as:

- Technical requirements which meet the nuclear safety objectives of the 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.

Technical requirements, in the context of the Policy and as interpreted by the DOE-assembled Regulatory Requirements Team, are the design and construction measures (as opposed to preoperational or operational measures) that are mandated by the NRC regulations. In addition, the Policy specifically excludes those requirements that only address environmental, Occupational Safety and Health Administration (OSHA), chemical accident safety, and other non-nuclear safety issues.

Given this Policy, the SNF Project performed a review and evaluation of the Title 10 CFRs and relevant NRC guidance against the existing DOE requirements for new SNF Project facilities (Reference 2). The purpose of the review and evaluation was to identify any additional actions, beyond the existing DOE requirements, that were necessary to demonstrate nuclear safety equivalence. Regarding the MCO, the result of this review was the identification of several NRC requirements that were necessary to achieve nuclear safety equivalency. These requirements are documented in MCO Additional NRC Requirements, HNF-SD-SNF-DB-005.

In the area of assigning the proper ASME Code class to the MCO, Item number 4 of DB-005 states:

> "Use Regulatory Guide 1.26 to assist in assigning the appropriate ASME Section III Code Classes to the MCO shell, parts and subassemblies, as applicable. (Note: NUREG/CR-3854, *Fabrication Criteria for Shipping Containers*, has direct application to the MCO and may be used in lieu of Regulatory Guide 1.26)."

The MCO Design Authority performed a review of Regulatory Guide 1.26, *Quality Group Classifications and Standards for Water, Steam, and Radioactive-Waste-Containing Components of Nuclear Power Plants* and U.S. Nuclear Regulatory Guide (NUREG) 3854, *Fabrication Criteria for Shipping Containers*, and determined that NUREG 3854 was more directly applicable to the MCO. Regulatory Guide 1.26 establishes quality groups related to specified national standards for reactor components or systems. The MCO does not clearly fit into the listing of components for any of the three quality groups described, as the MCO is not part of an operating nuclear power plant. NUREG 3854 identifies criteria for fabrication of shipping containers used for transporting radioactive materials, and has direct applicability to the MCO. The NUREG fabrication criteria are divided into three categories that are associated with the levels of safety for the types and quantities of radioactive materials being transported. Due to the high curie content of the loaded MCOs, the MCO falls into the Category I classification, which invokes specific articles of Section III, Subsection NB of the ASME Code for components fulfilling a containment safety function. For components providing criticality safety, specific articles of Subsection NG are applicable. The Sections of the ASME Code invoked in NUREG 3854 are listed in Table 1. Based on the NUREG criteria, ASME Section III, Subsection NB was selected as the appropriate criteria for MCO fabrication.

Table 1. ASME Code Fabrication Criteria from NUREG 3854

Component Safety Group	Containment Sec. III, Subsection NB		Criticality Sec. III, NG
Category I	Primary vessel, bolts, piping, fitting, valves, closure	Relief Device	Support structures, neutron absorber
Materials	NB-2000	NB-2000	NG-2000
Forming, Fitting, Aligning	NB-4200	NB-4200	NG-4200
Heat Treatment	NB-4600	NB-4600	NG-4600
Examination	NB-5000	NB-5000	NG-5000
Acceptance Testing	NB-6000	NB-7000	

With NUREG 3854, DOE Order 6430.1A, and WHC-CM-4-46 all pointing toward selection of ASME Section III for the design and fabrication of the MCO, the MCO Project determined that application of the technical requirements of Subsection NB for both design and fabrication would best align the project with "NRC safety equivalency" and would be in accordance with the site design standards imposed via 6430.1A and WHC-CM-4-46. Although not available at the time the MCO design and fabrication requirements were established, the recently promulgated NUREG 1567, Standard Review Plan for Spent Fuel Dry Storage Facilities, states that the NRC accepts

construction of the storage confinement cask boundary and its sealing systems that comply with ASME Section III, Subsection NB or NC. The MCO Project position with respect to selection of ASME Section III, Subsection NB for design and fabrication is consistent with commercial practice as accepted by the NRC.

With respect to the administrative requirements of Section NCA of the ASME Code, application of Section 1300-3.2 of DOE Order 6430.1A used on nuclear containments at the Hanford site has not historically included administrative requirements for Code certified design documentation, ASME Authorized Inspection, Code Data Reports, Code Stamping, etc. In addition, the NRC has not required the existing licensed spent fuel canisters/casks to be ASME Code Stamped, nor comply with the administrative requirements that are associated with Code Stamping. Consistent with RL's position not to Code Stamp, and lacking any NRC precedent to require stamping, the MCO Project did not invoke the administrative requirements of Section NCA. Note, however, that the Quality Assurance (QA) Program required for MCO fabrication as discussed in Section III.C below is an NQA-1 based program, which is the QA program outlined in NCA-4000.

B. Applicability of the Washington State Boiler and Pressure Vessel Code

The RCW 70.79 and implementing regulations in the Washington Administrative Code (WAC) for Boilers and Unfired Pressure Vessels (WAC-296-104) have been reviewed by the DOE and determined to be not applicable as a matter of law to facilities of the United States Government (Reference 3). The DOE letter states, "There is no federal statute dealing with this subject which would require the Federal Government's compliance with such state laws. Absent a clear and unambiguous waiver of sovereign immunity, the activities of the Federal Government are not subject to state regulations." The letter continues to state that technical requirements of the WAC should be followed on the Hanford site, and be under RL program jurisdiction. The RL Spent Nuclear Fuel program has jurisdiction for the MCOs, and RL personnel have been involved in the development, review, and approval of the MCO design criteria and design media.

C. QA Requirements for Design and Fabrication

In the review of Title 10 CFRs to existing DOE requirements mentioned above, QA requirements listed in 10 CFR 72, Subpart G were compared with DOE QA requirements and the existing Hanford site QA program. The review concluded that the NRC QA requirements were essentially equivalent to the DOE QA requirements, and therefore, no additional NRC requirements, with respect to quality assurance, were imposed in DB-005. Item number 7 from DB-005 states:

> "Ensure the appropriate quality requirements in existing WHC procedures and instructions remain in effect (e.g., in SNF Project specific documents) for application to MCO activities."

However, the MCO project recognized that in addition to its role as a storage container, the

MCO would be part of a transportation package that could eventually be shipped offsite. Therefore, consideration was given to applying the QA requirements from 10 CFR 71, Subpart H. A review of 10 CRF 71 Subpart H to 10 CFR Subpart G showed that, overall, Subpart H was bounding of Subpart G, and in some cases more restrictive. The MCO project elected to apply the QA requirements from 10 CRF 71, Subpart H to the design and fabrication activities based on the premise that demonstration of compliance with 10 CFR 71 Subpart H would be beneficial for future transportation activities. The quality program utilized for MCO design complied with the applicable sections of 10 CFR 71, Subpart H.

Subsequent to completion of the design, the DOE directed that handling, packaging and transportation of spent fuel (which included the MCO) would be subject to compliance with the QA Requirements and Description (QARD) of the Office of Civilian Radioactive Waste Management (OCRWM) in order to enable OCRWM's future acceptance of spent fuel. A review of the QARD showed that design and fabrication of spent fuel canisters in accordance with 10 CFR 71, Subpart H was an acceptable standard for demonstrating compliance with the QARD. However, there were very few companies with NRC Certificates of Authorization for 10 CFR 71 that responded to the MCO fabrication Request for Interest. Most of the certificate holders were not interested in the fabrication portion of the project without the design portion included; they preferred to have design/build contracts and declined to be included on the MCO fabrication bidders list. In order to have reasonable competition for the fabrication contract, the QARD was reviewed against the NQA-1 Basic and Supplementary requirements and an equivalent set of QA criteria was established for MCO fabrication that met the applicable sections of the QARD. This criteria included all 18 NQA-1 basic requirements (except Design Control), many of the supplements to the basic requirements, and several pages of additional requirements that were determined to be unique to the QARD.

As a result, the MCO procurement Statement of Work provided two options regarding the QA program to be applied during fabrication, both of which met the QARD requirements: (1) the fabricator could follow a 10 CFR 71, Subpart H program provided he possessed an NRC Certificate of Authorization, or; (2) the fabricator could comply with the NQA-1 based program, as verified by audits/surveys performed by FDH.

IV. IMPLEMENTATION OF ASME CODE REQUIREMENTS

Having established that the design and fabrication of the MCO would be accomplished in accordance with the technical requirements of Section III, Subsection NB of the ASME Code, the MCO project proceeded to implement those requirements. In the discussion of implementation, it is important to understand that the governing body having jurisdiction over application of the ASME Code is the DOE, since the location of installation is on federal property, for which the DOE has responsibility. Each ASME Section III Code Subsection contains a foreword as a

predecessor to the Code Subsection. The forewords are all very similar and a quote from the Section III NB Foreword, page vi, follows:

> "The Code Committee does not rule on whether a component shall or shall not be constructed to the provisions of the Code. The Scope of each Section has been established to identify the components and parameters considered by the Committee in formulating the Code rules. Laws or regulations issued by municipality, state, provincial, federal, or other enforcement or regulatory bodies having jurisdiction at the location of an installation establish the mandatory applicability of the Code rules, in whole or part, within their jurisdiction. Those laws or regulations may require the use of this Code for vessels or components not considered to be within its Scope or may establish additions or deletions to that Scope. Accordingly, inquiries regarding such laws or regulations are to be directed to the issuing enforcement or regulatory body."

The above paragraph indicates that Code Committee policy allows the use of the Code for other purposes and also allows for the addition or deletion of scope in its use. Also, the decision for application of the Code, including additions and or deletions, rests with the laws or regulators governing the installation as clearly stated above in the quotation. As Code requirements have been implemented throughout the development of design and fabrication documents, the DOE has been actively involved in reviewing and approving MCO project documentation.

The ASME Code requirements were implemented through the issuance of the following project documentation:

1. **Performance Specification for SNF Multi-Canister Overpack, HNF-S-0426**

The MCO Performance Specification invokes the functional requirements identified and documented in the SNF MCO Functions and Requirements (WHC-SD-SNF-FRD-016). It contains:

- Design and accident loads
  - Design codes and standards
  - Interface requirements with other SNF systems
  - Applicable NRC equivalency requirements
  - Source term information
  - Functional design criteria
  - Material requirements
  - Safety classification of major components

Since the MCO has major interfaces with every other SNF facility and system, this document was developed, reviewed, and approved with considerable input from various SNF subproject personnel, as well as regulatory, safety, and other organizations, including

RL. The MCO Performance Specification is the baseline technical document governing the design activity.

With respect to application of the ASME Code, Revision 4 of the MCO Performance Specification requires the MCO to be constructed to meet the intent of ASME Section III, Subsection NB, with all deviations from Subsection NB documented, justified, and approved by DESH. The original issue of the Performance Specification (Rev. 0) used the words, "in accordance with" referring to the ASME Code, without the deviation language; however, as it was recognized that exceptions to the Code would be likely, the Design Agent would not be able to comply with the Performance Specification as written. This issue precipitated the change to "the intent of the Code", with exceptions documented, justified, and approved by DESH. This change did not provide latitude to the Design Agent to pick and choose what articles of the Code to apply; it was simply a way to address the fact that full conformance with the technical Code requirements was, at that time, not deemed possible. Current plans include replacing the words "to the intent" with "in accordance with", and retaining the requirement to identify and document any technical Code exceptions.

2. Multi-Canister Overpack Design Report, HNF-SD-SNF-DR-003

The MCO Design Report and appendices describe the features and functions of the MCO, demonstrate how the design complies with the Performance Specification requirements, and document the structural analyses and modeling performed. The Design Report documents the application of ASME Section III, Subsection NB to the MCO design. The body of the report includes a system description, a discussion of compliance with design criteria, and a compliance matrix, followed by numerous appendices containing stress analyses, a shielding evaluation, vendor data, a material evaluation, and weight summaries.

Appendix 1 of the Design Report consists of the design drawings of the MCO and baskets. The drawings require materials, fabrication, welding, and inspection to be performed in accordance with ASME Section III, Division I, Subsection NB.

Appendix 19 contains the "Specification for MCO Fabrication", HNF-S-0453. This Fabrication Specification requires conformance with applicable ASME Section III articles to procure, test, control, fabricate, and examine the MCO hardware.

Appendix 18 is the MCO Exception Report. This report documents any technical exceptions that are taken to the ASME Code requirements, including justifications for the need to deviate from the Code. Revision 0 of the Design Report listed several technical Code exceptions, many of which were related to the inability to radiographically examine the final closure weld, the lack of Code compliant overpressure protection devices, and the decision to not hydrostatically test the vessel after fuel loading. These exceptions were

reviewed by an ASME Code expert (see below), and after multiple meetings between the Code expert and the Design Agent, the exceptions have been eliminated, except for the fact a Code Stamp would not be applied. Two previous exceptions (no pressure test of the welded cover cap and no volumetric examination of the cover cap weld) are covered in a pending Code Case (N-595-1) for SNF containers which is nearing approval by the ASME Main Committee. A discussion of the merits of volumetric examination of the closure weld and pressure testing of the cover cap is contained in separate white papers.

3. Statement of Work for Fabrication of the MCO and Baskets

Although the Statement of Work for Fabrication of the MCOs and Baskets is not the vehicle to invoke ASME Code requirements, it is listed here to capture the QA requirements imposed on the MCO and baskets fabricator(s). Section 3.6.2 of the SOW provides two options for an acceptable fabrication QA program: (1) the fabricator can follow a 10 CFR 71, Subpart H program provided he possessed an NRC certificate of authorization, or; (2) the fabricator can comply with the NQA-1 based program, as verified by audits/surveys performed by FDH. The NQA-1 based program includes all 18 NQA-1 basic requirements (except Design Control), many of the supplements to the basic requirements, and several pages of additional requirements that were determined to be unique to the QARD.

V. MODIFICATION TO ASME CODE IMPLEMENTATION

In the spring of 1998, the Defense Nuclear Facilities Safety Board (DNFSB) staff members made inquiries regarding the extent of the application of the ASME Code to the MCO design and fabrication. To assist in addressing their concerns, the MCO Project contracted with Mr. Roger Reedy, of Reedy Engineering Inc., to provide ASME Code expertise. Mr. Reedy has over 30 years experience working on different ASME Code committees, and was previously chairman of Section III for over 15 years. Multiple meetings were held with Mr. Reedy, the Design Agent, the Design Authority, and other MCO team members to discuss the Code concerns. The purpose of the meetings was to review implementation of the ASME Code and identify any changes that would lead to improved confidence that the MCO design and fabrication are Code compliant. These meetings resulted in a better understanding of the project's compliance with the Code and in the commitment to make several modifications to improve the assurance that the MCOs will be fabricated in accordance with the Code. These improvements are summarized below:

A. Exception Report

As mentioned above, the initial release of the Exception Report included several technical Code exceptions. The Exception Report was reviewed in detail by Mr. Reedy and his associate. This review revealed that the Design Agent had been overly conservative in his interpretations of various sections of the Code and had documented exceptions in many

cases where none were required. Several stress analyses were revisited and other minor changes made to the design to bring the design to full technical Code compliance. Two previous exceptions (no pressure test of the welded cover cap and no volumetric examination of the cover cap weld) are covered in a pending Code Case (N-595-1) for SNF containers which is nearing approval by the ASME Main Committee. A discussion of the merits of volumetric examination for this weld and pressure testing of the cover cap is contained in separate white papers. Revision 1 to the Exception Report includes a discussion of the work performed to eliminate the Code exceptions.

B. Code Certified Design Documentation

A Design Specification, written in accordance with Section III, Division I, Appendix B, and certified by a Registered Professional Engineer, will be drafted to supplement the existing Performance Specification. The purpose of this document is to clearly define the design loads in a format that is understandable to all parties, including the Authorized Inspector who ultimately ensures Code compliance. While the existing Performance Specification contains most of this information, it is not formatted per the Code, nor is it certified.

Similarly, portions of the Design Report that address ASME Code requirements will be revised/reformatted to comply with Section III, Division I, Appendix C of the Code to show correlation with the Design Specification. This Design Report will also be certified by a Registered Professional Engineer. Structuring the Design Report per Code format and certifying the report will facilitate future reviews and inquiries, and provide added assurance that the design was performed in accordance with the ASME Code.

C. Code Accredited Fabrication Shop

The MCO procurement Statement of Work will be modified to require the fabricator to hold ASME Section III or Section VIII, Division 2 accreditation. The purpose of this change is to assure that the fabricator has experience in working to ASME Code requirements and is so accredited by ASME. According to both Mr. Reedy and the DNFSB Code consultant, the technical requirements in Section VIII, Division 2 are essentially equivalent to Section III. A fabricator familiar with working to Section VIII, Division 2 requirements will have the necessary experience and background to perform Section III fabrication. Permitting a Section VIII, Division 2 shop to fabricate is consistent with commercial spent fuel practice and allows a greater number of shops to qualify for bidding, resulting in more competitive bids than if bidding was restricted only to fabricators which hold ASME Section III accreditation. However, should Code Stamping be determined to be economically justified, only shops with Section III accreditation will be qualified to bid. Regardless of fabricator accreditation, the MCO fabrication specification will still require fabrication in accordance with Section III requirements.

D. Code Authorized Inspectors

The procurement documents will be modified to require the use of ASME Code Authorized Inspectors to monitor fabrication activities. ASME Authorized Inspectors are trained, qualified, and certified to perform comprehensive inspection in accordance with the Code. Their charter will be to complete all applicable inspection activities that would normally be required to permit stamping of the vessel. The use of experienced Authorized Inspectors will ensure that the fabricator follows Code requirements relative to materials, material control and traceability, welding, nondestructive examination, testing and other applicable Code articles.

The SNF Project modifications discussed above relative to the ASME Code are consistent with the recommendations made by the DNFSB staff and by the ASME Code consultant, Mr. Roger Reedy. The use of a Code accredited fabrication shop, certified design documentation, and ASME Authorized Inspectors will provide a high level of confidence that Code requirements are being implemented properly. Although the requirement for certified design documentation and the use of Authorized Inspectors go beyond the current NRC guidelines, their application to the MCO design and fabrication activities is prudent given the central role played by the MCO in the SNF Project.

VI. ASME CODE STAMPING

During the meetings held to discuss the level of application of the ASME Code, the question of Code Stamping the MCO was discussed on numerous occasions. The issues relating to Code Stamping have also been reviewed with RL, the DNFSB staff during the June 30, 1998 and September 29, 1998 meetings at the Hanford site, and with the Independent Review Panel (IRP) on July 8, 1998 and September 29, 1998. The Spent Nuclear Fuel Project position with respect to Code Stamping is that adequate assurance of ASME Code compliance can be obtained via implementation of the Code requirements as described in this paper, including the use of Authorized Inspectors, an ASME accredited fabrication shop, and certified design documentation, without requiring formal Code Stamping. Rationale for not requiring the Code Stamp includes:

- As mentioned above, the NRC equivalency documentation directs the application of Section III of the ASME Code to MCO fabrication. If the MCO were to be Code Stamped, it would need to be fabricated in a shop possessing an ASME "N" stamp. According to our Code consultant, there are a very limited number of shops that carry this accreditation (about four), due to the decline of the nuclear industry in the United States. In order to obtain competitive bids, the fabrication would need to be

performed in accordance with Section VIII, Division 2, for which a larger number of shops are qualified (about 500). While there are those who believe Section VIII, Division 2 is equivalent to Section III, the IRP is adamantly opposed to using Section VIII for the MCOs. In order to Code Stamp the MCOs and address the concerns of the IRP, the prospective bidders would have to be narrowed to the few carrying "N" stamp accreditation, which could be cost prohibitive. Notwithstanding the above, if Code Stamping (N-Stamp) is determined to be economically justified, based on current and future pre-procurement investigations, Code Stamping (N-Stamp) will be considered.

- Commercial practice, as accepted by the NRC, has not included the requirement to Code Stamp spent fuel casks and canisters. NUREG 3854, Fabrication Criteria for Shipping Casks, which was used for guidance in applying the ASME Code, states, "It is not intended that the ASME Code Stamp be applied to the shipping container." Examples include the Vectra and Sierra Nuclear storage system certifications under 10 CFR 72, Subpart K. Commercial practice has included designing and fabricating to Section III, Subsection NB or NC, and using a fabricator with Section III or Section VIII accreditation.

- Historical precedent set by the DOE at the Hanford site has been to not require ASME Code Stamping. DOE Order 6430.1A requires the design of safety class vessels to be in accordance with Section III of the ASME Code; this requirement has historically been fulfilled by complying with the technical requirements of the Code rather than the administrative requirements.

VII. CONCLUSIONS

Application of a nationally accepted standard such as the ASME Code provides a technical basis for MCO design and fabrication that will ensure the vessel's ability to withstand design loads without endangering personnel safety or the environment. The baseline requirements applicable to MCO design and fabrication designate Section III, Subsection NB for containment and Section III, Subsection NG for criticality control. Consistent with commercial practice and historical precedent at the Hanford site, the technical requirements of the Code were correctly applied for MCO design and fabrication. Based on input from an ASME Code consultant and some minor design changes, the previously identified technical exceptions to the Code have been eliminated. In order to better ensure Code compliance, the MCO Project is making the following modifications regarding ASME Code implementation:

- issuing an ASME Code Design Specification and Design Report, certified by a Registered Professional Engineer

- requiring the MCO fabricator to hold ASME Section III or Section VIII, Division 2 accreditation

- using Authorized Inspectors for MCO fabrication

Application of the Section III technical Code requirements, supplemented by the improvements listed above, provides adequate assurance that the MCO will be constructed in accordance with the Code. If Code Stamping (N-Stamp) is determined to be economically justified, based on current and future pre-procurement investigations, Code Stamping (N-Stamp) will be considered.

REFERENCES

1. Letter, E. D. Sellers, RL, to President, WHC, "Implementation of the K Basins Spent Nuclear Fuel Project Regulatory Policy," 95-SFD-167, dated September 12, 1995.

2. Document, WHC-SD-SNF-DB-002, Rev. 2, "Spent Nuclear Fuel Project Path Forward, Nuclear Safety Equivalency to Comparable NRC-Licensed Facilities, 1996.

3. Letter, R. D. Larson, RL, to President, WHC, "Jurisdiction for Boiler and Pressure Vessel Maintenance," 9307349, dated September 15, 1993.

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8. HNF-3266, MCO Design Pressure Rating
9. HNF-3255, ASME Code Requirements for MCO Design and Fabrication
10. HNF-3398, MCO Inservice Inspection and Maintenance
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13. HNF-3270, MCO Pressure Testing