Department of Energy
National Nuclear Security Administration
Washington DC 20585

September 14, 2009 OFFICE OF THE ADMINISTRATOR

The Honorable Carl Levin
Chairman, Committee on Armed Services
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

Section 3112 of the Duncan Hunter Defense Authorization Act for Fiscal Year 2009 requires that the Administrator of the National Nuclear Security Administration (NNSA) certify that design concerns raised by the Defense Nuclear Facilities Safety Board (Board) have been resolved before certain funds can be made available in support of the Chemistry and Metallurgy Research Building Replacement Project (CMRR) at the Los Alamos National Laboratory. This letter provides my certification as required by the Act and also provides the basis for my certification. The specific language from the Act is provided below for convenience:

> *Of the amounts appropriated pursuant to an authorization of appropriations in this Act or otherwise made available for fiscal year 2009 for Project 04-D-125 Chemistry and Metallurgy Research Replacement (in this section referred to as 'CMRR') facility project, Los Alamos National Laboratory, Los Alamos, New Mexico, not more than $50,200,000 may be made available until—*
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> > *(1) the Administrator for Nuclear Security and the Defense Nuclear Facilities Safety Board have each submitted a certification to the congressional defense committees stating that the concerns raised by the Defense Nuclear Facilities Safety Board regarding the design of CMRR safety class systems (including ventilation systems) and seismic issues have been resolved; and*
> >
> > *(2) a period of 15 days has elapsed after both certifications under paragraph (1) have been submitted.*

The CMRR project comprises two principal structures. The first, the Radiological Laboratory, is nearly completed and the procurement of specialty equipment inside the facility has begun. The second, the Nuclear Facility is nearing the end of the preliminary design phase and will soon start final design. The Board's concerns relate to the Nuclear Facility.

The staffs of the NNSA and the Board devised a plan to fulfill the Certification requirements. The Board identified its concerns formally as "findings" in five letters sent to my staff. NNSA took action to resolve each issue and documented its actions in formal responses from NNSA back to the Board. Finally, the Board issued letters acknowledging its evaluation and acceptance of NNSA's resolution and declaring each of the findings to be closed.

The plan I approved for NNSA Certification draws heavily on the standard processes NNSA already had in place to assure that safety is properly integrated into the design of any new facility such as the CMRR-Nuclear Facility. Key elements of our safety review of facility design projects include the completion of the review and acceptance of the safety basis documentation by competent federal line managers and the completion of an intensive and thorough "Technical Independent Project Review" (TIPR) by a team of experts who are not affiliated with the project. To supplement these principal technical components, my staff has performed extensive oversight to assure that the delivered products have met the high standards of quality that I expect.

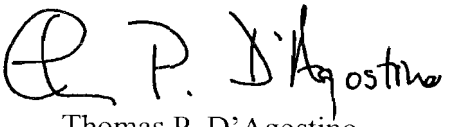
I have considered the following inputs in rendering my conclusion to certify that the concerns raised by the Board have been resolved:

- The development and approval with conditions of the applicable safety documentation ("Preliminary Documented Safety Analysis") by the Manager of the Los Alamos Site Office;
- Completion of the TIPR and the development of an associated action plan;
- Declarations from the project's Federal Project Director and the Los Alamos Site Office Manager that the Board's concerns are resolved and that the project is suitably mature for progressing to the next design phase. The Federal Project Director's report that summarizes the rationale used in determining that the issues are resolved is enclosed for reference;
- The close out of the Board Findings in concert with the Board and its staff;
- The independent oversight functions performed by my Headquarters staff;
- The advice and counsel from senior members of my staff; and
- Discussions with the Board and its staff that the concerns are resolved.

Accordingly, I am pleased to certify, in accordance with the requirement contained in the aforesaid Authorization Act, that the concerns raised by the Board are resolved. I understand from my discussions with the Vice Chairman of the Board that the Board will provide its report to the defense committees separately.

If you have any questions, please contact me or Mr. James B. Lambert, Acting Director, Office of Congressional, Intergovernmental and Public Affairs, at (202) 586-3714.

Sincerely,



Thomas P. D'Agostino
Administrator

Enclosure

cc: The Honorable Howard P. McKeon
Ranking Member

Department of Energy
National Nuclear Security Administration
Washington DC 20585

September 14, 2009

OFFICE OF THE ADMINISTRATOR

The Honorable Daniel K. Inouye
Chairman, Subcommittee on Defense
Committee on Appropriations
United States Senate
Washington, DC 20510

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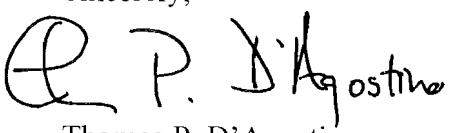

Thomas P. D'Agostino
Administrator

Enclosure

cc: The Honorable Bill Young
Ranking Member

Department of Energy
National Nuclear Security Administration
Washington DC 20585

September 14, 2009 OFFICE OF THE ADMINISTRATOR

The Honorable John P. Murtha
Chairman, Subcommittee on Defense
Committee on Appropriations
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

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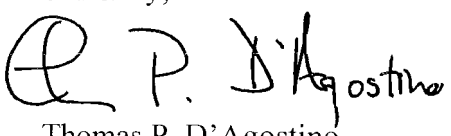

Thomas P. D'Agostino
Administrator

Enclosure

cc: The Honorable Thad Cochran
Ranking Member

Department of Energy
National Nuclear Security Administration
Washington, DC 20585

September 14, 2009

OFFICE OF THE ADMINISTRATOR

The Honorable Ike Skelton
Chairman, Committee on Armed Services
U.S. House of Representatives
Washington, DC 20515

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Sincerely,

Thomas P. D'Agostino
Administrator

Enclosure

cc: The Honorable John McCain
Ranking Member

UNITED STATES GOVERNMENT DEPARTMENT OF ENERGY

National Nuclear Security Administration
Los Alamos Site Office
Los Alamos, New Mexico 87544

memorandum

DATE: AUG 13 2009
REPLY TO ATTN OF: CMRR: Fong-2009-07
SUBJECT: Certification Report - Resolution of Defense Nuclear Facilities Safety Board Concerns for the Chemistry and Metallurgy Research Replacement Project

TO: Gerald L. Talbot, Jr., Assistant Deputy Administrator for Nuclear Safety and Operations, NA-17, HQ/FORS

Reference:
1) Title XXXI, Subtitle B, Section 3112 of the Duncan Hunter Defense Authorization Act (Act) for Fiscal Year 2009
2) Certification Report, Resolution of Defense Nuclear Facilities Safety Board Concerns for the Chemistry and Metallurgy Research Replacement Project, Dated August 13, 2009

Pursuant to the mandate as provided for within reference document 1 (Act), it is stated: "...the Administrator for Nuclear Security and the Defense Nuclear Facilities Safety Board have each submitted a certification to the congressional defense committees stating that the concerns raised by the Defense Nuclear Facilities Safety Board [DNFSB] regarding the design of CMRR safety class systems (including ventilation systems) and seismic issues have been resolved." DNFSB staff have documented those concerns within five DNSFB Findings.

The National Nuclear Security Administration (NNSA) Los Alamos Site Office, with support from NNSA line and support organizations, and Los Alamos National Laboratory (LANL) CMRR project staff have reached technical resolution with DNFSB staff on all Findings. The attached report (reference 2) documents that technical resolution.

As a basis to support the Act mandate, I am submitting the attached report for your review and approval and submittal to the Administrator to support certification, as called for by the Act.

If you have questions you may contact Herman Le-Doux of my staff at (505) 665-8432.

Donald L. Winchell, Jr.
Manager

Attachment

cc w/attachment:
J. McConnell, NA-17, HQ/FORS
D. Nichols, NA-1, HQ/FORS
K. Loll, NA-171.1, HQ/FORS
A. Delapaz, NA-171.1, HQ/FORS
M. Thompson, NA-172, HQ/FORS
P. Rhoads, NA-172.2, HQ/FORS
H. LeDoux, CMRR, LASO
R. Holmes, CMRR, LANL, MS-E550
Records Center, LASO
Official Contract File, LASO

LASO Correspondence Concurrence Form

File Code I-135	ePegasus #	Corresp. # Fong-2009-07	Program/Project ID (if applicable) CMRR DNFSB Certification Report for NNSA				
Originating Org.	**POC & Phone or Pager**	**Admin. Initial**	**Date Released**		**Required back to Originator By**		
CMRR	S. Fong 5-5534		8/10/2009				
Organization	**POC**	**Initial to Concur**	**Date Due (Est. by Originator)**	**Date Initialed**	**Dissenting Opinion**	**Non-concur**	**Comment**
OOM	S. McCreary	Preparer			Check box, enter statements below		
CMRR	S. Fong	SF		8/13/09			
CMMR	H. LeDoux	HL		8/13/09			
OOM	R. Snyder			8/12/09			
Signator Org.	**Signator**						
OOM	D. Winchell	DW		8/13/09			
	Comments and Dissenting Opinions:						
					No. of Addtl. Pages		

National Nuclear Security Administration

Los Alamos NATIONAL LABORATORY

LOS ALAMOS NATIONAL LABORATORY CHEMISTRY AND METALLURGY RESEARCH REPLACEMENT PROJECT

Certification Report

Resolution of Defense Nuclear Facilities Safety Board Concerns for Chemistry and Metallurgy Research Replacement Project

CMRR-RPT-PM-1912, R0

August 13, 2009

Classification Review			
Leroy Martinez 091781	8/13/09	☐ UCNI	☐ Classified
ADC/RO Signature and Z#	Date	☐ OUO	☒ Unclassified
Marking Information / Special Instructions:			

Concurrence by

8/13/09

Rick Holmes **Date**
CMRR Division Leader
Los Alamos National Laboratory

8/13/09

Herman Ledoux **Date**
CMRR Federal Project Director
NNSA Los Alamos Site Office

EXECUTIVE SUMMARY

The National Defense Authorization Act for Fiscal Year 2009 contains language explicitly limiting the amount of appropriated funding that can be released for the Chemistry and Metallurgy Research Replacement (CMRR) Project until both the National Nuclear Security Administration (NNSA) Administrator and the Defense Nuclear Facilities Safety Board (DNFSB) submit a certification stating that the DNFSB concerns regarding the design of safety class systems and seismic issues have been resolved.

The communication of DNFSB concerns to Congress has parentage to its quarterly reports to Congress. In response to the statutory direction to the two agencies, the Board and NNSA agreed-upon form to formally document and track the resolution of the issues indentified by the Board as "Findings". This report provides a history of what were the Board's findings and how they were resolved as a technical basis for the Administrator to certify to Congress that the issues have been resolved. As a secondary purpose, this report documents for historical traceability how legacy issues raised in Defense Nuclear Facility Safety Board were resolved in the past and thus were never elevated to "Findings" and were not part of the certification process.

The most recent DNFSB quarterly report to Congress (June 22, 2009) reflects six issues, one of which was resolved in June 2007 (design-build acquisition strategy). The other five "open" issues identified in the most recent report are: (1) Site Characterization and Seismic Design; (2) Safety-Significant Active Ventilation System; (3) Safety-Class Fire Suppression System; (4) Safety-Class and Safety-Significant Container Design; and, (5) Deficiencies In Draft Preliminary Documented Safety Analysis (PDSA).

Between January 16 and March 30, 2009, the DNFSB formally transmitted five findings to NNSA in which they considered resolution a prerequisite to Congressional certification: (1) CMRR Seismic Design; (2) Seismic Design of Active Confinement Ventilation Systems and Support Systems; (3) Documenting and Maintaining Preliminary Documented Safety Analysis (PDSA) Safety-Related Functions and Requirements; (4) Inadequate Identification of Safety-related Controls, Functional Requirements, and Performance Criteria; and (5) System Design Descriptions Do Not Incorporate Preliminary Documented Safety Analysis Requirements Adequately.

As can be seen from the listing of issues, although there is some commonality and interrelationship between the issues identified by the DNFSB in their quarterly reports to Congress and the five specific findings formally transmitted to NNSA, there is not a "one-to-one" correlation. Therefore, this report discusses in detail those actions taken by NNSA to resolve the safety issues raised by the DNFSB through either of the two mechanisms.

The NNSA used established protocols with the DNFSB to achieve and document resolution of the concerns. NNSA communicated on those technical issues of concern to DNFSB via a combination of formal letters, meetings and teleconferences. NNSA and DNFSB augmented the conventional formal correspondence through the use of Finding Forms for the DNFSB staff to document specific details on those unresolved technical issues that could preclude DNFSB certification. NNSA used the same Finding Forms to define those actions that would be undertaken to resolve the technical issues and formally transmitted the completed forms to DNFSB for acceptance. Periodic meetings, staff field

visits, and other interactions with the DNFSB were used to gain an understanding of the technical issues, discuss planned corrective actions, status the progress of corrective actions, and to confirm the adequacy of issue resolution needed to support DNFSB certification to Congress. The technical issues identified are discussed in the body of this report along with the status of resolution.

The following is a synopsis of the approach and actions taken to resolve each of the DNFSB Findings considered a prerequisite for certification:

1. **CMRR Seismic Design**

   The CMRR Project Team performed some detailed analysis and modeling of the Nuclear Facility structure to demonstrate the technical feasibility of the preliminary design to withstand the lateral and vertical accelerations associated with the design basis earthquake (DBE). The CMRR Project Team developed a Structural Design Criteria document, Seismic Analysis Plan and a Structural Design Plan along with a flowchart to define the process and requirements that will govern the subsequent detailed seismic design of the Nuclear Facility. The plans, procedures, and results of the analyses have been extensively reviewed with the DNFSB to ensure the methods and approaches are technically sound. The DNFSB will continue to monitor the evolution of the detailed design to ensure consistency with the agreed upon methods and approaches.

2. **Seismic Design of Active Confinement Ventilation**

   Los Alamos National Laboratory (LANL) has further examined the approach and technical basis for the vertical acceleration associated with the DBE that poses the greatest design challenge not only for the active confinement ventilation system, but other CMRR Nuclear Facility structural components as well. The CMRR Project Team prepared a summary of the recommended approach that can be used to reduce the design demands associated with the vertical motion while maintaining an adequate technical basis for nuclear safety design margin. The CMRR Project Team developed a Safety-related Equipment Seismic Qualification Plan that incorporated feedback from commercial nuclear industry suppliers. The CMRR Project Team had the qualification plan independently peer reviewed by an expert in the field of seismic qualification and the results have been transmitted to the DNFSB.

3. **Documenting and Maintaining PDSA Safety-Related Functions and Requirements**

   The CMRR Project Team revised the System Engineering Management Plan (SEMP) and Configuration Management Plan [CMP]) to improve the process for documentation and flow-down of the safety-related functions and requirements derived from the PDSA into key design documents, such as the System Design Descriptions (SDDs). The most recent DNFSB quarterly report to Congress (dated June 22, 2009) indicates no additional actions are needed prior to certification and reflects the revised processes are expected to yield acceptable results post-certification.

4. **Inadequate Identification of Safety-related Controls, Functional Requirements and Performance Criteria**

   The CMRR Project Team completed process hazard analyses and updated criticality safety evaluations, the results of which have been incorporated into the PDSA hazard analyses. New tables were developed for inclusion in the PDSA to improve the traceability between the hazard and accident analyses and the derived safety functions, functional requirements, and performance criteria for safety-related structures, systems, and components. The results

of the analyses and the new PDSA tables were provided to the DNFSB as they were developed or completed.

5. **SDDs Do Not Incorporate PDSA Requirements Adequately**

   In conjunction with the actions taken to address the finding on *Documenting and Maintaining PDSA Safety-related Functions and Requirements*, the CMRR Project Team committed to include these elements specifically in the CORE® requirements database used to maintain configuration management of the PDSA and SDDs. In this manner, consistency of the information contained in the SDDs is ensured with that contained in the PDSA. As reflected in their most recent report to Congress, the DNFSB considers no additional actions are required prior to certification and indicates they will review the revised SDDs as they become available post-certification to ensure the process is effective.

In the development of the CMRR project, NNSA will continue to utilize required processes that assure implementation of the derived safety functions, functional requirements and performance criteria for safety-related structures, systems and components. Dialogue with DNFSB will be constant during this development and NNSA will look for opportunities for direct engagement. NNSA is committed to undertake actions identified during this certification process.

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1.0 Introduction

Title XXXI, Subtitle B, Section 3112, Limitation on Funding for Project 04-D-125 Chemistry and Metallurgy Research Replacement Facility Project, Los Alamos National Laboratory, Los Alamos, New Mexico of the Duncan Hunter National Defense Authorization Act for Fiscal Year (FY) 2009 states:

> "Of the amounts appropriated...for fiscal year 2009 for [the CMRR facility project], not more than $50,200,000 may be made available until:
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> 2. A period of 15 days has elapsed after both certifications under paragraph (1) have been submitted."

1.1 Purpose

This report is structured to serve as the basis for the Administrator of the National Nuclear Security Administration (NNSA) certification to the congressional defense committees that the concerns raised by the Defense Nuclear Facilities Safety Board (DNFSB) regarding the design of the Chemistry and Metallurgy Research Replacement (CMRR) safety class systems have been resolved. It identifies what the findings were and how they were resolved. As a matter of completeness of the record, this report also indentifies how legacy issues raised previously by the Board were resolved in the past. This report was developed consistent with the *Certification Plan for Chemistry and Metallurgy Research Replacement Project,* approved by the Administrator on April 14, 2009.

1.2 Acronyms

Acronym	Term
CAP	Corrective Action Plan
CMP	Configuration Management Plan
CMRR	Chemistry and Metallurgy Research Replacement
COA	Conditions of Approval
CSE	Criticality Safety Evaluation
DNFSB	Defense Nuclear Facility Safety Board
DOE	Department of Energy
FY	Fiscal Year

HVAC	Heating, Ventilation and Air Conditioning
LANL	Los Alamos National Laboratory
LASO	Los Alamos Site Office
LTV	Long-term Vault
NF	Nuclear Facility
NNSA	National Nuclear Security Administration
PDSA	Preliminary Documented Safety Analysis
HA	Hazard Analysis
PrHA	Process Hazard Analysis
PSVR	Preliminary Safety Validation Report
S&L	Sargent and Lundy
SBRT	Safety Basis Review Team
SDC	Structural Design Criteria
SDD	System Design Description
SEMP	System Engineering Management Plan
SGH	Simpson Gumpertz & Heger, Inc.
SSC	Systems, Structures and Components
SSI	Soil Structure Interaction
STV	Short-term Vault
TIPR	Technical Independent Project Review
URS	Update of the Probabilistic Seismic Hazard Analysis

2.0 Background

Technical issues raised by the DNFSB on the CMRR Project have been formally documented via two sources: (1) DNFSB Quarterly Reports to Congress on the status of significant unresolved issues with Department of Energy (DOE) design and construction projects; and (2) DNFSB correspondence to NNSA with Finding Forms that identify issues not adequately resolved that could preclude DNFSB certification. The following sections summarize the background, chronology of correspondence, and identify the technical issues stemming for the two sources. In the most recent report form the Board to the staff, dated June 22, 2009, the Board states all the issues that stand in way of certification are captured and tracked as "Findings" and, accordingly, the aspects of this report that relate to certification focus on the Board's findings.

In October 2008, prior to the certification requirement being levied by Congress, the NNSA had directed performance of a Technical Independent Project Review (TIPR) to evaluate the CMRR Nuclear Facility (NF) Project's readiness to start Final Design activities. In the case of the CMRR Project, the TIPR Review Committee was requested to specifically examine the project's progress in addressing the unresolved safety issues raised by the DNFSB on the CMRR NF design. The TIPR for the CMRR NF was completed in February 2009. The TIPR Review Committee identified seventeen (17) significant concerns requiring resolution prior to the project proceeding to final design. The significant concerns reflected that the safety issues on the design of the CMRR NF previously identified by the DNFSB in

their quarterly reports to Congress were still unresolved. The CMRR Project Team was subsequently tasked to develop a comprehensive corrective action plan (CAP) in response to all of the issues identified by the TIPR Review Committee.

Independent of the TIPR, the Los Alamos Site Office (LASO) established a Safety Basis Review Team (SBRT) composed of subject matter experts in a variety of engineering and technical disciplines to conduct a detailed evaluation of the Preliminary Documented Safety Analysis (PDSA) developed by Los Alamos National Laboratory (LANL) for the CMRR NF. The PDSA was developed by LANL for compliance with the requirements contained in 10 CFR 830 (Subpart B), DOE O 413.3A, and DOE-STD-1189-2008 (invoked by DOE 413.3A). The LASO SBRT conducted a series of in-depth technical reviews on successive versions of the PDSA, each time providing specific technical comments requiring resolution in order to achieve conformance with applicable DOE requirements and implementation guidance.

The LASO SBRT documented the results and conclusions of their review in a Preliminary Safety Validation Report (PSVR). Based upon the recommendations of the SBRT, the LASO Manager approved the LANL PDSA for the CMRR NF, Revision G3, on April 9, 2009. The PSVR contained conditions of approval (COAs) recommended by the SBRT and imposed by the LASO Manager. The LASO COAs identified a number of the same unresolved safety and technical issues as those identified by the DNFSB in their quarterly reports to Congress.

The CMRR Project Team was directed to resolve the COAs prior to proceeding to the next stage of design. The CMRR Project Team submitted an integrated resource-loaded plan and schedule for resolution of the COA technical issues on April 30, 2009.

The following sections summarize the background, chronology of correspondence, and identify the technical issues stemming from the two sources of DNFSB concerns: (1) DNFSB Quarterly Reports to Congress and (2) DNFSB Finding Forms.

2.1 DNFSB Quarterly Reports to Congress

On September 29, 2006, House Conference Report 109-702 on the National Defense Authorization Act for FY 2007 (H.R. 5122) was released and approved by both houses of Congress. The Conference Report, Section 3201 noted the conferees' concern regarding the untimely resolution of technical issues raised by the DNFSB, and that DNFSB and DOE would benefit from a more structured process for issue resolution that would allow issues to be raised, evaluated, and adjudicated at logical points in the design and construction process. The Conference Report directed the DNFSB and DOE to continue discussions on a process for more timely identification and resolution of technical differences concerning design standards, and to report jointly to the Congressional defense committees on these efforts. In the interim, the conferees directed that the DNFSB provide quarterly reports on the status of significant unresolved technical differences between the DNFSB and DOE concerning design and construction of DOE's defense nuclear facilities.

In the DNFSBs first quarterly report on the status of significant unresolved issues with DOE design and construction projects, dated February 15, 2007, the DNFSB identified design issues associated with the LANL CMRR Project as one of the defense nuclear facilities posing the greatest concern. The DNFSBs first quarterly report to Congress initially identified five issues of concern related to the CMRR Project:

1. Design-build acquisition strategy.
2. Site characterization and seismic design.
3. Safety-significant active ventilation system.
4. Safety-class fire suppression system.
5. Safety-class and safety-significant container design.

The Board has continued to provide quarterly reports to Congress on the status of significant unresolved technical issues on the design and construction of DOE defense nuclear facilities. The most recent Board quarterly report to Congress, the eighth such report dated June 22, 2009, stated the CMRR Project "remains a concern to the Board" and made reference to the joint certification provision contained in the 2009 National Defense Authorization Act, Section 3122.

The Board's June 22, 2009 report to Congress reflected the following status of CMRR related issues:

1. Design-build acquisition strategy. – *resolved (Jun 07)*
2. Site characterization and seismic design.
3. Safety-significant active ventilation system. – *resolved (2) reopened due to issue 6 (Oct 07)*
4. Safety-class fire suppression system.
5. Safety-class and safety-significant container design.
6. Deficiencies in Draft Preliminary Documented Safety Analysis.

Note: Dates in parentheses indicate the quarterly report in which an issue was considered resolved or a new issue was identified.

2.2 DNFSB Finding Forms

In response to the certification provision established by Congress, the Board and DOE/NNSA mutually agreed to a process whereby the Board would document the details associated with the remaining unresolved technical issues affecting joint certification through the formal transmittal of finding forms. The Board subsequently transmitted five separate finding forms on the following topics via the referenced correspondence:

1. *CMRR Seismic Design* – DNFSB letter dated January 16, 2009 (Kasdorf to Talbot)
2. *Seismic Design of Active Confinement Ventilation Systems and Support Systems* – DNFSB letter dated January 16, 2009 (Kasdorf to Talbot)
3. *Documenting and Maintaining Preliminary Documented Safety Analysis Safety-Related Functions and Requirements* – DNFSB letter dated March 4, 2009 (Kasdorf to Talbot)
4. *Inadequate Identification of Safety-related Controls, Functional Requirements, and Performance Criteria* – DNFSB letter dated March 16, 2009 (Kasdorf to Talbot)
5. *System Design Descriptions Do Not Incorporate Preliminary Documented Safety Analysis Requirements Adequately* – DNFSB letter dated March 30, 2009 (Kasdorf to Talbot)

It should be noted that the topics associated with the five DNFSB Finding Forms do not have a one-to-one correlation with the five unresolved issues identified in the most recent (June 22, 2009)

quarterly report to Congress (June 22, 2009). For this reason, NNSA provided a formal response to each of the finding forms via the following correspondence:

1. *CMRR Seismic Design* – NNSA letter dated March 11, 2009 (Talbot to Kasdorf)
2. *Seismic Design of Active Confinement Ventilation Systems and Support Systems* – NNSA letter dated March 11, 2009 (Talbot to Kasdorf)
3. *Documenting and Maintaining Preliminary Documented Safety Analysis Safety-Related Functions and Requirements* – NNSA letter dated April 21, 2009 (Talbot to Kasdorf)
4. *Inadequate Identification of Safety-related Controls, Functional Requirements, and Performance Criteria* – NNSA letter dated April 21, 2009 (Talbot to Kasdorf)
5. *System Design Descriptions Do Not Incorporate Preliminary Documented Safety Analysis Requirements Adequately* – NNSA letter dated April 21, 2009 (Talbot to Kasdorf)

3.0 Resolution Status

3.1 DNFSB Quarterly Reports to Congress

1. *Design-build acquisition strategy* – The acquisition strategy for the CMRR NF has been revised to a traditional "design-bid-build" approach. The design of the CMRR NF will be completed via contracts with Architect/Engineering firm(s) with LANL functioning as the design authority. Construction management will be performed by LANL with a separate contract (through competitive bid) for construction services. The *CMRR Project Execution Plan* has been updated to reflect the revised acquisition strategy. As reflected in the most recent DNFSB report to Congress (June 22, 2009), this issue has been resolved.
2. *Site characterization and seismic design* – The technical issues associated with the site characterization and seismic design of the CMRR NF are encompassed by the DNFSB Finding: *CMRR Seismic Design*. See the discussion of resolution status under the DNFSB Findings section of this report, specifically Finding #1.
3. *Safety-significant active ventilation system* – The technical issues associated with the safety-significant ventilation system design of the CMRR NF are encompassed by the DNFSB Findings: *Seismic Design of Active Confinement Ventilation Systems and Support Systems* and *Inadequate Identification of Safety-related Controls, Functional Requirements, and Performance Criteria*. See the discussion of resolution status under the DNFSB Findings section of this report, specifically Finding #2 and Finding #4.
4. *Safety-class fire suppression system* – Technical issues related to the design of the safety-class fire suppression system in the CMRR NF stem primarily from the lack of specific DOE design requirements and guidance for safety-class fire suppression systems, as documented by the Board in DNFSB Recommendation 2008-1, *Safety Classification of Fire Protection Systems*. The CMRR Project Team has remained abreast of DOE implementation actions taken in response to DNFSB Recommendation 2008-1. The preliminary design of the safety-class fire suppression system for the CMRR NF is consistent with current DOE requirements and guidance for such systems. As implementation requirements and guidance evolve for DNFSB Recommendation 2008-1, the CMRR Project Team will evaluate the potential impacts on the design for the CMRR NF. Cost versus benefit evaluations will be performed if DOE requirements and guidance change related to safety-class fire protection systems.

Formal change control will be used to incorporate changes in requirements or guidance into the technical baseline in situations where the changes represent a benefit (increase in safety, reduction in cost, etc.).

Issues relating to the adequacy of functional requirements and performance criteria for the safety-class fire suppression system have been addressed through the resolution of DNFSB Finding #4, *Inadequate Identification of Safety-related Controls, Functional Requirements, and Performance Criteria*. See the discussion of resolution status under the DNFSB Findings section of this report for additional details.

5. *Safety-class and safety-significant container design* – Technical issues related to the design of safety-class and safety-significant containers used for storage and handling of radioactive material in the CMRR NF arose because the draft PDSA initially reviewed by the DNFSB relied upon some specific containers (e.g., AL-R8/SI) that had not been evaluated to meet the full range of all potential accident environments. The PDSA was subsequently revised to establish safety functions, functional requirements, and performance criteria for radioactive material containers derived from the range of design basis accidents (and associated accident environments). The container design issue has been resolved in conjunction with resolving the issues identified in the DNFSB Finding #4, *Inadequate Identification of Safety-related Controls, Functional Requirements, and Performance Criteria*.

   Rather than establish a safety design strategy predicated on the use and performance of specific containers, the project team has demonstrated the adequacy of preliminary design configurations for the short-term vault (STV) and long-term vault (LTV) to support safe storage of a variety of nuclear materials and containers. Analyses were performed to demonstrate that the features incorporated into the design of these storage areas are adequately integrated with the range of nuclear materials and potential containers used for storage to withstand potential accident environments. For example, analyses were performed to evaluate the potential thermal effects on nuclear material stored in containers upon the loss of active ventilation. The analyses demonstrate that the resulting temperature increase in the nuclear material storage configuration increases at a relatively slow rate and that the peak temperatures reached will not pose a challenge to the design of long-term storage containers even without human operator intervention for an extended period of time (> 30 days) to restore convective cooling (through restoration of the active ventilation system).

6. *Deficiencies in Draft Preliminary Documented Safety Analysis* – Technical issues related to the PDSA have been adequately addressed by the NNSA response to the DNFSB Finding #4, Inadequate Identification of safety-related controls, functional requirements, and performance criteria. See the discussion of resolution status under the DNFSB Findings section of this report for additional details, specifically Finding #4.

3.2 DNFSB Findings

3.2.1 Finding #1 - CMRR Seismic Design

3.2.1.1 NNSA Actions

Finding #1, CMRR Seismic Design Issues, was issued on January 16, 2009. This finding highlights DNFSB concerns that the seismic and structural behavior of the facility is complex

and not well understood. NNSA provided an initial response on March 13, 2009. NNSA agreed that the structural response of the CMRR NF must be understood for PC-3 seismic design ground motions. NNSA also agreed that the Soil Structure Interaction (SSI) analysis is fundamental to understanding the seismic behavior of the NF. NNSA provided four studies assessing the seismic and structural behavior issues. After reviewing these studies, the Board's staff indicated to NNSA that additional work would be needed to address this Finding.

Subsequently, a meeting was held in early May 2009 to reach agreement on the path forward to close this Finding. NNSA committed to provide additional discussion of the complex structural behavior, and provide additional details on how future structural modeling will ensure that the complex structural behavior is understood and that the structure is capable of meeting Performance Category 3 requirements. The additional information derived from future structural modeling will be provided to the DNFSB, as it becomes available.

Below are detailed NNSA responses to the specific actions requested by the DNFSB to either resolve the issue or establish a plan for resolution.

1. The DNFSB requested structural drawings that clearly identify all load carrying structural elements and their dimensions without ambiguity, particularly slab thicknesses.

   In December 2008, the S-Series drawings for the CMRR NF were forwarded to the DNFSB. Walls 2-ft thick or more were shaded on the drawings to indicate that they are to be considered part of the lateral load resisting system. Slab thicknesses were indicated on the drawings.

   In June 2009, the Structural Behavior Report (Reference 3) was provided to the DNFSB. Attachment A to the Structural Behavior Report provided copies of the structural drawings issued as of April 30, 2009. The structural drawings will be revised to incorporate changes to the structure based on the recommendations from the Structural Behavior Report. Please see the response to Item # 10 for discussions on implementation of the recommended changes.

2. The DNFSB requested a detailed lateral load transfer model for the mezzanine floor that included all walls up to the laboratory floor and down to the basement floor. The DNFSB emphasized that this model should address potential large relative displacements that could develop from higher dynamic modes.

   A SAP2000-3 model was developed for the CMRR NF Security Category 1 Building and the Auxiliary Building to study the lateral loads transfer at the mezzanine level. 1-g static load cases were performed for the North-South, East-West and Vertical directions. The results of the SAP2000-3 model were provided to the DNFSB in February 2009.

   Dynamic responses of the CMRR structure were examined and described in the Structural Behavior Report provided to the DNFSB in June 2009 (Reference 3). As a part of the structural behavior assessment, the response of the building due to higher modes (which includes the response of the mezzanine) was evaluated. A design verification step will be included in the structural design process (see Chapter 5 *Design Criteria for the CMRR Nuclear Facility Structural Design Criteria*, Reference 4, and the flowchart in

Figure #1) which uses SSI section cut forces to assure that the seismic demands are properly incorporated into the design. The SSI results incorporate higher mode effects.

3. The DNFSB requested examples of 2D strip models for design of the NS and EW slab strips interior to the structure. The DNFSB emphasized that these strip models should include appropriate foundation calculations based on CMRR geotechnical data and that documentation of these examples should include discussion of what loads and relative displacements would be applied.

   The NNSA response provided in March 2009 indicated that the CMRR Project design team does not intend to use any vertical 2D strip models through the structure. The design team will design floor slabs and the basemat foundation for vertical loading using the SAFE slab design program. Floor diaphragms will be evaluated for the in-plane shear demand computed from SASSI analysis. Columns will be designed for axial loads resulting from vertical loads, as well as lateral story displacements (taken from SASSI) due to earthquake loading.

   The design of slabs is described in the Structural Design Criteria (SDC) (Reference 4), which specifies that the slabs will be designed with plate models using SAFE and includes loadings from supported walls and columns, as well as the stiffness from the supporting structural elements. Foundation displacements associated with response of the foundation mat resting on an elastic foundation will be included in the basemat calculations through the use of a sub-grade modulus. LANL will verify slab designs using a 3D model by comparison of design forces, and comparison of foundation displacements to Winkler spring results, as well as comparison of foundation displacements to Geotech results. It is noted that ground improvement being considered for the soft Qbt3L layer. Once implemented, foundation displacements will be minimized, reducing structural demands due to relative displacement.

4. The DNFSB requested a discussion of how the out-of-plane and in-plane forces/displacements would be used in the design of the wall along CL 9 and requested preliminary design calculations for this wall.

   A SAP2000 model was created of the shear wall along column line 9. Dead, live and earthquake loads for a 1-g acceleration were applied and 5 different load combinations were evaluated that would result in maximum in-plane shear and axial forces. The study, *9-Line Shear Wall Study for the CMRR (for 1-g Static Loading)*, Rev A, (2-27-2009) (100320-RPT-004, Rev A – Shear Wall) provided an example of how shear walls will be evaluated and was provided to the DNFSB in March 2009.

   NNSA provided an updated response in June 2009 to reflect that the structural responses in question are examined further in the Structural Behavior Report. Chapter 5 *Design Criteria for the CMRR Nuclear Facility Structural Design Criteria* has been revised to incorporate the effects of out-of-plane relative deformations on the walls in the development of basic design forces. The design verification step (described in Chapter 5 *Design Criteria for the CMRR Nuclear Facility Structural Design Criteria* and shown in Figure 1) is included in the structural design process which uses SSI section cut (or beam strip) forces to verify that the out-of-plane forces developed in the basic design is appropriate.

5. The DNFSB requested a discussion of how lateral loads on the slab between CL 11 and 12 at the mezzanine floor level are transferred and requested the CMRR Project team to provide preliminary design calculations for this slab.

   For the slab between CL 11 and 12 at the mezzanine floor level, the lateral load path is demonstrated using a SAP2000 3D model from CL 9 to 13 and A to R and an applied 1-g static load. The model results were provided to the DNFSB in March 2009.

   NNSA provided an updated response in June 2009 reflecting that the structural responses in question are examined further in the Structural Behavior Report. The SDC was modified to explicitly addresses chord steel and show example of planned addition of chord steel into the design. The in-plane shears used for basic design are extracted from the SSI analysis as described in Chapter 5 *Design Criteria for the CMRR Nuclear Facility Structural Design Criteria* and summarized in supplement description provided below the flowchart shown in Figure 1. A design verification step will be included in the structural design process (see flowchart in Figure 1) which uses SSI section cut forces to verify appropriateness of in-plane diaphragm force developed during the basic design.

6. The DNFSB requested preliminary design details for the NS walls at the interstitial level, the columns in the Laboratory level, and their connections.

   NNSA provided the requested information in March 2009. The connections between the columns and interstitial walls were evaluated under a 1-g static load using a SAP2000 3D finite-element model (FEM) to illustrate the lateral forces resisting elements in the CMRR NF. The design of the columns uses the software PCA Column V 3.6.1 and is based on the dead, live, and preliminary earthquake loads.

   In June 2009, NNSA provided an updated response. The details were provided on the structural drawing S-5301 included in Attachment A to the Structural Behavior Report, as well as Chapter 5 *Design Criteria for the CMRR Nuclear Facility Structural Design Criteria.*

7. The DNFSB requested a discussion of how the SSI soil model appropriately models the ground motions given the sloping site conditions with the South face of the building embedded less than the other sides and requested the project team to demonstrate that the ground motions are realistic at the foundation level and at the free field away from the structure.

   NNSA provided an initial response in March 2009, reflecting that this topic was addressed in the Seismic Analysis Plan (as written by Simpson Gumpertz & Heger, Inc. [SGH]). The updated plan incorporated responses to all of the submitted comments dated October 9, 2008. The new plan also included updated appendices on the backfill modeling sensitivity study, the mesh refinement sensitivity study, and the slab stiffness study. In the backfill study, a beam and column model for the structure is being used instead of the area element model to avoid unrealistic Poisson's ratio effects. In the mesh study, some cases are being added for increasing the slab modulus of elasticity to account for the stiffening effect of large column and wall supports. These studies were identified in Revision C of the Seismic Analysis Plan (as appendices) in the January 2009 draft.

In June 2009, NNSA provided an update to reflect that SSI input motions are developed at the foundation level consistent with the PSHA UHS/DRS (FIRS). The description of the analysis process that will be used to develop the FIRS was included in the revised Seismic Analysis Plan. A sketch provided a pictorial representation. Additionally, NNSA indicated that the Seismic Analysis Plan will be revised to incorporate the process used in the SSI analyses which will address potential modifications to the underlying soil; location, geometry and material properties of the berm soil located to the south of the structure; modeling of backfill material; and variations in embedment depth around the building.

8. The DNFSB requested a discussion of how forces/displacements from the 3D SSI analysis will be transferred to and designed for in the CMRR 2D structural design.

   The NNSA response provided in March 2009 reflected that story displacements are very small and that there will only be minor secondary moments at the ends of columns. The CMRR will be designed using a 3D FEM model (as opposed to the originally proposed 2D structural design). The *Seismic Design Plan* Revision 0A (2/26/2009) provided details of how SASSI output will be used in the seismic design (see Table 2, Sect. 5A.4). Section 5A.4.1 (of the *Seismic Design Plan*) also provided specific details of how the SASSI analysis results will be used to develop horizontal seismic forces (in Sect. 5A.4.1.1); vertical seismic forces (in Sect. 5A.4.1.2); and out-of plane inertial forces (in Sect. 5A.4.1.3) for shear walls. Section 5A.4.2 (of the *Seismic Design Plan*) provided details of how SASSI output will be used to calculate the slab design forces that are to be applied.

9. The DNFSB requested a discussion of how the SSI model will address in-structure relative displacement concerns.

   The NNSA response provided in March 2009 reflected that the displacements are negligible, due to stiffness of the elements involved. In the 3D model, the design team is using "very soft" springs that are parallel and adjacent to each of the columns. The "very-soft" springs extend the full length of each column. Each soft spring is about 10^{-4} times the stiffness of the adjacent column. From these "very-soft" springs, the relative displacements can be obtained.

10. The DNFSB requested the CMRR design team to develop and execute a Fixed Base model of the latest CMRR Structural configuration to ensure that overall static and dynamic behavior is understood.

    The CMRR design team presented the in-process results at the February 17-18, 2009 meetings with the DNFSB in Orange County, CA (at the SGH Offices). The CMRR Project design team began the SSI Analyses at the end of March 2009, and the SSI Report will be complete at the end of July 2009.

    At the request of DNFSB staff, a meeting was held in the DNFSB office in Washington, DC on Wednesday May 6, 2009 among the DNFSB staff, NNSA staff, LANL personnel, and Sargent and Lundy (S&L) Structural personnel to jointly review and understand the structural response and behavior of the CMRR building structure when subjected to

seismic forces. This structural behavior review was based on the results of 1g static analysis and dynamic modal analysis using the fixed base analysis model developed by SGH. In addition, studies of partial structural models with application of 1g static loads performed by S&L were discussed. The joint review concluded that the structural behavior of the CMRR NF when subjected to seismic forces is complex, and these complex responses must be captured in the seismic analysis for use in design.

In order to identify important attributes of the structural behavior and establish appropriate design approaches consistent with that behavior, a Structural Behavior Report was developed. As part of the process to support closure of Finding #1, the contents and recommendations of this report were presented to the Board during the review meeting held in Los Alamos, NM on June 9, 2009. Also presented during the review meeting were the revised Structural Design Criteria, Seismic Design Plan, and Seismic Analysis Plan which provides more explanations of seismic analysis and the seismic/structural design process.

Following the review of documents (Structural Design Criteria, Seismic Design Plan, etc.) the Board suggested the need for a flowchart that shows an integrated analysis and design process. Figure 1 – CMRR Structural Design Process provides a flowchart illustrating the planned approach for the integration of the overall approach for modeling and how it will be used for design, analysis, and verification of the design output. This flowchart is supplemented with a brief summary discussion that provides information related to a number of critical steps identified in the flowchart. The flowchart is described below.

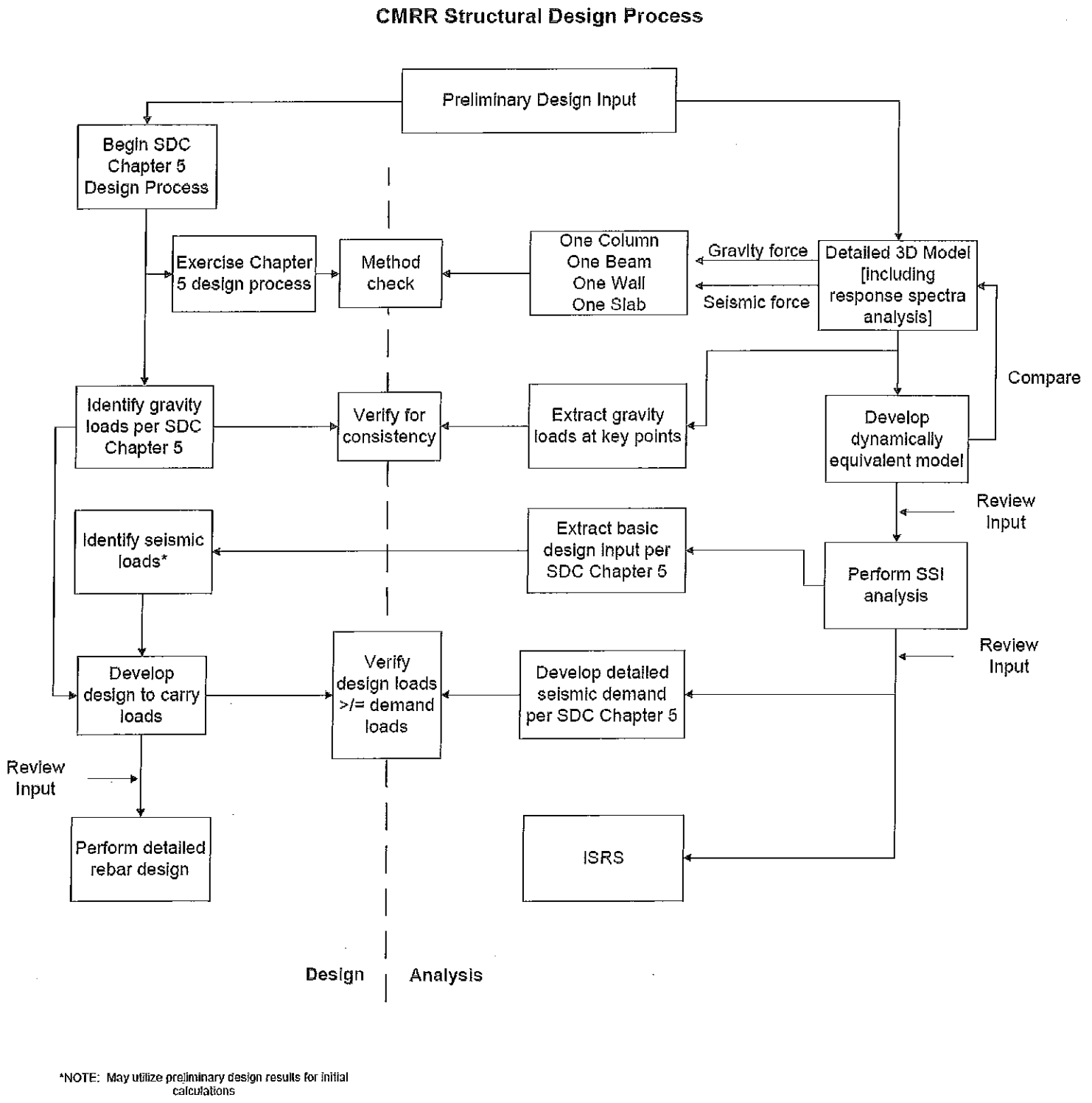

Figure #1 – CMRR Structural Design Process

Dynamic Equivalent Model

The dynamic equivalence of the coarsened model that will be used for the SSI analyses to the detailed 3D model will be demonstrated by comparison of the responses of the two models, both having fixed base boundary conditions. The responses that will be compared include; (1) displacements resulting from the application of static 1 g loads; (2) in-structure response spectra at critical locations; (3) forces and moments on section cuts at critical locations.

SDC Chapter 5 Design Process - Identify Seismic Loads

The design process to be performed by S&L is described in Structural Design Criteria, Chapter 5. The results of the seismic analyses, from SASSI, are used to develop basic design inputs that are provided to S&L. These basic design inputs, as described in Chapter 5, are summarized as:

- For shear walls (Appendix A of SDC)
  - Horizontal and vertical forces at diaphragm wall interfaces computed using maximum plate stresses from the SASSI analyses
  - Nodal accelerations for out-of-plane inertial forces
  - Nodal accelerations for in-plane inertial forces (used to compute additional inertial load between center the element center and element edge)
  - Maximum out-of-plane story displacement between top and bottom of shear walls
  - Out-of-plane demand due to lateral soil pressure on exterior walls is taken as the ASCE 4 elastic solution superposed on the out-of-plane demands computed from all other sources.
- For columns
  - Maximum relative end displacements to compute; bending moments, shears
  - Maximum axial load
  - Maximum nodal acceleration at each column support. Used to compute inertial demand due to self weight
- For roof girders
  - Maximum nodal accelerations for vertical inertial forces
  - Maximum nodal accelerations for horizontal inertial forces
- For elevated slabs
  - Nodal accelerations for out-of-plane inertial forces
  - Nodal accelerations for in-plane inertial forces (used to compute additional inertial load between center the element center and element edge)
  - Absolute (maximum) shear forces in elements along length of slab at slab/wall interface
- For basemat
  - Absolute (maximum) shear forces in elements along length of slab at slab/wall interface
  - Maximum vertical column forces

The basic seismic inputs, summarized above, are used to develop a set of "design forces and moments" that are used for design of the various structural elements, as described in Chapter 5 of the Structural Design Criteria.

Method Check

As a check of the Chapter 5 design process methodology, a step is included in the process to assess the ability of the design process methodology to develop acceptable designs. This step includes using the detailed 3D model to perform both static (gravity) and response spectrum analyses using fixed base boundary conditions. The basic design inputs, described above, will be extracted from the fixed base results for each element type (shear wall, column, beam, and diaphragm).

S&L will implement the portion of the design process described in Structural Design Criteria, Chapter 5 that develops design forces using input from the detailed 3D fixed base analysis. Design forces will be "checked" by comparison to design forces extracted directly from the detailed 3D fixed base analysis.

Extract Basic Design Input per SDC Chapter 5

At the completion of the SSI analyses, the results of the 3D seismic analyses will be used to produce basic input required for implementation of the Chapter 5 methodology. The 3D SSI results will also be used in a similar manner as described above to produce seismic demands at critical locations in the building.

Verify Design Loads Are Less Than Or Equal To The SSI Loads

Seismic demands (section cut forces, column shears and moments, etc.) will also be extracted from the 3D SSI results. These demands will be used to verify that the demands computed using the Chapter 5 methodology are consistent, or bounding, of the demands that are generated directly from the seismic analyses using the 3D SASSI analyses.

SSI Section Cut Forces

It should be noted that SASSI does not directly produce section cut forces and these demands are produced during post processing. The methodology used during post processing to generate "design forces and moments" on cut sections and its verification will be included in the calculations developed for the verification of the Chapter 5 design process methodology. Based on conversation with the DNFSB staff, the information provided to date, coupled with the commitment to the design process defined in Figure #1, will enable the DNFSB to close Finding #1.

3.2.2 Finding #2 - Seismic Design of Active Confinement Ventilation Systems and Support Systems

3.2.2.1 NNSA Actions

Finding #2, CMRR Seismic Design of Active Confinement Ventilation System and Support Systems, was issued on January 16, 2009. This Finding raised a concern with the design and qualification of safety-related active confinement ventilation system equipment given the

very high in-structure vertical seismic design motions currently estimated for the CMRR facility.
NNSA agreed that the risk associated with active confinement ventilation system must be understood and that NNSA must have confidence that equipment associated with this system can be seismically qualified during design. Designer and vendor interactions are necessary to confirm qualification of identified safety components can be achieved. NNSA committed to an active confinement ventilation system at PC-3 in the *Nuclear Safety Design Strategy, Rev 2 dated January 28, 2009.* Active confinement ventilation is credited as a Safety Significant PC-3 seismic SSC in the NNSA-approved PDSA for the CMRR NF. In March 2009, NNSA provided the following response:

1. The LANL seismic team undertook several studies to reduce input vertical motion prior to initiating the next SSI iteration. The CMRR Project Team prepared a summary of the recommended approach to developing ground motions for use in CMRR NF SSI Analyses which includes two sections: (1) Development of PSHA Consistent Response Spectra for Input to the SSI Analyses; and (2) Development of Time History Records for Use in SSI Analyses. Also, LANL committed to provide Strain-Compatible Soil Properties for Use in Soil-Structure Interaction Analyses based on the March Report as well as a validation of W. Silva's procedure/methodology and results.

2. For the primary and support equipment required for the reduced-flow active confinement ventilation systems, equipment vendors that serve the commercial nuclear industry were contacted in the Preliminary Design phase to assess the availability of equipment that would meet CMRR NF seismic-qualification requirements.

   Discussion with typical HVAC fan, HVAC filter plenum, electrical distribution, diesel generator and control equipment vendors confirmed that equipment supplied for the international commercial nuclear market in Taiwan and Japan were qualified to higher levels than typically seen in the United States. Certain equipment designs are sufficiently robust to withstand higher seismic motions. However in some cases, the use of seismic isolation approaches may be part of an equipment vendor's strategy to meet specific seismic response spectra.

   Early procurement plans are also included in the project work plans and schedule to purchase long-lead and safety-related equipment during the continuing Interim Design activities this calendar year. This strategy is intended to address both long engineering and manufacturing lead times for this equipment as well as allow sufficient time for seismic test development, execution, and evaluation including the potential use of seismic isolation strategies.

   The CMRR Project Team prepared a Safety-Related Equipment Seismic Qualification Plan which includes: a flowchart of the CMRR Seismic Qualification process, a summary table of Seismic Qualification of Major PC-3 Active Components; and a table of CMRR Preliminary Seismic Accelerations (by floor level, location in NF building, and worse case vertical instructure).
   Based on feedback from the DNFSB staff, NNSA committed to a peer review of the Safety-Related Equipment Seismic Qualification Plan by individuals with appropriate seismic design expertise.

In July 2009, the CMRR Project Team provided an update on the two issues related to this finding: (a) near-term studies to assess the potential conservatism in PC-3 vertical design basis ground motions, and revise PC-3 vertical design basis ground motions as appropriate, and (b) an assessment of equipment qualification related to both safety-class fire suppression system and safety-significant active ventilation system, and associated support system. The DNFSB requested that the CMRR Project Team document the approach to seismically qualify safety-related equipment to PC-3 design basis ground motions including potential use of seismic isolation for this equipment.

The Wong and Silva report (*Update of the Seismic Design Ground Motions for the CMRR Los Alamos National Laboratory, New Mexico*) presents the results of ongoing studies designed to investigate the conservatism in the design basis ground motion for CMRR. Specifically, the report presents the results on the CMRR site specific Uniform Hazard Response Spectra and Design Response Spectra that incorporate SSHAC Degree Level A issues which include;

- Use of NGA ground motion prediction equations,
- Inclusion of additional epistemic uncertainty (σ_{in}= 0.25) on the NGA models,
- Use of a refined suite of site-specific and empirical generic soil V/H ratios used to develop the site-specific vertical hazard, and
- Calculation of additional structural frequencies in the probabilistic hazard to better predict peak vertical response. These spectra represent a decrease in the spectral amplitudes of about 20% from the corresponding spectra as published in the 2007 Update of the Probabilistic Seismic Hazard Analysis (URS).

The CMRR Project Team and LANL are continuing to investigate conservatisms embodied in the 2007 work to include nonlinear response of soil due to p-waves. However, it is anticipated that this work will rise to the level of SSHAC issue degree levels B or C, and will involve more formal elicitation of alternate hypotheses to ensure that the Technical Integrator has properly captured the informed opinions of the scientific community when incorporating this effect into the LANL hazard. Dr. Jeffrey Kimball of the DNFSB Staff is aware of this ongoing work, and has been invited to participate in future workshops.

The ARES Report (ARES Independent Evaluation of Seismic Equipment Qualification of CMRR Facility) indicates that high seismic demand from PC-3 design basis ground motion (2500-year return period) imposed on active safety components planned for CMRR NF, but that similar active components have been qualified for use in active nuclear power plants. The report presents the use of documented engineering experience in the seismic qualification of safety related equipment from a plant located in a high seismic zone and reviews the qualification of equipment similar to those planned for use in CMRR NF. The review summarizes the available in structure demand on planned safety class components and concludes that there is a high degree of confidence that mechanical and electrical equipment can be qualified to the demands from the 2500-year design basis event. It should be noted that the in-structure response used in this study were based on the uniform hazard spectra from the 2007 UPSHA and that these spectra are expected to be reduced.

The contents of these reports (Update of the Seismic Design Ground Motions for the CMRR Los Alamos National Laboratory, New Mexico and ARES Independent Evaluation of

Seismic Equipment Qualification of CMRR Facility) were presented to the DNFSB during the review meeting held in Los Alamos, NM on June 9, 2009.

Based on conversations with DNFSB staff, the two reports should enable the DNFSB to close Finding # 2.

3.2.3 Finding #3 - Documenting and Maintaining Preliminary Documented Safety Analysis Safety-Related Functions and Requirements

3.2.3.1 NNSA Response

Finding #3, CMRR Documenting and Maintaining Preliminary Documented Safety Analysis Safety-Related Functions and Requirements, was issued on March 4, 2009. This Finding identifies inadequacies in the processes to control the integration and flow down of safety requirements from the PDSA into the design of safety-related systems. An NNSA response was provided on April 21, 2009. NNSA committed to revising the CMRR processes to control the integration and flow down of requirements from the PDSA into the design.

The NNSA committed to revising the System Engineering Management Plan (SEMP), CMP, and System Design Descriptions (SDDs) to explicitly incorporate the requirements from the PDSA. NNSA agreed that the safety functions and functional requirements should be explicitly listed in the appropriate SDDs. A detailed schedule for the completion of these activities (along with the remainder of the work to address the NNSA COAs contained in the Preliminary Safety Validation Report [PSVR]) was provided to the DNFSB. The update of the associated plans and implementing procedures (i.e., SEMP, CMP, SDDs) was encompassed by those action required to address COA-6.

In order to address the long-term consistency of the safety function and functional requirements within the PDSA and the SDDs, the CMRR Project Team committed to include these elements in the CORE database and reports for all of the documentation generated from CORE. This included the PDSA and the SDDs. This is not intended to take the ownership of these descriptions from the safety basis team, but to place them into a common place for configuration control. The details of the schedule to accomplish this explicit conformance are included in the COA-6 portion of the schedule.

The most recent DNFSB quarterly report to Congress (dated June 22, 2009) reflects that no additional actions are needed to address Finding #3 prior to certification. The DNFSB has accepted the NNSA plan and expects the revised processes to yield acceptable results post-certification.

3.2.4 Finding #4 - Inadequate Identification of Safety-related Controls, Functional Requirements, and Performance Criteria

3.2.4.1 NNSA Actions

Finding #4, CMRR Inadequate Identification of Safety-related Controls, Functional Requirements, and Performance Criteria, was issued on March 16, 2009. This Finding identifies weaknesses in the safety-related controls specified in the CMRR PDSA,

particularly with the functional requirements that each safety-related system is required to meet. NNSA provided a response on April 14, 2009.

NNSA committed to completing a revision to the PDSA to ensure the safety function and functional requirement descriptions thoroughly and comprehensively describe all safety-class and safety-significant controls and their support systems that envelope the identified events in the PDSA hazard analysis scenarios (in appendix 3B). The CMRR Project Team developed a series of tables for inclusion in the revised PDSA to show these relationships and improve the traceability. NNSA provided the results (i.e., draft PDSA tables) to the DNFSB, as they were developed. NNSA noted that COA-8 of the PSVR identified a similar need for improved traceability of safety-related controls.

Finding #4 identified two elements. First, in the attachment to the Finding, DNFSB staff provided specific examples where the documented system response to a hazard analysis scenario might not be complete. Similar comments to these were identified by the NNSA review team during the review of PDSA (Revision G3) and included in the resulting NNSA PSVR and COAs. The resolution of the specific set of comments included in COA-1 and COA-2 to the PSVR were to ensure the demands imposed on systems are complete. NNSA reflected that the schedule for completion of the resolution of the identified issues was included in the response to DNFSB Finding #3.

The second element identified in Finding #4, was the adequacy and completeness of the safety function and functional requirement descriptions in the PDSA given the demands identified in the hazard analysis. The NNSA committed to performing a systematic re-evaluation of the defined safety functions and functional requirements to ensure that in a complete and comprehensive fashion, they are consistent with hazard and accident analysis as credited. This commitment was encompassed in COA-8 of the NNSA PSVR.

The CMRR Project Team developed a work instruction for the completion of this effort and a copy was provided to the DNFSB. The schedule for completion of the work was included in the schedule provided in the NNSA response to Finding #3 and Finding #5. The specific activities were included under COA-6 and COA-8. NNSA viewed the efforts linked with the commitments for consistency in the documentation of safety functions and functional requirements between the documentation within the PDSA and the implementing SDDs.

As reflected in the most recent quarterly report to Congress (June 22, 2009), the DNFSB agreed to these actions, but was awaiting the results of the re-evaluation. Subsequently, revised PDSA hazard analysis tables incorporating the results of Process Hazard Analyses (PrHAs) and updated Criticality Safety Evaluations (CSEs) have been provided to the DNFSB, along with the new PDSA tables used to improve traceability between the hazard and accident analyses and the derived safety functions, functional requirements and performance criteria for safety-related structures, systems and components (SSCs). The above information was transmitted to DNSFB for closure of Finding #4 and will be utilized in development and eventual approval of the PDSA.

3.2.5 Finding #5 - System Design Descriptions Do Not Incorporate Preliminary Documented Safety Analysis Requirements Adequately

3.2.5.1 NNSA Actions

Finding #5, CMRR System Design Descriptions Do Not Incorporate Preliminary Documented Safety Analysis Requirements Adequately, was issued on March 30, 2009. This Finding identified inconsistencies in safety functions and functional requirements between the CMRR PDSA and SDDs for safety-related systems. The SDDs are used to ensure that the design of a safety system meets its specified safety function. NNSA provided a response on April 21, 2009.

The response provided by NNSA was similar to that provided for Finding #3. NNSA agreed that the safety functions and functional requirements should be explicitly listed in the appropriate SDD. The CMRR Project Team provided a detailed schedule for the completion of these activities along with the remainder of the work to address the COAs contained in the NNSA PSVR.

To address the consistency of the safety function and functional requirements within the PDSA and the SDDs for the long-term, the CMRR Project Team committed to include these elements in the CORE database and reports for all of the documentation generated from CORE. This included those portions of the PDSA and the SDDs produced using the CORE database. NNSA included the details necessary to accomplish this explicit conformance in the COA-6 portion of the schedule. The approach also addressed the commitments under the response to Finding #4.

As reflected in their most recent report to Congress (June 22, 2009), the DNFSB considers that no additional actions are needed to address this Finding prior to certification. The Board will review the revised SDDs as they become available to validate their quality and adequacy in fulfilling the NNSA commitment.

4.0 Chronology of Key Events

- September 29, 2006 - House Conference Report 109-702 requires DNFSB to furnish a quarterly report on the status of significant unresolved technical differences between the Board and DOE concerning design and construction of DOE's defense nuclear facilities
- February 15, 2007 – DNFSB's first quarterly report to Congress identifies five unresolved issues on the CMRR Project: (1) Design-build acquisition strategy; (2) Site characterization and seismic design; (3) Safety-significant active ventilation system; (4) Safety-class fire suppression system; and (5) Safety-class and safety-significant container design
- January 16, 2009 – DNFSB transmits two (2) separate letters, each with an associated Finding Form (Finding #1 - *CMRR Seismic Design* and Finding #2 - *Seismic Design of Active Confinement Ventilation Systems and Support Systems*)

- October 2008 – National Defense Authorization Act for FY 2009 requires the NNSA Administrator and the DNFSB to each submit a certification to the congressional defense committees stating that the concerns raised by the DNFSB regarding the design of the CMRR safety class systems (including ventilation systems) and seismic issues have been resolved prior to making more than $50,200,000 of the appropriation available for use
- February 17-18, 2009 – DNFSB staff meet with CMRR Project Team in Orange County, CA to review preliminary design and seismic response information
- March 4, 2009 – DNFSB transmits a third Finding Form (Finding #3 - *Documenting and Maintaining Preliminary Documented Safety Analysis Safety-Related Functions and Requirements*)
- March 11, 2009 – NNSA transmits response to DNFSB Finding Form (Finding #1 - *CMRR Seismic Design*)
- March 11, 2009 – NNSA transmits response to DNFSB Finding Form (Finding #2 - *Seismic Design of Active Confinement Ventilation Systems and Support Systems*)
- March 16, 2009 – DNFSB transmits a fourth Finding Form (Finding #4 - *Inadequate Identification of Safety-related Controls, Functional Requirements, and Performance Criteria*)
- March 30, 2009 – DNFSB transmits a fifth Finding Form (Finding #5 - *System Design Descriptions Do Not Incorporate Preliminary Documented Safety Analysis Requirements Adequately*)
- April 21, 2009 – NNSA transmits response to DNFSB Finding Form (Finding 3- *Documenting and Maintaining Preliminary Documented Safety Analysis Safety-Related Functions and Requirements*)
- April 21, 2009 – NNSA transmits response to DNFSB Finding Form (Finding #4 - *Inadequate Identification of Safety-related Controls, Functional Requirements, and Performance Criteria*)
- April 21, 2009 – NNSA transmits response to DNFSB Finding Form (Finding #5 - *System Design Descriptions Do Not Incorporate Preliminary Documented Safety Analysis Requirements Adequately*)
- May 6, 2009 – NNSA, LANL, CMRR Project Team meet with DNFSB in Washington, DC to discuss seismic design criteria, seismic analysis plan, and design process for CMRR Nuclear Facility
- June 22, 2009 - DNFSB eighth quarterly report to Congress identifies five issues on the CMRR Project remain unresolved: (1) Site characterization and seismic design; (2) Safety-significant active ventilation system; (3) Safety-class fire suppression system; (4) Safety-class and safety-significant container design; and (5) Deficiencies in Draft Preliminary Documented Safety Analysis
- August 2009 - NNSA transmits updated response to DNFSB Finding Form (Finding #1 - *CMRR Seismic Design* and Finding #2 - *Seismic Design of Active Confinement Ventilation Systems and Support Systems*)
- August 2009 - NNSA transmits updated response to DNFSB Finding Form (Finding #4 - Inadequate Identification of Safety-related Controls, Functional Requirements, and Performance Criteria

5.0 Documents Provided to the DNFSB

Transmittal Number	Date	Description
09-DTF-764	07/30/2009	CMRR-PLAN-PM-1902, Project Management Plan
09-DTF-723	07/21/2009	Table 3-37 Second Submittal, Structure, Fire Barriers, UPS, Diesel, Emerg Power, Engine Gen., Submittal Summary, List of Haz Assessment Changes, HA Summary Tables 3-9 thru 3-14 and 3-16
09-DTF-705	07/16/2009	100320-ECAL-00001, Rev. A and ETAP Files.pdf, Short circuit calculation 13568-109NF-ECAL-001-RD.070604, ETAP source file associated with electrical load
09-DTF-591	06/22/2009	CMRR-AP-ENG-0308: Technical Baseline Change Control CMRR-AP-ENG-0310: Design Information Transmittal CMRR-AP-ENG-0312: Project Interface Control Document CMRR-PLAN-ENG-0304: Technical Interface Management CMRR-CHTR-SAB-2202: Safety Design Integration Team Charter
09-DTF-555	06/11/2009	S+L_Dan_Geers_6-11-2009_signed-by-MWE.pdf, 0833308 01-SCAL-001 Rev 0A_21Apr09_SGH_Mesh Refinement Sensitivity Study.pdf, 0833308 01-SCAL-003 Rev 0A_21Apr09_SGH_Slab Stiffness Sensitivity Study.pdf 0833308.01-SCAL-002 RevA 20May09_SGH_Backfill Study.pdf 0833308.01-SCAL-004 Rev A_1-May-09_SGH_CMRR Fixed Base Model.pdf 08333080112_ARES_Report_on_Equipment_Qualification_Rev B.pdf, CMRR Cert_9Jun09_Wong_+Silva.ppt, CMRR NF Seismic Analysis Plan Update 06-09-09_sas.ppt, D5_09-33 Structural Behavior Report 6-02-09.pdf, Finding1-10 points_Tom-Houston_12PM_6-08-2k9.ppt, FoundationMitigationAlternative_rev e_6-05-2k9_1030AM.doc, Intro CMRR Cert Stats_Salmon_+_Rich-Lee_6-09-2k9.ppt, LANL CMRR_PSHA_figures_5-22-2k9.pdf, LANL Update_Ground_Motions_CMRR Facility_draft_5-22-2k9.pdf, PRESENTATION CMRR-Seismic Equip Qual-6-10-09.ppt, Seismic Analysis Plan_RevD 06-05-2009.pdf, Structural Behavior Presentation_Mertz_+Houston_06-09-2009.ppt
09-DTF-546	06/10/2009	SGH SCAL-001, SCAL-002,SCAL-003, CMRR-DC-002 CH 5 REV 0B DRAFT,CMRR-DC-002 CH5A PART II REV 0B DRAFT
09-DTF-541	06/09/2009	1CD containing PDSA G4 Submittal to DNFSB
09-DTF-529	06/08/2009	CMRR-AP-ENG-0308, Technical Baseline Change Control, partially signed. LA-UR-06-3036, Gamma Spectrometry Challenges in the Analysis of Neutron Irradiated Uranium Samples
09-DTF-538	06/08/2009	Draft copy of CMRR-PLAN-PM-1902, Project Management Plan
09-DTF-540	06/08/2009	CD w/ SGH SCAL-004 Fixed Base Model Report May 1, 2009 plus supporting files, S & 1 DRAFT Structural Design Criteria, Rev. 0B June 5, 2009, S & L DRAFT Seismic Design Plan, Rev 0B, June 5, 2009, SGH Seismic Analysis Plan Rev. D, June 5, 2009
09-DTF-523	06/04/2009	CD with SGH SCAL-004 Fixed base model Report May 1,2009

Transmittal Number	Date	Description
		plus supporting files
09-DTF-515	06/03/2009	CD with four files, Structural Behavior Report for CMRR NF, ARES Report on Equipment Qualification, LANL Update Ground Motions CMRR Facility, LANL CMRR PSHA Figures
09-DTF-497	06/02/2009	CMRR-PLAN-PM-0101, R2, Program Requirements Document for Approval Signature
09-DTF-498	06/02/2009	Programmatic Requirements for MAR Values for the CMRR Nuclear Facility
09-DTF-419	05/04/2009	SCAL-007, Glovebox 1x3x1 Enclosure Calc.
09-DTF-402	04/29/2009	Resume for Paul Baughman and Mohsin Khan
09-DTF-354	04/07/2009	SCAL-001 Mesh Refinement Study SCAL-003 Slab Stiffness sensitivity Study SCAL -001 CD
09-DTF-341	04/01/2009	Draft PDSA G3
09-DTF-340	03/31/2009	Kleinfelder Report DCN 101492.2.3-ALB09RP001
09-DTF-280	03/04/2009	DNFSB Comment Responses: container comment doc1 rev0 Draft Response.pdf, DNFSBfireprotectionresponsesPDSA.doc.pdf, DNFSBPDSA&Strategy.pdf, DNFSBPDSAcontainercomments.pdf, electrical comment doc1 rev0_Draft_Response_1a.pdf, electrical comment doc2 rev0_Draft_Response_1a.pdf, electrical comment doc3 rev0_Draft_Response_1a.pdf, ventilation comment doc1a Draft Response.pdf, ventilation comment doc1b Draft response.pdf, ventilation comment doc1c Draft response.pdf
09-DTF-266	03/02/2009	CMRR NF Diesel Generator Sizing and Arrangement Evaluation Report, Rev. A, WBS 2.02.03, date 7/24/08, CMRR NF Overall One-Line Diagrams Group A (E-6001), B (E-6002), and C (E-6003), Interim Design Extension 60% Review, date 11/25/08
09-DTF-247	02/26/2009	Fire Technology Document Protection of Duct Openings in 2 hour fire resistant walls and partitions Evaluation of Duct Openings in 2 hour fire resistant walls and partitions Revised Prototype Submittal - Revised to Incorporate Test Agency Comments -- Merrick Document
09-DTF-193	02/10/2009	SB-DO-CALC:07-044, CMRR-PLAN-ENG-2801, LA-CP-99-99, LA-CP-04-0857, LA-CP-04-0008, LA-CP-04-0874, LA-CP-05-0362, LA-CP-07-0152, LA-UR-00-1769, LA-13482-MS, NCS-TECH-08-026, INP Workshop Briefing Materials, NMT-DO(U)06-065, and Fire Hazards Analysis of Rocky Flats Building 776/777 Duct Systems 12/88
09-DTF-178	02/09/2009	CMRR-DC-002-CH5, Rev.0A, CMRR-DC-002-CH5,Part II Attach D, CMRR-DC-002-CH5,Part II Attach B, CMRR-DC-002-CH5,Part II Attach C, CMRR-DC-002-CH5,Part II Rev. 0A, Structural Design Criteria D5 Comment Responses, Structural Design Plan D5 Comment Responses
09-DTF-187	02/09/2009	1 CD containing CMRR-DC-002-CH5A_PART 2_ATTACH A

Transmittal Number	Date	Description
		S&L Request for ISRS Locations 2-6-09, DIT-CMRR-07-0012-2
09-DTF-157	02/02/2009	Seismic Analysis Plan for CMRR, Revision C dated January 2009
09-DTF-160	02/02/2009	SB-DO-CALC:01-044, Natural Gas Excavation Accident Analysis, August 2007
09-DTF-160	02/02/2009	SB-DO:CALC-07-029, CMRR Buoyant Plume Dispersion/Explosion Analysis, John Hargreaves, November 2007
09-DTF-160	02/02/2009	SB-DO:CALC-07-053, Estimating the CMRR Laboratory Operations Area Material-at-Risk form distribution at the bounding Authorization Basis limit
09-DTF-160	02/02/2009	SB-DO: CALC-08-042, CMRR Glovebox Fire Modeling Using Fire Dynamic Simulator
09-DTF-160	02/02/2009	SB-DO: CALC-08-043, Simplified MELCOR Leak Path Factor Modeling for CMRR
09-DTF-160	02/02/2009	SB-DO-CALC: 08-044, CMRR Buoyant Natural Gas Plume Dispersion and Explosion Analysis for 3-Inch Line Break at 70 Meters
09-DTF-160	02/02/2009	SB-DO: CALC-08-045 CMRR Buoyant Natural Gas Plume Dispersion and Explosion Analysis for 8 Inch Line Break at 70 Meters
09-DTF-160	02/02/2009	SB-DO: CALC-08-046 CMRR Buoyant Natural Gas Plume Dispersion and Explosion Analysis for 4 Inch Line Break at 70 Meters
09-DTF-160	02/02/2009	SB-DO: CALC-08-054, CMRR Criticality Event Dose Consequences
09-DTF-160	02/02/2009	SB-DO: CALC-08-056, Chemistry & Metallurgy Research Replacement Facility - Dropbox to Dropbox Fire Spread Investigation
09-DTF-160	02/02/2009	CMRR-PLAN-ENG-2801, Rev. 0A, CMRR Functional and Operational Requirements
09-DTF-160	02/02/2009	LA-CP-99-0099, Key Research and Chemistry Capabilities and Capacities in the Chemistry and Metallurgy Research (CMR) Building, Moy, Ming ; Leasure, Craig S., May 1999
09-DTF-160	02/02/2009	LA-CP-04-0857, CMRR Project Open Front Hood Use Analysis Report, November 2004
09-DTF-160	02/02/2009	LA-CP-04-0008, Needs Assessment – Fire Prevention and Suppression Services and Resources, Los Alamos National Laboratory, Los Alamos, New Mexico, Revision 0, 6/7/04.
09-DTF-160	02/02/2009	LA-CP-04-0874, Chemistry and Metallurgy Research Facility Replacement Project Preliminary Hazard Analysis. Los Alamos National Laboratory report, Los Alamos, NM. December 21, 2004.
09-DTF-160	02/02/2009	LA-CP-05-362, Los Alamos Integrated Nuclear Planning: History and Status to Date, Kornreich, Drew E.; Nuckols, Matthew M. , April 2005
09-DTF-160	02/02/2009	LA-CP-07-0152, Preliminary Safety Design Guidance for the Chemical and Metallurgical Research Replacement Facility Long Term Vault, February 12, 2007
09-DTF-160	02/02/2009	LA-UR-08-1769, Water Resources of the Nile Basin - Extreme Events, Climate Change, and Regional Security, Geernaert, Gerald,

Transmittal Number	Date	Description
		April 2008
09-DTF-160	02/02/2009	LA-13482-MS, Minimum Analytical Chemistry Requirements for Pit Manufacturing at Los Alamos National Laboratory, August 1998
09-DTF-160	02/02/2009	13568-109NF-NCAL-011, Rev. 1
09-DTF-160	02/02/2009	13568-109NF-VV-012, Certification and Validation for POSTMAX Software
09-DTF-160	02/02/2009	13568-109NF-VV-017, CMRR MELCOR 1.8.6 Case Code RP Verification and Validation Analysis, Nov. 2006
09-DTF-160	02/02/2009	13568-109NF-RPT-016, Fire Protection Design Approach for Gloveboxes for the Chemistry and Metallurgy Research Replacement (CMRR) Nuclear Facility Preliminary Design Project, Revision 1, DMJMH&N, Los Alamos, NM, 07/16/08.
09-DTF-160	02/02/2009	13568-109NF-RPT-023, Smoke Control for the Chemistry and Metallurgy Research Replacement (CMRR) Nuclear Facility
09-DTF-160	02/02/2009	Review of Calculation 13568-109NF-NCAL-007, Hans Jordan, Los Alamos National Laboratory, May 2007.
09-DTF-160	02/02/2009	NCS-TECH-08-026, Preliminary Criticality Safety Evaluation for the Fire Protection Concerns in the CMRR NF, October 2008
09-DTF-160	02/02/2009	Memo 08-CMRR-275, L. Schulte to B. Gallimore, November 4, 2008, Safety Significant Oxygen Monitors for Pyrophoric Operations in CMRR
09-DTF-160	02/02/2009	INP Workshop Briefing Materials (OUO/UCNI). Workshop #1 held April 18, 2001, Workshop #2 held July 11, 2001, both at DOE/AL
09-DTF-160	02/02/2009	Greenaugh, K. C., Office of Military Application and Stockpile Operations, "Validation Study Results: Chemistry and Metallurgy Research Replacement - Nuclear Facility (CMRR-NF)" (UCNI), National Nuclear Security Administration, Nov. 21, 2008.
09-DTF-160	02/02/2009	Kohler, J., "Bolas Grande Project Options and Alternatives Evaluation: Comparison of Potential Facility/Receiver Sites Against Programmatic and Project Requirements," Los Alamos National Laboratory, Cover Memo NMT-DO(U)06-065, March 27, 2006.
09-DTF-160	02/02/2009	Fire Hazards Analysis of Rocky Flats Building 776/777 Duct Systems, Hughes Associates, Inc., Baltimore, MD, 12/88.
09-DTF-160	02/02/2009	T-CLC-F-00335, FB-Line 3013 Can Assembly Fire Analysis
09-DTF-160	02/02/2009	LANL Implementation Support Document (ISD) 341-2, Engineering Standards Manual, Chapter 2, Fire Protection, Section D40, Fire Protection, Revision 1, dated 06/18/08.
09-DTF-160	02/02/2009	Insurance Services Office, Inc. (ISO) Memorandum, ISO "Public Protection Classification" Report for Los Alamos County, November 2004, from ISO to Max Baker, Los Alamos County Manager, ISO, Chicago, IL, 4/25/05.
09-DTF-124	01/22/2009	Memo D5:09-001, Site-Specific Ground Motion for use in CMRR Design dated 01/09/09
09-DTF-124	01/22/2009	3 CMRR PC3 Timehist.txt documents
09-DTF-122	01/21/2009	Loss of Cooling in Long Term vault 1-2009

Transmittal Number	Date	Description
		Unclassified Controlled Nuclear Information 11-14-2008 CMRR Project Calculation Summary Sheet 06-06-08
Via Email	12/01/2008	S-1100 CMRR NF Basement Foundation Rev E
Via Email	12/01/2008	S-1200 CMRR NF Basement Mezzanine Rev E
Via Email	12/01/2008	S-1300 CMRR NF Laboratory Level Floor Rev E
Via Email	12/01/2008	S-1400 CMRR NF Interstitial Level Floor Rev E
Via Email	12/01/2008	S-1500 CMRR NF Main Roof Plan Rev E
Via Email	12/01/2008	S-1600 CMRR NF Aux Bldg Penthouse Floor and Roof Plan Rev E
Via Email	12/01/2008	S-3001 CMRR NF Longitudinal Bldg Sections Rev E
Via Email	12/01/2008	S-1301 CMRR NF Transverse Bldg Sections Rev E