NAC INTERNATIONAL

Atlanta Corporate Headquarters
3930 East Jones Bridge Road, Suite 200
Norcross, GA 30092
Phone 770-447-1144
www.nacintl.com

November 18, 2016

U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2738

Attn: Document Control Desk

Subject: Submittal of Replacement Pages to Update the NAC-UMS® FSAR from Revision 10 to Revision 11 (Docket No. 72-1015)

Reference:
1. ED20120128, Submittal of Replacement Pages to Update the NAC-UMS FSAR from Revision 9 to Revision 10 (Docket No. 72-1015), NAC International, November 1, 2012
2. ED20140126, Biennial Update to the NAC-UMS FSAR for the Reporting Period (November 2012 – November 2014), November 17, 2014

In accordance with the requirements of 10 CFR 72.248, NAC International (NAC) herewith provides one copy of the changed pages necessary to complete the update of the NAC-UMS Universal Storage System Final Safety Analysis Report (FSAR) to Revision 11.

Revision 11 of the NAC-UMS FSAR is based on Reference 1 and on the changes that have been reviewed and incorporated by NAC under the 10 CFR 72.48 regulation. A certification of the accuracy of the Revision 11 changes by a duly authorized officer of NAC is provided as Enclosure 3.

A 10 CFR 72.48 Determination Summary Report for the NAC-UMS® Universal Storage System for the period of November 2014 – November 2016 is provided as Enclosure 1 for your information. A detailed description of all of the changes incorporated in Revision 11 of the NAC-UMS FSAR is provided in the List of Changes for the NAC-UMS FSAR, Revision 11, as Enclosure 2.

Consistent with NAC administrative practice, NAC-UMS FSAR, Revision 11, changed pages are uniquely identified by the revision number located in the header of each page. Revision bars mark the FSAR text changes.

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NMSS

ED20160108

If you have any questions regarding this letter, please feel free to contact me on my direct number at 678-328-1236.

Sincerely,

Wren Fowler
Director, Licensing
Engineering

Enclosure 1: 10 CFR 72.48 Determination Summary Report for the NAC-UMS® Universal Storage System (Period Covered: November 2014 – November 2016)

Enclosure 2: List of Changes for the NAC-UMS® FSAR, Revision 11

Enclosure 3: Certification of the Accuracy of the Revision 11 Changes

Enclosure 4: Replacement pages to update the NAC-UMS® Universal Storage System Final Safety Analysis Report from Revision 10 to Revision 11

November 2016

NAC-UMS

Universal Storage System

10 CFR 72.248 and 10 CFR 72.48(d)(2) 24-Month Updates

Docket No. 72-1015

NAC INTERNATIONAL

Atlanta Corporate Headquarters: 3930 East Jones Bridge Road, Norcross, Georgia 30092 USA
Phone 770-447-1144, Fax 770-447-1797, www.nacintl.com

Enclosure 1

10 CFR 72.48 Determination Summary Report

for the

UMS FSAR, Revision 11
(Docket No 72-1015)

Period Covered:
November 2014 – November 2016

NAC International

November 2016

72.48 Determination ID #NAC-15-UMS-005

Change Description

Chapter 12C, Revised the first paragraph of Surveillance Requirements, SR 3.1.6.1.

Chapter 12C, Section 3.1.6.1, page 12C3-31.

Source of Change: 72.48 Determination ID #NAC-15-UMS-005

Originating Document: DCR(L) 790-FSAR-10A

This DCR(L) revised the text in Chapter 12C, Section 3.1.6.1 to clarify an inconsistency between the Technical Specification (TS), TS bases and Final Safety Analysis Report (FSAR) accident analysis.

Specifically, the bases for Surveillance Requirement (SR) 3.1.6.1 previously described the system as being inoperable when one or more air inlet or outlet vents are completely blocked. This was revised to state that partial blockages of less than two air inlet or outlet screens or the equivalent effective screen area does not result in the heat removal system being unable to provide adequate heat removal.

72.48 Determination ID #NAC-15-UMS-007

Change Description

Revised the text in Chapter 3, Section 3.4.1, and 3.8.

Chapter 3, TOC page 3-ii, Section 3.4.1, page 3.4.1-9, and Section 3.8, pages 3.8-1 and 3.8-21 through 3.8-26.

Source of Change: 72.48 Determination ID #NAC-15-UMS-007

Originating Document: DCR(L) 790-FSAR-10B

This DCR(L) revised the text in Chapter 3, adding PPG Dimetcote 9 as an acceptable primer to be used in lieu of PPG Metalhide 97-694 series.

The following FSAR pages were changed:

1. Page 3-ii, Added 3.8.8 PPG Dimetcote 9.
2. Page 3.4.1-9, Section 3.4.1.2.3, 2nd paragraph at top of page, after "PPG METALHIDE® 97-694 Series Primer" added "or PPG Dimecote 9".
3. Page 3.4.1-9, Section 3.4.1.2.4, 1st paragraph, after "PPG METALHIDE® 97-694 Series Primer" added "or PPG Dimecote 9".
4. Page 3.8-1, Section 3.8, 1st paragraph, after "PPG METALHIDE® 97-694 Series Primer" added "or PPG Dimecote 9".
5. Added new section 3.8.8, PPG Dimetcote 9 project data sheet, October 28,2015.

72.48 Determination ID #NAC-16-UMS-005

Change Description

Revised Chapter 1, Section 1.5, Table 1.5-1; Chapter 2, Section 2.3.1 and Table 2.3-1.

Chapter 1, Section 1.5, Table 1.5-1 pages 1.5-2 and 1.5-4; and Chapter 2, page 2-iv, Section 2.3.1, pages 2.3-1 through 2.3-2, and Table 2.3-1, pages 2.3-12 thru 2.3-19.

Source of Change: 72.48 Determination ID #NAC-16-UMS-005

Originating Document: DCR(L) 790-FSAR-10D

This DCR(L) revised the FSAR to update Table 2.3-1 based on current list of components and Q Category based on latest License/Design Drawings and Q List 790-Q-01, and changed the title to Quality Category Classification of NAC-UMS. Need for changes identified in YR CR 16-38 and CY CR 16-58 and evaluated as an extent of condition to UMS FSAR.

1. Revised Chapters 1 and 2 of UMS FSAR to revised/updated Table 2.3-1 to incorporate all current components identified on approved and submitted UMS License Drawings and to add the Q Category of all listed components based on latest revisions to the applicable Design Drawings and Quality List 790-Q-01.
2. Revised references in Chapters 1 and 2 to correct title reference to Table 2.3-1 to Quality Classification of Universal Storage System Components from "Safety Classification", as quality classification is appropriate designation based on NAC QP 7-3 and NUREG/CR-6407. A new quality category was added to FSAR section 2.3.1 (i.e., NQ).
3. Minor editorial/formatting changes were made on Table 1.5-1.
4. Corrected quality classifications for Drawing 412-502 Items 6 and 14, "Filter Screen" from Cat B to Cat C, and Item 13, "Support Ring" from Cat A to Cat B in accordance with QCA Q-412-102-S1, R0.

72.48 Determination ID #NAC-16-UMS-007

Change Description

Incorporation of DCR(L)s 790-FSAR-10A, -10B, -10D and 790-585-21A into Revision 10 to create Revision 11 of the UMS FSAR.

Revised License Drawing 790-585, incorporates DCR(L)s 10A, 10B and 10D

Source of Change: 72.48 Determination ID #NAC-16-UMS-007

Originating Document: DCR(L) 790-FSAR-10E incorporated DCR(L)s 790-FSAR-10A, -10B, -10D and 790-585-21A into Revision 10 to create Revision 11 of the UMS FSAR.

Changes to the List of License Drawings were made to reflect the as following revised drawing:

DCR(L) 790-585-21A:
Sheet 1:

1. Revised Delta Note 21: "For assemblies 98 and 97 (BWR) weld size is (1/2), For Assy 99, 96, and 95 (PWR) minimum weld depth of bevel is .36" for a weld size of (3/8) nominal to (5/16) minimum." , was "For assemblies 98 and 97 (BWR) weld size is (1/2). For assy 99, 96, and 95 (PWR) weld size is (3/8)."

Enclosure 2

List of Changes

for the

UMS FSAR, Revision 11
(Docket No 72-1015)

NAC International

November 2016

List of Changes for the UMS FSAR, Revision 11

Incorporates 10 CFR 72.48 changes for the period November 2014 through November 2016

Chapter/Page/ Figure/Table	Source of Change: DCR(L)/ 72.48	Description of Change
Note:	The List of Effective Pages and the Chapter Table of Contents, List of Figures and List of Tables have been revised accordingly to reflect the list of changes detailed below.	
Chapter 1		
Pages 1.5-2 and 1.5-4, Table 1.5-1	DCR(L) 790-FSAR-10D NAC-16-UMS-005	Modifiedd text in the "Description of Compliance" column of Table 1.5-1 for Item 1 of Chapters 1 and 2.
Page 1.8-1	DCR(L) 790-FSAR-10E NAC-16-UMS-007	Updated the List of Drawings to reflect Revision 22 of License Drawing 790-585.
Chapter 2		
Page 2-iv	DCR(L) 790-FSAR-10D NAC-16-UMS-005	Modified the title of Table 2.3-1.
Page 2.3-1 thru 2.3-2	DCR(L) 790-FSAR-10D NAC-16-UMS-005	Modified the second paragraph and added the last bullet to Section 2.3.1.
Pages 2.3-12 thru 2.3-19, Table 2.3-1	DCR(L) 790-FSAR-10D NAC-16-UMS-005	Modified Table 2.3-1 throughout.
Chapters 3		
Page 3-ii	DCR(L) 790-FSAR-10B NAC-15-UMS-007	Added Section 3.8.8 to the TOC.
Page 3.4.1-9	DCR(L) 790-FSAR-10B NAC-15-UMS-007	Added text to the second and fourth paragraphs on the page in Sections 3.4.1.2.3 and 3.4.1.2.4.
Page 3.8-1	DCR(L) 790-FSAR-10B NAC-15-UMS-007	Added text to the first paragraph on the page in Section 3.8.
Pages 3.8-21 thru 3.8-26	DCR(L) 790-FSAR-10B NAC-15-UMS-007	Added Section 3.8.8.
Chapters 4 through 11 – no changes		
Chapter 12		
Page 12C3-31	DCR(L) 790-FSAR-10A NAC-15-UMS-005	Modified the first paragraph on the page of SR 3.1.6.1.
Chapter 13 – no changes		

Enclosure 3

Certification of Accuracy

of the

UMS FSAR, Revision 11
(Docket No 72-1015)

NAC International

November 2016

NAC INTERNATIONAL

CERTIFICATION OF ACCURACY PURSUANT TO 10 CFR 72. 248(c)(4)(i)

George Carver (Affiant), Vice President, Engineering and Licensing, of NAC International, hereinafter referred to as NAC, at 3930 East Jones Bridge Road, Norcross, Georgia 30092, being duly sworn, deposes and certifies that:

1. Affiant has reviewed the information described in Item 2, is personally familiar with the preparation, checking and verification of that information and is authorized to certify its accuracy.

2. The information being certified as accurate includes all of the changes incorporated into the UMS Final Safety Analysis Report, Revision 11.

STATE OF GEORGIA, COUNTY OF GWINNETT

Mr. George Carver, being duly sworn, deposes and says:

That he has read the foregoing affidavit and the matters stated therein are true and correct to the best of his knowledge, information and belief.

Executed at Norcross, Georgia, this 15th day of November, 2016.

George Carver
Vice President, Engineering and Licensing
NAC International

Subscribed and sworn before me this 15th day of November, 2016.

Deborah R Chapman
Notary Public

DEBORAH R CHAPMAN NOTARY PUBLIC GWINNETT COUNTY, GEORGIA MY COMMISSION EXPIRES 02-27-2017

November 2016
Revision 11

NAC-UMS

Universal Storage System

FINAL SAFETY ANALYSIS REPORT

for the UMS Universal Storage System

Docket No. 72-1015

NAC INTERNATIONAL

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List of Effective Pages

Chapter 1

Chapter 2

List of Effective Pages (continued)

Chapter 3

List of Effective Pages (continued)

Chapter 4

List of Effective Pages (continued)

Chapter 5

Chapter 6

List of Effective Pages (continued)

List of Effective Pages (continued)

Chapter 11

List of Effective Pages (continued)

Chapter 12

Chapter 13

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1.5 UMS® Universal Storage System Compliance with NUREG-1536

The design of the UMS® Universal Storage System meets the regulatory requirements and acceptance criteria specified in NUREG-1536 as shown in Table 1.5-1. This table provides a compliance matrix that shows the specified regulatory requirements and acceptance criteria of NUREG-1536, and the location in the UMS® Universal Storage System Safety Analysis Report where each of the requirements or criteria are addressed.

Table 1.5-1 NUREG-1536 Compliance Matrix

Chapter 1 – General Description			
Area	**Requirement**	**Acceptance Criteria**	**Description of Compliance**
1. General Description and Operational Features	The application must present a general description and discussion of the DCSS, with special attention to design and operating characteristics, unusual or novel design features, and principal safety considerations. [10 CFR Part 72.24(b)]	The applicant should provide a broad overview and a general, nonproprietary description (including illustrations) of the DCSS, clearly identifying the functions of all components and providing a list of those components classified by the applicant as being "important to safety."	A general description of the system is provided in Section 1.2. Quality category classifications are provided in Table 2.3-1.
2. Drawings	Structures, systems, and components (SSCs) important to safety must be described in sufficient detail to enable reviewers to evaluate their effectiveness. [10 CFR Part 72.24(c)(3)]	The applicant should provide non-proprietary drawings of the storage system, of sufficient detail, that an interested party can ascertain its major design features and general operations.	Drawings of the system are provided in Section 1.8.
3. DCSS Contents	The applicant must provide specifications for the contents expected to be stored in the DCSS (normally spent fuel). These specifications may include, but not be limited to, type of spent fuel (i.e., boiling-water reactor (BWR), pressurized-water reactor (PWR), or both), maximum allowable enrichment of the fuel before any irradiation, burnup (i.e., megawatt-days/metric ton Uranium), minimum acceptable cooling time of the spent fuel before storage in the DCSS (aged at least 1 year), maximum heat designed to be dissipated, maximum spent fuel loading limit, condition of the spent fuel (i.e., undamaged or damaged assembly or consolidated fuel rods), weight and nature of nonspent fuel contents, and inert atmosphere requirements. [10 CFR Part 72.2(a)(1) and 10 CFR Part 72.236(a)]	The applicant should characterize the fuel and other radioactive wastes expected to be stored in the DCSS. If the potential exists that the DCSS will be used to store degraded fuel, the SAR should include a discussion of how the sub-criticality and retrievability requirements will be maintained.	A description of the contents to be stored is presented in Section 2.1, and Tables 2.1.1-1 and 2.1.2-1.

Table 1.5-1 NUREG-1536 Compliance Matrix (continued)

Chapter 1 – General Description			
Area	**Requirement**	**Acceptance Criteria**	**Description of Compliance**
4. Qualifications of the Applicant	The application must include the technical qualifications of the applicant to engage in the proposed activities. Qualifications should include training and experience. [10 CFR Part 72.24(j), 10 CFR Part 72.28(a)]	The reviewer should ensure that the applicant has clearly identified the roles and responsibilities that the DCSS designer, vendor, and other agents, such as potential licensees, fabricators, and contractors will have in the review process. Verify that the applicant has provided clear evidence demonstrating that they are qualified to engage in the proposed activities. In addition, verify that the applicant has delineated the responsibilities for all those who will be involved in the construction and operation of the DCSS if known. The reviewer should ensure that the applicant has specifically defined activities which they will not perform.	Applicant qualifications are discussed in Section 1.6.
5. Quality Assurance	The safety analysis report (SAR) must include a description of the applicant's quality assurance (QA) program, with reference to implementing procedures. This description must satisfy the requirements of 10 CFR Part 72, Subpart G, and must be applied to DCSS SSC that are important to safety throughout all design, fabrication, construction, testing, operations, modifications and decommissioning activities. These implementing procedures need not be explicitly included in the application. [10 CFR Part 72.24(n)]	Verify that the applicant has described the proposed QA program, citing the applicable implementing procedures. This description should satisfy all requirements of 10 CFR Part 72, Subpart G, that apply to the design, fabrication, construction, testing, operation, modification, and decommissioning of the DCSS SSCs that are important to safety.	Applicant QA program is presented in Chapter 13.
6. Consideration of 10 CFR Part 71 Requirements Regarding Transportation	If the DCSS under consideration has previously been reviewed and certified for use as a transportation cask, the application must include a copy of the Certificate of Compliance issued for the DCSS under 10 CFR Part 71, including drawings and other documents referenced in the certificate. [10 CFR 72.230(b)]	If the DCSS under review has previously been evaluated for use as a transportation cask, the submittal should include the Part 71 Certificate of Compliance and associated documents.	The transport application for issuance of a Part 71 Certificate of Compliance is discussed in Section 1.0.

Table 1.5-1 NUREG-1536 Compliance Matrix (continued)

Chapter 2 – Principal Design Criteria			
Area	**Requirement**	**Acceptance Criteria**	**Description of Compliance**
1. Structures, Systems, and Components (SSC) Important to Safety	The applicant must identify all SSC that are important to safety, and describe the relationships of non-important to safety SSC on overall DCSS performance. [10 CFR 72.24(c)(3) and 72.44(d)] The applicant must specify the design bases and criteria all SSC that are important to safety. [10 CFR 72.24(c)(1), 72.24(c)(2), 72.120(a), and 72.236(b)]	The applicant should discuss the general configuration of the DCSS, and should provide an overview of specific components and their intended functions. In addition, the applicant should identify those components deemed to be important to safety, and should address the safety functions of those components in terms of how they meet the general design criteria and regulatory requirements discussed above. Additional information concerning specific functional requirements for individual DCSS components are addressed in the subsequent chapters of this SRP.	The quality category classification of system components are described in Table 2.3-1. The design bases and criteria for the system are specified in Table 2-1. Detailed design criteria are presented in Section 2.2.

1.8 License Drawings

This section presents the list of License Drawings for the Universal Storage System.

1.8.1 License Drawings for the UMS® Universal Storage System

Drawing Number	Title	Revision No.	No. of Sheets
790-501	Canister/Basket Assembly Table, NAC-UMS®	3	1
790-559	Assembly, Transfer Adapter, NAC-UMS®	7	4
790-560	Assembly, Standard Transfer Cask (TFR), NAC-UMS®	17	7
790-561	Weldment, Structure, Vertical Concrete Cask (VCC), NAC-UMS®	15	4
790-562	Reinforcing Bar and Concrete Placement, Vertical Concrete Cask (VCC), NAC-UMS®	18	7
790-563	Lid, Vertical Concrete Cask (VCC), NAC-UMS®	6	1
790-564	Shield Plug, Vertical Concrete Cask (VCC), NAC-UMS®	8	3
790-565	Nameplate, Vertical Concrete Cask (VCC), NAC-UMS®	5	1
790-570	Fuel Basket Assembly, 56 Element BWR, NAC-UMS®	4	2
790-571	Bottom Weldment, Fuel Basket, 56 Element BWR, NAC-UMS®	3	1
790-572	Top Weldment, Fuel Basket, 56 Element BWR, NAC-UMS®	4	1
790-573	Support Disk and Misc. Basket Details, 56 Element BWR, NAC-UMS®	8	1
790-574	Heat Transfer Disk, Fuel Basket, 56 Element BWR, NAC-UMS®	3	1
790-575	BWR Fuel Tube, NAC-UMS®	10	2
790-581	PWR Fuel Tube, NAC-UMS®	9	2
790-582	Shell Weldment, Canister, NAC-UMS®	12	2
790-583	Assembly, Drain Tube, Canister, NAC-UMS®	8	1
790-584	Details, Canister, NAC-UMS®	20	3
790-585	Transportable Storage Canister (TSC), NAC-UMS®	22	3
790-587	Spacer Shim, Canister, NAC-UMS®	1	1
790-590	Loaded Vertical Concrete Cask (VCC), NAC-UMS®	7	2
790-591	Bottom Weldment, Fuel Basket, 24 Element PWR, NAC-UMS®	6	2

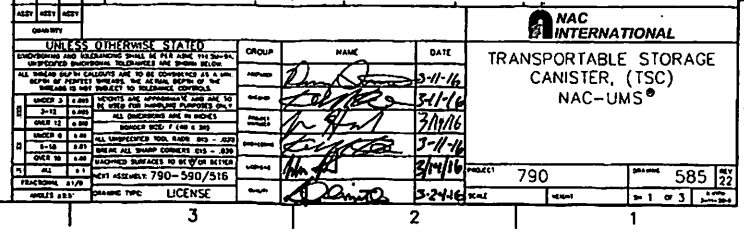
License Drawings (continued)

Drawing Number	Title	Revision No.	No. of Sheets
790-592	Top Weldment, Fuel Basket, 24 Element PWR, NAC-UMS®	8	1
790-593	Support Disk and Misc. Basket Details, 24 Element PWR, NAC-UMS®	7	2
790-594	Heat Transfer Disk, Fuel Basket, 24 Element PWR, NAC-UMS®	2	1
790-595	Fuel Basket Assembly, 24 Element PWR, NAC-UMS®	10	2
790-605	BWR Fuel Tube, Over-Sized Fuel, NAC-UMS®	11	2
790-613	Supplemental Shielding, VCC Inlets, NAC-UMS®	2	1
790-617	Door Stop, NAC-UMS®	4	2

1.8.2 Site Specific Spent Fuel License Drawings

Drawing Number	Title	Revision No.	No. of Sheets
412-501	Spent Fuel Can Assembly, Maine Yankee (MY), NAC-UMS®	4	2
412-502	Fuel Can Details, Maine Yankee (MY), NAC-UMS®	6	6

Security-Related Information Figure Withheld Under 10 CFR 2.390.



Security-Related Information Figure
Withheld Under 10 CFR 2.390.

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TRANSPORTABLE STORAGE CANISTER, (TSC)
NAC-UMS®

PROJECT 790 | DRAWING 585 | REV 22 | SH 2 of 3

Security-Related Information Figure
Withheld Under 10 CFR 2.390.

NAC INTERNATIONAL

TRANSPORTABLE STORAGE
CANISTER, (TSC)
NAC-UMS®

PROJECT 790 | DRAWING 585 | REV 22 | SHT 3 OF 3

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2.3 Safety Protection Systems

The Universal Storage System relies upon passive systems to ensure the protection of public health and safety, except in the case of fire or explosion. As discussed in Section 2.3.6, fire and explosion events are effectively precluded by site administrative controls that prevent the introduction of flammable and explosive materials. The use of passive systems provides protection from mechanical or equipment failure.

2.3.1 General

The Universal Storage System is designed for safe, long-term storage of spent nuclear fuel. The system will withstand all of the evaluated normal, off-normal, and postulated accident conditions without release of radioactive material or excessive radiation exposure to workers or the general public. The major design considerations that are incorporated in the Universal Storage System to assure safe, long-term fuel storage are:

1. Continued containment in postulated accidents.
2. Thick concrete and steel biological shield.
3. Passive systems that ensure reliability.
4. Inert helium atmosphere to provide corrosion protection for fuel cladding and enhanced heat transfer for the stored fuel.

Each component of the Universal Storage System is classified with respect to its function and corresponding effect on public safety. In accordance with Regulatory Guide 7.10 [17], each system component is assigned a quality category classification and then "important to safety" items are further categorized based on importance to safety into Category A, B, C, or NQ as shown in Table 2.3-1. The quality category classification is based on review of each component's function and the assessment of the consequences of its failure following the guidelines of NUREG/CR-6407 [18]. The quality category classification categories are defined as follows:

- Category A - Components critical to safe operations whose failure or malfunction could directly result in conditions adverse to safe operations, integrity of spent fuel, or public health and safety.

- Category B - Components with major impact on safe operations whose failure or malfunction could indirectly result in conditions adverse to safe operations, integrity of spent fuel, or public health and safety.

- Category C - Components whose failure would not significantly reduce the packaging effectiveness and would not likely result in conditions adverse to safe operations, integrity of spent fuel, or public health and safety.

- Category NQ - Non quality components have no impact on safety.

As discussed in the following sections, the Universal Storage System design incorporates features addressing the above design considerations to assure safe operation during loading, handling, and storage of spent nuclear fuel.

2.3.2 Protection by Multiple Confinement Barriers and Systems

2.3.2.1 Confinement Barriers and Systems

The radioactivity that the Universal Storage System must confine originates from the spent fuel assemblies to be stored and residual contamination that may remain inside the canister as a result of contact with water in the fuel pool where the canister loading is conducted. The system is designed to confine this radioactive material.

The Transportable Storage Canister is closed by welding. The shield lid weld is pressure tested. All of the field-installed shield lid welds are liquid penetrant examined following the root and final weld passes. The shield lid welds are leak tested. The installation of the canister structural lid, which provides a redundant closure over the shield lid and port covers, is accomplished by multi-pass welding that is either: 1) progressively liquid penetrant examined; or 2) ultrasonically examined in conjunction with a liquid penetrant examination of the final weld surface. The longitudinal and girth welds of the canister shell are full penetration welds that are radiographically examined during fabrication. The weld that joins the bottom plate to the canister shell is ultrasonically and liquid penetrant examined during fabrication.

The canister welds are an impenetrable boundary to the release of fission gas products during the period of storage. There are no evaluated normal, off-normal, or accident conditions that result in the breach of the canister and the subsequent release of fission products. The canister is

handling and transfer. Transfer operations could include temporary holding of a loaded canister in the transfer cask to allow repair of a concrete cask, transfer of a canister from one concrete cask to another, or transfer from a concrete cask to a transport cask.

The design of the Canister Handling Facility would meet the requirements of the Universal Storage System described in Approved Contents and Design Features presented in Appendix B of the CoC Number 1015 Technical Specifications, in addition to those requirements established by the site.

The design, analysis, fabrication, operation and maintenance of the Canister Handling Facility would be performed in accordance with the quality assurance program requirements of the site general licensee, or the site-specific licensee of the ISFSI. The Canister Handling Facility would be classified as Important to Safety or Not Important to Safety in accordance with the guidelines of NUREG-6407.

Table 2.3-1 Quality Category Classification of Universal Storage System Components

Drawing No.	Description	Item No.	Component	Function	Quality Category
790-559	Assembly, Transfer Adapter	20	Set Screw	Operations	NQ
		19	Cylinder Stop	Operations	NQ
		18	Guide Segment	Operations	C
		17	Cylinder Bolt	Operations	C
		15	Connector Body Bolt	Operations	C
		14	Wear Pad Bolt	Operations	NQ
		13	Wear Pad	Operations	NQ
		12	Connector Body	Operations	C
		10	Cylinder Nut	Operations	C
		8	Door Cylinder	Operations	C
		7	Lift Lug	Operations	C
		6	Support	Operations	C
		5	Side Shield	Operations	C
		3, 4	Door Rail	Operations	C
		2	Locating Ring	Operations	C
		1	Base Plate	Operations	C
790-560	Assembly, Transfer Cask	52	Lift Plate B	Operations	NQ
		51	Lift Plate A	Operations	NQ
		50	Door Plug	Operations	NQ
		49	Wear Strip	Operations	NQ
		47	Door Lock Bolt	Operations	C
		46	Dowel Pin	Operations	NQ
		45	Fill/Drain Line Pipe	Operations	C
		44	Fill/Drain Line Plate	Operations	C
		43	Shielding Ring	Shielding	B
		42	Transfer Adapter SHCS	Shielding	B
		41	Transfer Cask Extension	Shielding	B
		39	Connector	Operations	C
		38	Retaining Ring Bolt	Operations	B

Table 2.3-1 Quality Category Classification of Universal Storage System Components (continued)

Drawing No.	Description	Item No.	Component	Function	Quality Category
790-560 (Continued)	Assembly, Transfer Cask	37	Scuff Plate	Operations	NQ
		36	Gamma Shield Brick	Shielding	B
		33-34	Neutron Shield Cover Plate	Operations	C
		28-32	Neutron Shield Boundary	Structural	C
		26-27	Bottom Plate	Structural	B
		25	Stainless Steel Sheet	Operations	NQ
		24	Paint	Operations	NQ
		23	Lead Wool	Operations/Shielding	NQ
		22	Coating	Operations	C
		21	Support Plate	Operations	B
		20	Retaining Ring	Operations	B
		19	Door Lock Bolt	Operations	C
		16	Door Rail	Operations	B
		15	Top Plate	Structural	B
		14	Neutron Shield	Shielding	B
		13	Trunnion Cap	Operations	C
		12	Trunnion	Structural	B
		7-11	Outer Shell	Structural	B
		2-6	Inner Shell	Structural	B
		1	Bottom Plate	Structural	B
790-561	Weldment, Structure, Vertical Concrete Cask	37	Dowel Pin	Operations	NQ
		36	Cover	Operations	C
		35	Pipe/Tube/Bar	Shielding	B
		32	Coatings	Operations	NQ
		31	Lifting Nut	Operations	NQ

Table 2.3-1 Quality Category Classification of Universal Storage System Components (continued)

Drawing No.	Description	Item No.	Component	Function	Quality Category
790-561 (Continued)	Weldment, Structure, Vertical Concrete Cask	26	Screen Table	Structural	C
		25	Baffle	Heat Transfer	B
		18-24	Outlet (4)	Heat Transfer	B
		20	Shield Plate	Shielding	B
		17	Nelson Stud	Structural	B
		16	Base Plate	Structural	B
		15	Stand	Structural	B
		13-14	Inlet (4)	Heat Transfer	B
		12	Bottom	Structural	B
		11	Shield Ring	Shielding	B
		10	Cover	Operations	B
		4-8	Jack (Leveling)	Operations	NQ
		3	Support Ring	Structural	C
		2	Top Flange	Structural	B
		1, 27-30	Shell	Shielding/Structural	B
790-562	Reinforcing Bar And Concrete Placement	48	Retainer Plate	Operations	NQ
		47	Spacer	Operations	B
		45	Washer	Operations	B
		44	Nut	Operations	B
		43	Threaded Rebar	Operations	B
		42	Supplemental Cover	Operations	NQ
		32	Base Plate	Structural	B
		31	Lift Lug	Structural	B
		29	Lag Screw	Operations	NQ

Table 2.3-1 Quality Category Classification of Universal Storage System Components (continued)

Drawing No.	Description	Item No.	Component	Function	Quality Category
790-562 (Continued)	Reinforcing Bar And Concrete Placement	28, 36, 39	Concrete Anchor	Operations	NQ
		16-19, 40-41, 49	Screen/Strip/Screw/Washer	Operations	NQ
		15	Concrete Shell	Shielding/ Structural	B
		1-11, 33, 46	Reinforcing Bar	Structural	B
790-563	Lid, Vertical Concrete Cask	1	Lid	Structural/Operations	B
790-564	Shield Plug, Vertical Concrete Cask	13			
		12			
		11			
		10			
		9			
		4, 8	Neutron Shield Cover	Shielding/Operations	B
		3, 5	Neutron Shield	Shielding	B
		2, 6, 7	NS Retaining Ring	Structural	B
		1	Shield Plug	Shielding	B
790-565	Nameplate, Vertical Concrete Cask	1	Nameplate	Operations	NQ
790-570	BWR Fuel Basket	23	Flat Washer	Structural	C
		4	Drain Tube Sleeve	Operations	C
790-571	Bottom Weldment, BWR Fuel Basket	3	Support	Structural	A
		2	Pad	Structural	A
		1	Plate	Structural	A

Table 2.3-1 Quality Category Classification of Universal Storage System Components (Continued)

Drawing No.	Description	Item No.	Component	Function	Quality Category
790-572	Top Weldment, BWR Fuel Basket	6	Baffle	Structural	A
		3-5	Support		
		2	Ring		
		1	Plate		
790-573	Support Disk and BWR Basket Details	8	Split Spacer	Structural	A
		7	Top Spacer	Structural	A
		5, 6	Tie Rod	Structural	A
		4	Top Nut	Structural	A
		3	Spacer	Structural	A
		1	Support Disk	Structural	A
790-574	Heat Transfer Disk, BWR	1	Heat Transfer Disk	Thermal	A
790-575	BWR Fuel Tube	10	Flange	Structural	A
		7-9	Cladding	Criticality Control	A
		4-6	Neutron Absorber	Criticality Control	A
		1-3	Tubing	Structural	A
790-581	PWR Fuel Tube	10	Flange	Structural	A
		7-9	Cladding	Criticality Control	A
		4-6	Neutron Absorber	Criticality Control	A
		1-3	Tubing	Structural	A
790-582	Canister, Shell	7	Location Lug	Operations	C
		6	Bottom	Structural/Confinement	A
		1-5	Shell	Structural/Confinement	A

Table 2.3-1 Quality Category Classification of Universal Storage System Components (Continued)

Drawing No.	Description	Item No.	Component	Function	Quality Category
790-583	Drain Tube Assembly	7	Metal Boss Seal	Operations	C
		2-6	Tube	Operations	C
		1	Nipple	Operations	C
790-584	Canister Details	8	Key	Operations	C
		7	Spacer Ring	Structural	C
		6	Lid Support Ring	Structural	B
		5	Cover	Confinement/Operations	B
		4	Structural Lid	Structural	A
		3	Metal Boss Seal	Operations	C
		2	Nipple	Operations	C
		1	Shield Lid	Shielding/Confinement	B
790-585	Transportable Storage Canister	24	Dowel Pin	Operations	NQ
		23	Structural Lid Plug	Operations	NQ
		22	Shield Lid Plug	Operations	NQ
790-587	Spacer Shim, Canister	1-6	Spacer Shims #1 - #6	Operations	C
790-590	Loaded Vertical Concrete Cask	19	Tab	Operations	NQ
		18	Seal Wire	Operations	C
		17	Security Seal	Operations	C
		16	Seal Tape (Optional)	Operations	NQ
		15	Cover	Operations	C
		14	Washer (Lid Bolt)	Operations	NQ
		13	Lid Bolt	Operations	B

Table 2.3-1 Quality Category Classification of Universal Storage System Components (Continued)

Drawing No.	Description	Item No.	Component	Function	Quality Category
790-591	Bottom Weldment, PWR Basket	3, 5-7	Support	Structural	A
		4	Pad	Structural	A
		2	Support	Structural	A
		1	Bottom Disk	Structural	A
790-592	Top Weldment, PWR Basket	7	Baffle	Structural	A
		3, 5-6	Support	Structural	A
		4	Center Support	Structural	A
		2	Ring	Structural	A
		1	Top Disk	Structural	A
790-593	Support Disk and Details, PWR	8	Top Spacer	Structural	A
		5-7	Tie Rod	Structural	A
		4, 9, 10	Top Nut	Structural	A
		3	Spacer	Structural	A
		2	Split Spacer	Structural	A
		1	Support Disk	Structural	A
790-594	Heat Transfer Disk, PWR	1	Heat Transfer Disk	Thermal	A
790-595	PWR Fuel Basket	8	Flat Washer	Structural	C
		4	Drain Tube Sleeve/Tube	Operations	C
790-605	BWR Fuel Tube, Over-Sized	7	Flange	Structural	A
		5-6	Cladding	Criticality Control	A
		3-4	Neutron Absorber	Criticality Control	A
		1-2	Tubing	Structural	A

Table 2.3-1 Quality Category Classification of Universal Storage System Components (Continued)

Drawing No.	Description	Item No.	Component	Function	Quality Category
790-613	Supplemental Shielding, VCC Inlets	4	Shims	Operations	NQ
		3	Paint	Operations	NQ
		2	Pipe	Shielding	B
		1	Side Plate	Shielding	B
790-617	Door Stop	6	Attachment Screw	Operations	NQ
		5	Lock Pin	Operations	NQ
		4	Handle	Operations	NQ
		3	Back Plate	Operations	NQ
		2	Top Plate	Operations	NQ
		1	Bottom Plate	Operations	NQ
412-502	Maine Yankee (MY) Fuel Can Details, NAC-UMS®	16	Dowel Pin	Operations	C
		13	Support Ring	Structural/Operations	B
		12	Lift Tee	Structural/Operations	B
		10, 19	Tube Body	Structural/Criticality	A
		9, 18	Side Plate	Structural/Criticality	A
		8	Bottom Plate	Structural/Criticality	A
		7, 15	Backing Screen	Operations	C
		6, 14	Filter Screen	Confinement	B
		5	Lid Bottom	Structural/Criticality	A
		4	Wiper	Operations	C
		3	Lid Guide	Operations	C
		2	Lid Plate	Structural/Criticality	A
		1	Lid Collar	Confinement	A

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Series Epoxy Enamel or Carboline 890 to protect the components during in-pool use and to provide a smooth surface to facilitate decontamination.

The concrete shell of the vertical concrete cask contains an ASTM A36 carbon steel liner, as well as other carbon steel components. The exposed surfaces of the base of the concrete cask and the liner are coated with Keeler & Long Y-1-Series Acrylic Urethane Enamel or PPG METALHIDE® 97-694 Series Primer or PPG DIMETCOTE® 9 Primer and PPG PITT-THERM® 97-724 Series Top Coating to provide protection from weather-related moisture and direct sunlight.

No potential reactions associated with the BWR basket carbon steel disks, the transfer cask components or vertical concrete cask components are expected to occur.

3.4.1.2.4 Coatings

The exposed carbon steel surfaces of the transfer cask and the transfer cask adapter plate are coated with either Carboline 890 or Keeler & Long E-Series Epoxy Enamel. The technical specifications for these coatings are provided in Sections 3.8.1 and 3.8.2, respectively. These coatings are approved for Nuclear Service Level 2 use. Load bearing surfaces (i.e., the bottom surface of the trunnions and the contact surfaces of the transfer cask doors and rails) are not painted, but are coated with an appropriate nuclear grade lubricant, such as Neolube®. The exposed metal surfaces of the vertical concrete cask are coated with Keeler & Long Kolor-Poxy Primer No. 3200 and Acrythane Enamel Y-1 Series top coating or PPG METALHIDE® 97-694 Series Primer or PPG DIMETCOTE® 9 Primer and PPG PITT-THERM® 97-724 Series top coating. The technical specifications for these coatings are provided in Sections 3.8.4, 3.8.5, 3.8.6 and 3.8.7, respectively.

Carbon steel support disks used in the BWR canister basket are coated with electroless nickel. The coating is applied in accordance with ASTM B733-SC3, Type V, Class 1[37]. As described in Section 3.8.3, the electroless nickel coating process uses a chemical reducing agent in a hot aqueous solution to deposit nickel on a catalytic surface. The deposited nickel coating is a hard alloy of uniform thickness of 25 μm (0.001 inch), containing from 4% to 12% phosphorus. Following its application, the nickel coating combines with oxygen in the air to form a passive oxide layer that effectively eliminates free electrons on the surface that would be available to cathodically react with water to produce hydrogen gas. Consequently, the production of hydrogen gas in sufficient quantities to facilitate combustion is highly unlikely.

3.4.1.2.5 Concrete

The vertical concrete storage cask is fabricated of 4000 psi, Type 2 Portland cement that is reinforced with vertical and circumferential carbon steel rebar. Quality control of the proportioning, mixing, and placing of the concrete, in accordance with the NAC fabrication specification, will make the concrete highly resistant to water. The concrete shell is not expected to experience corrosion, or significant degradation from the storage environment through the life of the cask.

3.4.1.2.6 Criticality Control Material

The criticality control material is boron carbide mixed in an aluminum alloy matrix. Sheets of this material are affixed to one or more sides of the designated fuel tubes and enclosed by a welded stainless steel sheet. The material resists corrosion similar to aluminum, and is protected by an oxide layer that forms shortly after fabrication and inhibits further interaction with the stainless steel. Consequently, no potential reactions associated with the aluminum-based criticality control material are expected.

3.4.1.2.7 Neutron Shielding Material

The neutron shielding materials, NS-3 and NS-4-FR, consist primarily of aluminum, carbon, oxygen and hydrogen. NS-4-FR is used in the transfer cask and either NS-3 or NS-4-FR may be used in the shield plug of the vertical concrete storage cask to provide radiation shielding. The acceptable performance of the materials has been demonstrated by use and testing. The materials have been used for over 10 years in licensed storage casks in the United States and in licensed casks in Japan, Spain and the United Kingdom. There are no reports that the shielding effectiveness of the materials has degraded in these applications, demonstrating the long-term reliability for the purpose of shielding neutrons from personnel and the environment. There are no potential reactions associated with the polymer structure of the materials and the stainless steel or carbon steel in which it is encapsulated during use.

The chemistry of the materials (e.g., the way the elements are bonded to one another) contributes significantly to the fire-retardant capability. Approximately 90% of the off-gassing that does occur consists of water vapor.

3.8 Carbon Steel Coatings Technical Data

This section presents the technical data sheets for Carboline 890, Keeler & Long E-Series Epoxy Enamel, Keeler & Long Kolor-Poxy Primer No. 3200, Acrythane Enamel Y-1 Series top coating, PPG METALHIDE® 97-694 Series Primer or PPG DIMETCOTE® 9 Primer and PPG PITT-THERM® 97-724 Series top coating. These coatings are applied to protect exposed carbon steel surfaces of the transfer cask and the vertical concrete cask. Also provided is a description of the electroless nickel coating that is applied to the BWR support disks. Each coating meets the service and performance requirements that are established for the coating by the design and service environment of the component to be covered.

Performance requirements for the coatings of the carbon steel components used in the primary containment facility (Service Level 1) include the transfer cask and the BWR support disks. These components are exposed to similar environments and require that the coatings meet the following conditions:

- be applied to carbon steel
- be submersible for up to a week in clean water
- are rated Service Level 1 (EPRI TR-106160 for paints)
- do not contain zinc (boric acid pool condition)
- have a service temperature of at least 200°F in water and 600°F in a dry environment (applicable to basket materials)
- generate no hydrogen, or minimal hydrogen, when submersed in water (in-pool service)
- have no, or limited, special processes required for proper application or curing
- have a service environment in a high radiation field (basket material service)

Either Carboline 890 or Keeler & Long E-Series Epoxy Enamel may be used on the exposed carbon steel surfaces of the transfer cask and the transfer cask extension. These coatings are listed in EPRI TR 106160, "Coating Handbook for Nuclear Power Plants," June 1996 [36], as meeting the requirements for Service Level 1 or 2.

Electroless nickel coating is used on the carbon steel BWR support disks to provide a submersible, passive protective finish. This coating has a history of acceptance and successful performance in similar service conditions.

Vertical Concrete Cask carbon steel coatings provide service outside containment and are subject to radiation, heat loads and decontamination. These coatings are defined as Service Level 2

applications. Coatings identified for Service Level 1 are acceptable for Service Level 2 applications. Following initial shop application, alternate coatings to those listed previously may be used in routine maintenance for protection of the exposed Vertical Concrete Cask carbon steel surfaces.

No coating characteristics that may enhance the performance of the coated components (such as better emissivity) are considered in the analyses of these components. Therefore, no adverse effect on system performance results from incidental scratching or flaking of the coating, and no touchup of the coating on the BWR support disks or the storage cask liner is required.

3.8.8 PPG DIMETCOTE® 9 Primer

PRODUCT DATA SHEET

October 28, 2015 (Revision of June 25, 2015)

DIMETCOTE® 9 / SIGMAZINC™ 9

DESCRIPTION

Two-component, moisture-curing zinc (ethyl) silicate coating

PRINCIPAL CHARACTERISTICS

- Specified for structural joints according to ASTM A325 or A490 Bolts RCSC specification, Class B
- Complies with the compositional requirements of SSPC-Paint 20, Level 1
- Anticorrosive primer for structural steel
- Suitable as a system primer in various paint systems based on unsaponifiable binders
- Can withstand substrate temperatures from –90°C (–130°F) up to 400°C (750°F), under normal atmospheric exposure conditions
- When suitably topcoated provides excellent corrosion protection for steel substrates up to 540°C (1000°F)
- Good low-temperature curing
- Good impact and abrasion resistance
- Must not be exposed to alkaline (more than pH 9) or acidic (less than pH 5.5) liquids

COLOR AND GLOSS LEVEL

- Greenish gray
- Flat

BASIC DATA AT 20°C (68°F)

Data for mixed product	
Number of components	Two
Mass density	2.4 kg/l (20.0 lb/US gal)
Volume solids	63 ± 3%
VOC (Supplied)	Directive 1999/13/EC, SED: max. 221.0 g/kg UK PG 6/23(92) Appendix 3: max. 480.0 g/l (approx. 4.0 lb/US gal)
Recommended dry film thickness	50 - 100 µm (2.0 - 4.0 mils) depending on system
Theoretical spreading rate	8.4 m^2/l for 75 µm (337 ft^2/US gal for 3.0 mils)
Dry to touch	15 minutes
Overcoating Interval	Minimum: 24 hours Maximum: Unlimited
Full cure after	46 hours
Shelf life	Binder: at least 9 months when stored cool and dry Pigment: at least 24 months when stored pigment moisture free

Notes:
- See ADDITIONAL DATA – Spreading rate and film thickness
- See ADDITIONAL DATA – Overcoating intervals
- See ADDITIONAL DATA – Curing time

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DIMETCOTE® 9 / SIGMAZINC™ 9

RECOMMENDED SUBSTRATE CONDITIONS AND TEMPERATURES

Immersion exposure

- Steel; blast cleaned to ISO-Sa2½, blasting profile 40 – 70 µm (1.6 – 2.8 mils)
- Steel with approved zinc silicate shop primer; sweep blasted to SPSS-Ss, welds, rusty and damaged areas blast cleaned to ISO-Sa2½
- Existing pipelines may have to be cleaned first by scraper pigs and solvents

Atmospheric exposure conditions

- Steel; blast cleaned to ISO-Sa2½ or minimum SSPC SP-6, blasting profile 40 – 70 µm (1.6 – 2.8 mils)
- Steel with approved zinc silicate shop primer; pretreated to SPSS-Pt3

Substrate temperature and application conditions

- Substrate temperature during application and curing down to -18°C (0°F) is acceptable; provided the substrate is free from ice and dry
- Substrate temperature during application up to 55°C (131°F) is acceptable
- Substrate temperature during application and curing should be at least 3°C (5°F) above dew point
- Relative humidity during curing should be above 50%

INSTRUCTIONS FOR USE

Mixing ratio by volume: binder to zinc powder 77:23

- Many of PPG's zinc silicates are supplied as two-pack materials consisting of a container with pigmented binder and a drum containing a bag of zinc powder.
- To ensure proper mixing of both components, the instructions given below must be followed
- To avoid lumps in the paint do not add the binder to the zinc powder
- [1] Take the bag with zinc powder out of the drum
- [2] Shake the binder in the jerrycan a few times to reach a certain degree of homogenization
- [3] Pour about 2/3 of the binder into the empty drum
- [4] With the jerrycan now reduced in weight and containing more free space, shake it vigorously to obtain a homogeneous mix with no deposits left on the bottom, and add this to the drum
- [5] Add the zinc powder gradually to the pigmented binder in the drum and, at the same time, continuously stir the mixture by using a mechanical mixer (keep the speed low)
- [6] Stir the zinc dust powder thoroughly through the binder (high speed) and keep stirring until a homogeneous mixture is obtained
- [7] Strain mixture through a 30 – 60 mesh screen
- [8] Agitate continuously during application (low speed). The use of a dedicated pump with a constant agitation for a zinc silicate coating is recommended

Note: At application temperature above 30°C (86°F) addition of max 10% by volume of THINNER 90-53 may be necessary

Induction time

None

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DIMETCOTE® 9 / SIGMAZINC™ 9

Pot life
8 hours

Note: See ADDITIONAL DATA – Pot life

Air spray

Recommended thinner
THINNER 90-53, THINNER 21-06 (AMERCOAT 65), THINNER 21-25 (AMERCOAT 101) FOR > 60°F (15°C)

Volume of thinner
0 - 10%, depending on required thickness and application conditions

Nozzle orifice
2.0 mm (approx. 0.079 in)

Nozzle pressure
0.3 MPa (approx. 3 Bar; 44 p.s.i.)

Note: A dedicated pump for a zinc silicate coating with constant agitation must be used

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Airless spray

Recommended thinner
THINNER 90-53, THINNER 21-06 (AMERCOAT 65), THINNER 21-25 (AMERCOAT 101) FOR > 60°F (15°C)

Volume of thinner
0 - 10%, depending on required thickness and application conditions

Nozzle orifice
Approx. 0.48 – 0.64 mm (0.019 – 0.025 in)

Nozzle pressure
9.0 - 12.0 MPa (approx. 90 - 120 bar; 1306 - 1741 p.s.i.)

Note: A dedicated pump for a zinc silicate coating with constant agitation must be used

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Brush/roller

- Only for touch-up and spot repair
- Roller application is not recommended

Recommended thinner

THINNER 90-53, THINNER 21-06 (AMERCOAT 65), THINNER 21-25 (AMERCOAT 101) FOR > 60°F (15°C)

Volume of thinner

5 – 15%

Note: Apply a visible wet coat with a max. dft of 25 µm (1.0 mils)|same for subsequent coats in order to obtain the required dft

Cleaning solvent

THNNER 90-53, THINNER 90-58 (AMERCOAT 12) OR THINNER 21-06 (AMERCOAT 65)

Upgrading

- This is only valid for spray application
- If the DFT is below specification and an extra coat of DIMETCOTE 9 / SIGMAZINC 9 has to be applied, it should be thinned down with 25 – 50% Thinner 90-53, in order to obtain a visible wet coat that remains wet for some time

ADDITIONAL DATA

Spreading rate and film thickness	
DFT	**Theoretical spreading rate**
75 µm (3.0 mils)	8.4 m^2/l (337 ft^2/US gal)
100 µm (4.0 mils)	6.3 m^2/l (253 ft^2/US gal)
125 µm (5.0 mils)	5.0 m^2/l (202 ft^2/US gal)

Notes:

- Maximum DFT when brushing: 35 µm (1.4 mils)
- Above 150 µm (6.0 mils) mudcracking can occur
- Highly pigmented zinc silicate primers produce dry films with void spaces in between the particles

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DIMETCOTE® 9 / SIGMAZINC™ 9

Overcoating interval for DFT up to 100 µm (4.0 mils)					
Overcoating with...	**Interval**	**0°C (32°F)**	**10°C (50°F)**	**20°C (68°F)**	**30°C (86°F)**
recommended topcoats	Minimum	48 hours	36 hours	24 hours	18 hours
	Maximum	Unlimited	Unlimited	Unlimited	Unlimited

Notes:

- For recoating with itself to take required dft, recommend to apply within 2 days before full cure. No minimum recoating interval limitation for itself.
- To confirm cure to topcoat, conduct a MEK rub test per ASTM D4752. A rating of 4 or higher is sufficient for topcoating
- For measuring of the curing, the MEK rub test according to ASTM 4752 is a suitable method: after 50 double rubs with a cloth soaked in MEK (or alternatively THINNER 90-53) no dissolving of the coating should be observed
- Curing/recoating time will be shortened by the increase of humidity, please contact regional technical service team for details
- A mist coat / full coating application technique is required when topcoating to prevent application bubbling. Ensure dry spray is removed from the surface
- DIMETCOTE 9 / SIGMAZINC 9 is a moisture curing zinc silicate, this means that it only cures after sufficient take up of water from the atmosphere during and after application; it is recommended that relative humidity and temperature are measured during the curing time
- When curing conditions are unfavorable or when reduced overcoat times are desired, curing can be accelerated 4 hours after application by: [1] Wetting or soaking with water, keeping the surface wet for the next 2 hours, followed by drying; [2] Wetting or soaking with a 0.5% ammonia solution, followed by drying
- Maximum interval is only unlimited when the surface is free from any contamination

Curing time for DFT up to 75 µm (3.0 mils)		
Substrate temperature	**Dry to handle**	**Full cure**
0°C (32°F)	2 hours	4 days
10°C (50°F)	1 hour	3 days
20°C (68°F)	30 minutes	46 hours
30°C (86°F)	20 minutes	36 hours

Notes:

- DIMETCOTE 9 / SIGMAZINC 9 is a moisture curing zinc silicate, this means that it only cures after sufficient take up of water from the atmosphere during and after application
- It is recommended that relative humidity and temperature are measured during the curing time
- Relative humidity during curing recommended to be above 50%
- Adequate ventilation must be maintained during application and curing (please refer to INFORMATION SHEETS 1433 and 1434)

Pot life (at application viscosity)	
Mixed product temperature	**Pot life**
20°C (68°F)	8 hours

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DIMETCOTE® 9 / SIGMAZINC™ 9

SAFETY PRECAUTIONS

- For paint and recommended thinners see INFORMATION SHEETS 1430, 1431 and relevant Material Safety Data Sheets
- This is a solvent-borne paint and care should be taken to avoid inhalation of spray mist or vapor, as well as contact between the wet paint and exposed skin or eyes

WORLDWIDE AVAILABILITY

It is always the aim of PPG Protective and Marine Coatings to supply the same product on a worldwide basis. However, slight modification of the product is sometimes necessary to comply with local or national rules/circumstances. Under these circumstances an alternative product data sheet is used.

REFERENCES

• CONVERSION TABLES	INFORMATION SHEET	1410
• EXPLANATION TO PRODUCT DATA SHEETS	INFORMATION SHEET	1411
• SAFETY INDICATIONS	INFORMATION SHEET	1430
• SAFETY IN CONFINED SPACES AND HEALTH SAFETY, EXPLOSION HAZARD – TOXIC HAZARD	INFORMATION SHEET	1431
• SAFE WORKING IN CONFINED SPACES	INFORMATION SHEET	1433
• DIRECTIVES FOR VENTILATION PRACTICE	INFORMATION SHEET	1434
• CLEANING OF STEEL AND REMOVAL OF RUST	INFORMATION SHEET	1490
• SPECIFICATION FOR MINERAL ABRASIVES	INFORMATION SHEET	1491
• RELATIVE HUMIDITY – SUBSTRATE TEMPERATURE – AIR TEMPERATURE	INFORMATION SHEET	1650

WARRANTY

PPG warrants (i) its title to the product, (ii) that the quality of the product conforms to PPG's specifications for such product in effect at the time of manufacture and (iii) that the product shall be delivered free of the rightful claim of any third person for infringement of any U.S. patent covering the product. THESE ARE THE ONLY WARRANTIES THAT PPG MAKES AND ALL OTHER EXPRESS OR IMPLIED WARRANTIES, UNDER STATUTE OR ARISING OTHERWISE IN LAW, FROM A COURSE OF DEALING OR USAGE OF TRADE, INCLUDING WITHOUT LIMITATION, ANY OTHER WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR USE, ARE DISCLAIMED BY PPG. Any claim under this warranty must be made by Buyer to PPG in writing within five (5) days of Buyer's discovery of the claimed defect, but in no event later than the expiration of the applicable shelf life of the product, or one year from the date of the delivery of the product to the Buyer, whichever is earlier. Buyer's failure to notify PPG of such non-conformance as required herein shall bar Buyer from recovery under this warranty.

LIMITATIONS OF LIABILITY

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SURVEILLANCE REQUIREMENTS	SR 3.1.6.1 The long-term integrity of the stored fuel is dependent on the ability of the CONCRETE CASK to reject heat from the CANISTER to the environment. Visual observation that all four air inlet and outlet screens are unobstructed and intact ensures that air flow past the CANISTER is occurring and heat transfer is taking place. However, partial blockage of less than two air inlet or outlet screens or the equivalent effective screen area does not result in the heat removal system being unable to provide adequate heat removal. Corrective actions should be taken promptly to remove the obstruction and restore full flow through the affected air inlet and outlet screens. Alternatively, based on the analyses, if the air temperature rise is less than the limits stated in the SR, adequate air flow and, therefore, adequate heat transfer is occurring to provide assurance of long-term fuel cladding integrity. The reference ambient temperature used to perform this Surveillance shall be measured at the ISFSI facility. The Frequency of 24 hours is reasonable based on the time necessary for CONCRETE CASK and CANISTER components to heat up to unacceptable temperatures assuming design basis heat loads, and allowing for corrective actions to take place upon discovery of the blockage of the air inlet and outlet screens. SR 3.1.6.2 The initial confirmation of the OPERABILITY of the CONCRETE CASK is established based on air temperature measurements at the CONCRETE CASK outlets and the ISFSI ambient, and verification that the air temperature rise is less than the limits stated in the SR. Following the initial confirmation, the continued OPERABILITY of the CONCRETE CASK shall be confirmed by one of the verification methods specified in SR 3.1.6.1. The specified Frequency of once between 5 and 30 days after beginning STORAGE OPERATIONS is reasonable and ensures that the CONCRETE CASK has reached thermal equilibrium and, therefore, the outlet air temperature measurements will reflect expected temperatures under normal operations. Completion of the measurements within 30 days of placement of the CONCRETE CASK into STORAGE OPERATIONS ensures that corrective actions can be taken to establish the OPERABLE status of the CONCRETE CASK within a reasonable period of time.
REFERENCES	1. FSAR Chapter 4 and Chapter 11, Section 11.1.2 and Section 11.2.13.

C 3.2 NAC-UMS® SYSTEM Radiation Protection

C 3.2.1 CANISTER Surface Contamination

BASES

BACKGROUND

A TRANSFER CASK containing an empty CANISTER is immersed in the spent fuel pool in order to load the spent fuel assemblies. The external surfaces of the CANISTER are maintained clean by the application of clean water to the annulus of the TRANSFER CASK. However, there is potential for the surface of the CANISTER to become contaminated with the radioactive material in the spent fuel pool water. Contamination exceeding LCO limits is removed prior to moving the CONCRETE CASK containing the CANISTER to the ISFSI in order to minimize the radioactive contamination to personnel or the environment. This allows the ISFSI to be entered without additional radiological controls to prevent the spread of contamination and reduces personnel dose due to the spread of loose contamination or airborne contamination. This is consistent with ALARA practices.

APPLICABLE SAFETY ANALYSIS

The radiation protection measures implemented at the ISFSI are based on the assumption that the exterior surfaces of the CANISTER are not significantly contaminated. Failure to decontaminate the surfaces of the CANISTER to below the LCO limits could lead to higher-than-projected occupational dose and potential site contamination.

LCO

Removable surface contamination on the exterior surfaces of the CANISTER is limited to 10,000 dpm/100 cm^2 from beta and gamma sources and 100 dpm/100 cm^2 from alpha sources. Only loose contamination is controlled, as fixed contamination will not result from the CANISTER loading process. Experience has shown that these limits are low enough to prevent the spread of contamination to clean areas and are significantly less than the levels that could cause significant personnel skin dose.

(continued)