UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-4005

April 6, 2005

Gregg R. Overbeck, Senior Vice
President, Nuclear
Arizona Public Service Company
P.O. Box 52034
Phoenix, AZ 85072-2034

SUBJECT: NRC INSPECTION REPORT 50-528/05-10; 50-529/05-10; 50-530/05-10; 72-44/05-01

Dear Mr. Overbeck:

A routine inspection of storage and loading operations at the Palo Verde Nuclear Generating Station Independent Spent Fuel Storage Installation (ISFSI) was conducted on March 7-10, 2005. At the conclusion of the inspection on March 10, 2005, an exit briefing was conducted with Mr. David Mauldin, Vice President of Engineering, and other members of your staff. The enclosed report presents the scope and results of that inspection.

The inspection was an examination of activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. Within these areas, the inspection included reviews of onsite concrete cask fabrication; fuel inventory and selection; ISFSI operation; Quality Assurance; radiological controls and safety reviews conducted by your staff. No violations of NRC regulations were identified during the inspection.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Should you have any questions concerning this inspection, please contact the undersigned at (817) 860-8191 or Mr. Ray Kellar at (817) 860-8164.

Sincerely,

/RA/

D. Blair Spitzberg, Ph.D., Chief
Fuel Cycle and Decommissioning Branch

Docket Nos: 50-528
50-529
50-530

72-044
License Nos: NPF-41
NPF-51
NPF-74

Enclosure:
NRC Inspection Report
50-528/05-010; 50-529/05-10;
50-530/05-10; 72-44/05-01

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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket Nos.:	050-00528; 050-00529; 050-00530; 072-00044
License Nos.:	NPF-41, NPF-51, NPF-74
Report No.:	50-528/05-10; 50-529/05-10; 50-530/05-10; 72-44/05-01
Licensee:	Arizona Public Service Company
Location:	Palo Verde Independent Spent Fuel Storage Installation 5951 S. Wintersburg Tonopah, Arizona
Dates:	March 7-10, 2005
Inspectors:	Ray L. Kellar, P.E., Health Physicist Scott P. Atwater, Health Physicist
Approved:	D. Blair Spitzberg, Ph.D., Chief Fuel Cycle and Decommissioning Branch
Attachments:	1) Supplemental Information 2) Loaded Casks at the Palo Verde ISFSI 3) Inspector Notes

EXECUTIVE SUMMARY

Palo Verde Nuclear Generating Station
NRC Inspection Report 50-528/05-10; 50-529/05-10;
50-530/05-10; 72-44/05-01

The Independent Spent Fuel Storage Installation (ISFSI) at Palo Verde Nuclear Generating Station (PVNGS) contained 26 loaded NAC-UMS Ventilated Concrete Casks (VCCs) at the time of the inspection. During the inspection the inspectors observed licensee personnel performing loading activities associated with VCC 27 and representatives from NAC International fabricating concrete casks. Personnel assigned to activities associated with the ISFSI were knowledgeable of their responsibilities and exhibited a high level of teamwork. There was a positive attitude exhibited by the workers and management to keep radiological exposure As Low As Reasonably Achievable (ALARA), as evidenced by the low radiological exposure attributed to loading operations for Cask 25 of 0.095 person-rem.

Cask Fabrication

- Onsite fabrication activities for NAC-UMS Ventilated Concrete Cask 31 were underway at the time of the inspection. Portions of construction activities associated with concrete mixing, delivery, sampling and placement were observed by the inspectors and found to meet requirements contained in the codes and standards referenced in the NAC Final Safety Analysis Report (FSAR) (Attachment 3 - Pages 1 - 4).

Fuel Inventory and Selection

- The PVNGS fuel selection procedure incorporated NRC guidance for differentiating between intact and damaged fuel assemblies. Licensee personnel utilized Ultrasonic Testing (UT) and Visual Testing (VT) examinations to determine if the fuel was intact (Attachment 3 - Page 5).

- The NAC Certificate of Compliance (CoC) specified fuel characteristics that were approved for loading in the NAC-UMS canisters. The licensee had implemented a fuel assembly selection procedure that mirrored the NAC CoC requirements, including requirements for soluble boron and limits for total decay heat load (Attachment 3 - Pages 5 & 7).

- The licensee had implemented requirements to ensure that a physical inventory of the spent fuel contained at the ISFSI was conducted at intervals not to exceed 12 months. Controls were present to ensure that ISFSI records were maintained for the life of the ISFSI plus 5 years (Attachment 3 - Page 6).

Operations/Maintenance

- The annual ISFSI concrete cask inspections had been completed with no abnormal cask deterioration observed (Attachment 3 - Page 8).

- Examinations of the critical weld areas on the PVNGS single-failure proof cranes, utilized to perform lifts of the dry fuel canisters, had been performed with no abnormalities identified (Attachment 3 - Page 8).

- The licensee had provided required registration letters to the NRC for the first 25 casks loaded at PVNGS (Attachment 3 - Page 9).

- In-pool cooling and vacuum drying time limits were controlled and implemented through licensee procedures that met Technical Specification requirements (Attachment 3 - Page 10).

- Minimum spacing requirements between the loaded casks on the ISFSI pad required by the NAC-UMS FSAR had been achieved (Attachment 3 - Page 11).

- Daily temperature monitoring requirements for the loaded concrete casks on the ISFSI pad were being achieved by the licensee. The maximum differential temperature limits were not exceeded by any of the loaded casks (Attachment 3 - Page 11).

- Time limitations for how long a canister could remain in the transfer cask after completion of the helium backfill operation were being met (Attachment 3 - Page 12).

- The canister vacuum drying time limit had been conservatively modified in response to misinterpretation of the drain down time clock by another plant that utilized a different type of NAC dry storage canister. A Condition Report / Disposition Request was initiated to evaluate the condition and determine if any previously loaded casks were outside the bases of the NAC thermal analyses. An inspection followup item was opened to review the licensee's evaluation of the previously loaded 22 casks (Attachment 3 - Page 12).

- The annual nondestructive examinations of the transfer cask trunnions, shield door and shield door rails were being conducted in accordance with applicable requirements (Attachment 3 - Page 13).

- The licensee had satisfied the vacuum drying pressure requirements (Attachment 3 - Page 14).

Quality Assurance (QA)

- The licensee had established and effectively implemented measures to ensure that conditions adverse to quality were promptly identified and corrected (Attachment 3 - Page 14).

- The licensee had met the requirements for conducting quality assurance audits of the dry cask loading operations during 2003 and 2004. Audits were found to be thorough and complete. The QA organization also performed source surveillances of NAC fabrication activities and surveillances of other primary vendors performing quality related activities (Attachment 3 - Page 15).

Radiological Controls

- The licensee's As Low As Reasonably Achievable (ALARA) program was effective. The ALARA prejob briefing observed by the inspectors was thorough and well attended. Accumulated radiological exposures incurred with the loading of several of the NAC canisters were low, particularly canister 25 with a total radiological exposure of 0.095 person-rem (Attachment 3 - Page 15).

- Loaded canisters met surface contamination limits. The surveys for the loaded canisters reviewed were all well below the technical specification limits (Attachment 3 - Page 16).

- The average surface dose rates for the loaded casks reviewed were all less than 10 percent of the technical specification limits (Attachment 3 - Page 17).

Safety Reviews

- The licensee had established and effectively implemented a safety review process that met the requirements of 10 CFR 72.48 (Attachment 3 - Page 18).

- Revisions to the report required by 10 CFR 72.212(b) for conditions of a general license were controlled in accordance with requirements (Attachment 3 - Page 18).

ATTACHMENT 1

Supplemental Inspection Information

PARTIAL LIST OF PERSONS CONTACTED

G. Andrews, Section Lead, Reactor Engineering
M. Barrymen, Cask Loading Coordinator
J. Bettencourt, Radiation Protection Technician
B. Chapman, Department Leader, Fuel Services
K. Coon, Technical Management Assistant, Radiation Protection
Y. Devereau, Engineer III, Reactor Engineering
T. Gray, Department Leader, Radiation Protection
C. Hammond, Radiation Protection Technician
B. Hansen, Section Leader, Dry Cask Storage
K. Hoedeman, NAC Construction Manager
R. Huffman, Refueling Services Section Lead
P. Johnson, Senior Evaluator Nuclear Assurance
G. Michael, Senior Engineer, Licensing
K. Schrecker, Section Lead, Civil Engineering
C. Seaman, Director, Nuclear Fuel Management
B. Shriber, Radiation Protection Technician
T. Sullivan, Team Leader, Radiation Protection
W. Wong, Coordinator, Dry Cask Storage

INSPECTION PROCEDURES USED

IP 60853	On-Site Fabrication of Components and Construction of an ISFSI
IP 60855	Operation of an ISFSI
IP 60855.1	Operation of an ISFSI at Operating Plants

LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

072-0044/0501-01	IFI	Review of previously loaded 22 casks for compliance with the NAC thermal analyses bases.

Closed

None.

Discussed

None.

LIST OF ACRONYMS

ACI	American Concrete Institute
ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
CE	Combustion Engineering
CoC	Certificate of Compliance
COR	Component Observation Report
CFR	Code of Federal Regulations
CWMO	Corrective Maintenance Work Order
CRDR	Condition Report / Disposition Request
DPM	Disintegrations Per Minute
FME	Foreign Material Exclusion
FSAR	Final Safety Analysis Report
ISFSI	Independent Spent Fuel Storage Installation
ISG	Interim Staff Guidance
KW	Kilo-Watt
NDE	Non Destructive Examination
NRC	Nuclear Regulatory Commission
PMB	Preventative Maintenance Basis
PSI	Pounds per Square Inch
PVNGS	Palo Verde Nuclear Generating Station
REP	Radiological Exposure Permit
SNM	Special Nuclear Material
Tech Spec	Technical Specification
TFR	Transfer Cask
TLD	Thermo-Luminescent Dosimeter
TSC	Transportable Storage Container or canister
UMS	Universal Multipurpose System
UT	Ultrasonic Test
VCC	Ventilated Concrete Cask or cask

ATTACHMENT 2

LOADED NAC-UMS CASKS AT THE PALO VERDE ISFSI [1]

LOADING ORDER	VCC CASK #	UNIT	DATE PLACED ON PAD	HEAT LOAD (kW)	MAXIMUM BURNUP MWd/MTU	MAXIMUM FUEL ENRICHMENT	MANHOURS TO LOAD	Person-Rem DOSE
1	#1	Unit 2	3/15/03	7.59	42,833	4.0334	5178	0.535
2	#2	Unit 2	4/15/03	7.76	41,841	4.0368	4635	0.389
3	#3	Unit 2	5/15/03	10.17	40,737	4.0397	2285	0.496
4	#4	Unit 2	5/29/03	10.04	40,408	4.0098	2208	0.338
5	#5	Unit 2	6/12/03	10.96	38,357	4.044	1244	0.274
6	#6	Unit 1	7/24/03	10.37	42,318	4.050	845	0.291
7	#7	Unit 1	8/07/03	10.48	42,214	4.046	715	0.267
8	#8	Unit 1	8/21/03	11.03	42,168	4.057	786	0.331
9	#9	Unit 1	9/05/03	11.52	42,050	4.057	738	0.261
10	#10	Unit 1	9/18/03	7.14	30,134	3.309	655	0.222
11	#11	Unit 3	1/23/04	12.16	39,735	3.905	1930	0.280
12	#12	Unit 3	2/06/04	12.13	39,574	3.917	1736	0.239
13	#13	Unit 3	2/26/04	12.26	39,821	3.913	1984	0.294
14	#14	Unit 3	3/11/04	11.52	39,640	3.919	1455	0.203
15	#15	Unit 3	3/25/04	11.73	39,180	3.917	1077	0.216

LOADING ORDER	VCC CASK #	UNIT	DATE PLACED ON PAD	HEAT LOAD (kW)	MAXIMUM BURNUP MWd/MTU	MAXIMUM FUEL ENRICHMENT	MANHOURS TO LOAD	Person-Rem DOSE
16	#16	Unit 3	5/27/04	11.74	39,939	3.913	2003	0.265
17	#17	Unit 2	7/15/04	10.65	44,693	4.041	1515	0.195
18	#18	Unit 2	7/29/04	10.66	44,637	4.050	1270	0.164
19	#19	Unit 2	8/12/04	9.71	43,369	4.030	1202	0.137
20	#20	Unit 2	8/26/04	9.73	43,362	4.043	1032	0.095
21	#21	Unit 2	9/10/04	9.73	43,350	4.044	1221	0.125
22	#22	Unit 2	9/23/04	9.73	43,205	4.036	987	0.115

Unit 1: 5 casks loaded, average heat load = 10.1 kW; average man-hours to load = 748 hrs; average dose = 0.274 person-rem
Unit 2: 11 casks loaded, average heat load = 9.7 kW; average man-hours to load = 2070 hrs; average dose = 0.260 person-rem
Unit 3: 6 casks loaded, average heat load = 11.9 kW; average man-hours to load = 1698 hrs; average dose = 0.250 person-rem

Notes:

1) PVNGS had loaded 26 casks at the time of the inspection, however tabulated information had only been prepared and checked for the first 22 casks.

- Heat Load (kW) is the sum of the heat load values for all 24 spent fuel assemblies
- Burnup is the value for the spent fuel assembly with the highest individual discharge burnup
- Fuel Enrichment is the spent fuel assembly with the highest individual enrichment per cent of U-235

ATTACHMENT 3 - INSPECTOR NOTES

Palo Verde Operating Inspection

(Table of Contents)

Palo Verde Operating Inspection 72-44/05-01
(INSPECTOR NOTES)

Category:	Cask Fabrication	**Topic:**	Composite Sampling Requirement 1
Reference:	ACI 318, Sect 5.6.2.1.		
Requirement	Samples for strength tests shall be taken in accordance with "Method of Sampling Freshly Mixed Concrete" (ASTM C 172).		
Finding:	This requirement was implemented by direct observation of composite concrete samples being taken for cask 31 from concrete truck numbers 4412 and 8908. The samples were obtained from the chute of the concrete trucks immediately prior to the concrete being placed on a conveyor belt. Composite samples were obtained by directing a portion of the concrete discharged from the chute into the wheelbarrow.		
Documents Reviewed:	None		

Category:	Cask Fabrication	**Topic:**	Composite Sampling Requirement 2
Reference:	ASTM C 172, Sect 4.1		
Requirement	The elapsed time shall not exceed 15 min between obtaining the first and final portions of the composite sample.		
Finding:	This requirement was met by observing composite concrete samples that were obtained for cask 31 from concrete truck numbers 4412 and 8908. The durations between obtaining the initial and final portions of the two composite concrete samples were less than 15 minutes each.		
Documents Reviewed:	None		

Category:	Cask Fabrication	**Topic:**	Concrete Deposition
Reference:	ACI 318, Sect 5.10.1		
Requirement	Concrete shall be deposited as nearly as practical in its final position to avoid segregation due to rehandling or flowing.		
Finding:	This requirement was implemented by direct observation of concrete placement into cask 31. The cask vendor utilized a conveyor system to transport the concrete from the ready-mix truck discharge chute to the top of the cask. Once the concrete was at the top of the cask elevation, a smaller chute was utilized to direct the concrete to the appropriate quadrant of the concrete cask for placement.		
Documents Reviewed:	None		

Category:	Cask Fabrication	**Topic:**	Concrete Placement Rate
Reference:	ACI 318, Sect 5.10.2		
Requirement	Concreting shall be carried on at such a rate that concrete is at all times plastic and flows readily into spaces between reinforcement.		

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Finding: This requirement was implemented by direct observation of concrete placement into cask 31 during the inspection. The concrete placed into this cask remained in a plastic state during placement activities and appeared to flow readily between the formwork and the reinforcing bars.

Documents Reviewed: None

Category: Cask Fabrication **Topic:** Concrete Strength Requirements

Reference: ACI 318, Sect 5.6.2.3

Requirement Strength level of an individual class of concrete shall be considered satisfactory if both of the following requirements are met: (a) Every arithmetic average of any three consecutive strength tests equals or exceeds f'c (required 28 day concrete compressive strength) and (b) no individual strength test (average of 2 cylinders) falls below f'c by more than 500 psi.

Finding: This requirement was met through a review of the 7-day and 28-day concrete compressive strength break records. The 7-day concrete cylinder break results were reported as 4,420 psi and 5,120 psi by the concrete testing laboratory. The 28-day concrete cylinder break results for the two sets of concrete cylinders taken were reported as 6,040 psi, 6,180 psi, 6,650 psi and 6,370 psi by the concrete testing laboratory. The minimum 28-day compressive strength requirement for the concrete was specified by the cask vendor as 4,000 psi. The 28-day compressive strength results met the minimum concrete compressive strength requirements.

Documents Reviewed: Sampling / Testing of Portland Cement Concrete Lab No. 2825 and 2826, Dated April 5, 2005

Category: Cask Fabrication **Topic:** Field Technician Requirements

Reference: ASTM C 31, Section 5.3

Requirement The field technicians making and curing specimens for acceptance testing shall be certified ACI Field Testing Technicians, Grade I or equivalent. Equivalent personnel certification programs shall include both written and performance examinations, as outlined in ACI CP-1.

Finding: The laboratory technician performing the concrete tests possessed a current ACI Level 1 Field Technician Certification. The cask vendor utilized a single individual supplied by a testing laboratory to make the concrete specimens for acceptance testing. The inspectors reviewed a copy of the technician's current ACI Level 1 certification and found it to meet the ASTM requirement.

Documents Reviewed: None

Category: Cask Fabrication **Topic:** Initial Sample Curing

Reference: ASTM C 31, Section 9.1

Requirement If the specimens cannot be molded at the place where they will receive initial curing, immediately after finishing move the specimens to an initial curing place for storage. Immediately after molding and finishing, the specimens shall be stored for a period up to

48 hours in a temperature range from 60 and 80 degrees F. Record the temperature using a maximum-minimum thermometer.

Finding: This requirement was met by use of a building with a controlled environment for initial storage of the concrete specimens. The inspectors observed the temporary storage building utilized to house the concrete specimens during the initial curing period. The building was provided with an air conditioner and a thermometer for recording the building temperature. The thermometer had been recently calibrated on February 7, 2005 and was reading 70.9 degrees F at the time of the inspection. The temperature chart located on the thermometer indicated that the temperature inside the temporary storage building had been maintained between 60 and 80 degrees F.

Documents Reviewed: None

Category: Cask Fabrication **Topic:** Making & Curing Test Specimens

Reference: ACI 318, Sect 5.6.2.2.

Requirement Cylinders for strength tests shall be molded and laboratory-cured in accordance with ASTM C-31, "Practice for Making and Curing Concrete Test Specimens in the Field."

Finding: This requirement was achieved through observation of the laboratory technician molding the 2 concrete cylinder samples obtained for cask 31. The technician placed the concrete into 3 approximately equal layers in the cylinder molds and rodded each layer 25 times. The concrete slump, air content and temperature were also tested and recorded by the laboratory technician and found to be within project specifications.

Documents Reviewed: None

Category: Cask Fabrication **Topic:** Ready Mixed Concrete

Reference: ACI 318, Sect 5.8.2

Requirement Ready-mixed concrete shall be mixed and delivered in accordance with the requirements of "Specification for Ready-Mixed Concrete" ASTM C 94 or "Specification for Concrete Made by Volumetric Batching and Continuous Mixing" ASTM C 685.

Finding: This requirement was implemented through a review of NAC records / procedures and discussions with NAC construction personnel. The inspectors witnessed concrete discharge from several ready-mix concrete trucks being placed into the NAC casks. ASTM C-94, allowed the purchaser to exceed the recommended discharge time of 1 1/2 hours or 300 drum revolutions provided that the concrete is of such a slump that it can be placed without the addition of water to the batch. NAC had prepared a waiver to exceed the recommended concrete discharge times and drum revolutions in accordance with allowances contained in ASTM C-94. The NAC construction manager with support from the NAC QA representative were required to make a determination of the concrete workability when nearing the 90 minute or 300-revolution limits.

Although the inspectors did not inspect the concrete batch plant for conformance to the requirements of ASTM C-94, they were shown a recently completed inspection checklist for the batch plant being utilized. This checklist indicated that the plant should meet the requirements of ASTM C-94. The cask vendor also stated that a representative from the concrete testing laboratory was stationed at the batch plant to monitor the batching

process and obtain the required aggregate moisture contents.

Documents Reviewed: None

Category: Cask Fabrication **Topic:** Required Number of Strength Samples

Reference: CoC 1015, Table 1.2-6

Requirement A minimum of 2 concrete samples for each concrete cask shall be taken in accordance with ASTM C172 and ASTM C31 for the purpose of obtaining concrete slump, density, air entrainment, and 28-day compressive strength values. The two samples shall not be taken from the same batch or truckload.

Finding: This requirement was achieved by the observation of the contractor obtaining separate samples of concrete from truck 4412 and truck 8908 for cask 31. The testing laboratory personnel measured the slump, concrete density, air entrainment and cast cylinders for obtaining compressive strength test results from each concrete sample .

Documents Reviewed: None

Category: Cask Fabrication **Topic:** Slump Tolerances

Reference: ASTM C 94, Section 6.1.1

Requirement Unless other slump tolerances are included in the project specifications, the following tolerances shall apply: When the slump specifications are written as a "maximum" or "not to exceed" amount and the specified slump is 3 inches or less the slump tolerance is +0/-1.5 inches. If the slump is specified is more than 3 inches the slump tolerance is +0/-2.5 inches.

Finding: This requirement was implemented by reviewing the cask vendor's project requirements for slump and by observing slump tests for cask 31. The cask vendor had specified a concrete slump requirement between 4 inches and 8 1/2 inches, as allowed by ASTM C-94, section 6.1 for the project. The inspectors witnessed the testing of the slump for the concrete placed into cask 31 during the inspection. A slump of 7 inches was obtained for the first slump test taken from truck 4412 and the second slump test from truck 8908 indicated a concrete slump of 5 3/4 inches. Both of these slump test results were within the specified slump tolerances.

Documents Reviewed: None

Category: Cask Fabrication **Topic:** Water/Cement Ratio

Reference: ACI 318, Sect 4.2.2, Table 4.2.2

Requirement Concrete that will be subject to the exposures given in Table 4.2.2 of ACI 318 shall conform to the corresponding maximum water-cementitious materials ratios and minimum strength requirements of that table.

Finding: This requirement was implemented through a review of the NAC mix design requirements. The concrete mix design utilized by NAC specified a maximum water-cement ratio of 0.45. This met the requirement contained in Table 4.2.2 of ACI 318 Building Code for a maximum water-cementitious materials ratio, by weight for normal weight aggregate concrete of 0.45.

Documents Reviewed:	None

Category:	Fuel Verification **Topic:** Classifying Damaged Fuel
Reference:	Interim Staff Guidance-1 (ISG-1)
Requirement	Damaged fuel should be classified based on ISG-1 "Damaged Fuel."
Finding:	The licensee had incorporated fuel classification definitions of intact and damaged fuel from ISG-1 into their site procedure 72DP-9NF02. The licensee reported that they were loading older fuel assemblies into the dry fuel canisters. The older fuel assemblies lacked sufficiently detailed reactor operating records to classify the assemblies as intact or damaged. The licensee had therefore implemented additional inspection processes for the fuel assemblies planned to be loaded into dry cask storage utilizing Ultrasonic Testing (UT) and Visual Testing (VT) examination methods. The licensee developed procedure 78TI-9RX01 to provide criteria for supplemental fuel assembly inspections and classification. The licensee utilized the ECHO-330 ultrasonic testing system to perform the UT examinations of the spent fuel assemblies. The inspectors reviewed selected inspection records associated with fuel assemblies P1E109, P1B117, P3E415, P3B139, P3C038 and P1C032 for compliance with the specified UT and VT inspections. The records for these fuel assemblies indicated that both the UT and VT inspections had been performed and were verified as acceptable by the licensee representatives.
Documents Reviewed:	Procedure 72DP-9NF02, "Fuel Assembly Selection For Dry Cask Storage", Revision 5; Procedure 78TI-9RX01, "Spent Fuel Inspection", Revision 6;

Category:	Fuel Verification **Topic:** Fuel Specifications
Reference:	CoC 1015, Tech Spec B.2.1.1
Requirement	Intact fuel assemblies meeting the limits specified by Tables B.2-1 through B.2-5 may be stored in the NAC-UMS canister.
Finding:	The licensee had incorporated the Technical Specification fuel characteristics for the CE 16 X 16 fuel assemblies into procedure 72DP-9NF02. The NAC CoC, Section B 2.0 "Approved Contents" defined the fuel assembly characteristics that were approved to be loaded into the NAC-UMS canister. These characteristics are located in Tables B2-1 through B2-5 of the NAC CoC. The requirements contained in the NAC CoC tables were compared to the fuel selection requirements contained in Appendix A and C of procedure 72DP-9NF02. The licensee procedure was determined to be satisfactory. The licensee fuel analysis reports contained the fuel characteristics for the fuel that had been selected for loading into the NAC casks. The fuel analysis reports for cask numbers 11 and 25 were reviewed. The inspectors compared the fuel characteristics for fuel assemblies P1F109, P1F102, P1C032, P3C038, P3B139 and P3E415 from cask numbers 11 and 25, to the NAC CoC Tables B2-1 through B2-5. No discrepancies were identified.
Documents Reviewed:	Procedure 72DP-9NF02, "Fuel Assembly Selection For Dry Cask Storage", Revision 5; Analysis RE-01-C12-2004-012, "U1C12 Spent Fuel Selection for Dry Casks 23 through

28 Storage", Revision 0; Analysis RE-03-C11-2003-018, "U3C11 Spent Fuel Selection for First Dry Cask", Revision 01

Category: Fuel Verification **Topic:** Physical Inventory

Reference: 10 CFR 72.72(b)

Requirement Each licensee shall conduct a physical inventory of all spent fuel containing special nuclear material at intervals not to exceed 12 months unless otherwise directed by the Commission. The licensee shall retain a copy of the current inventory as a record until the Commission terminates the license.

Finding: This requirement was implemented by the licensee through use of procedure 72DP-9NF01 that provided instructions for controlling and tracking changes of SNM inventory. Section 3.14 provided detailed instructions for performance of SNM physical inventory of the ISFSI. Specifically, the ISFSI physical inventory was required to be performed at intervals not to exceed 12 months.

As part of the performance of the SNM physical inventory, the licensee verified that each loaded cask was located at the ISFSI pad by either of two methods. The two approved methods were direct visual observation of the cask or by confirmation of the temperature differential that existed between the cask inlet and outlet vents as recorded in the appropriate surveillance test procedure. The ISFSI physical inventory did not audit the contents of each cask, as the serial numbers of the fuel assemblies placed into each canister were confirmed and documented after loading, but prior to welding the lid on each canister in procedure 78OP-9ZZ02, Appendix G..

The most recent ISFSI Inventory Document dated September 23, 2004 was reviewed. At the time of the inventory there were 22 loaded casks on the ISFSI pad. The fuel assemblies contained in each loaded cask were tracked by the physical location that the cask occupied on the ISFSI pad. The inspectors verified that the fuel information contained in the ISFSI Inventory Document for the cask located on the ISFSI pad at location number 11 matched the information contained in the Reactor Engineering Analysis report for the fuel assemblies reported to be placed in that canister. No discrepancies were noted.

Licensee procedure 84DP-0RM30, section 5.17 specified that records for the ISFSI and dry cask storage were required to be retained for a minimum of "Life of the ISFSI plus 5 years." While the majority of the ISFSI records were reported to be correctly classified, the licensee had identified through a Quality related audit that some of the ISFSI records were not correctly classified or being retained for the required retention period. Condition Report 2730052 had been initiated by the licensee to track and find any outlying records associated with the ISFSI.

Documents Reviewed: Procedure 72DP-9NF01, "Control of SNM Transfer and Inventory," Revision 15; ISFSI Inventory Document Dated 09/23/04; Analysis RE-03-C11-2003-018, "U3C11 Spent Fuel Selection for First Dry Cask", Revision 01; Procedure 84DP-0RM30, "Document / Record Control and Turnover," Revision 16; Procedure 78OP-9ZZ02, "NAC-UMS Cask Loading Operations," Revision 15

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Category:	Fuel Verification	**Topic:**	Soluble Boron Requirements

Reference: CoC 1015, Tech Spec B.3.2

Requirement The soluble boron concentration in the PWR fuel pool and canister water is required to be greater than or equal to 1,000 ppm as shown in Table B2-2 or the maximum enrichment of the fuel assemblies must be restricted..

Finding: Soluble boron credit was not required for loading spent fuel by the licensee due to a self imposed administrative limit for a maximum initial enrichment of 4.8 percent by weight of Uranium 235. The NAC CoC, Table B2-2 listed the maximum initial enrichment of Uranium 235 that was permitted in the CE 16 X 16 fuel assemblies without soluble boron credit as 4.8 percent by weight. The licensee had prepared procedure 72DP-9NF02 that listed the fuel assembly selection criteria for loading the NAC-UMS canisters. This procedure limited the maximum initial enrichment of the fuel assemblies selected by the licensee to be loaded as 4.8 percent by weight of Uranium 235. Therefore, no additional boron compensation during the loading operations was required for fuel with an initial enrichment of 4.8 percent by weight of Uranium 235 or less. Several of the spent fuel selection analysis reports prepared by the licensee were reviewed to verify that the maximum initial enrichment of the fuel assemblies selected for loading were below the specified initial enrichment limit. The individual records reviewed by the inspectors indicated that the initial enrichment of the fuel assemblies were all well below the maximum allowable initial enrichment of 4.8 percent by weight of Uranium 235.

Documents Reviewed: Procedure 72DP-9NF02, "Fuel Assembly Selection For Dry Cask Storage", Revision 5; CoC 1015 Table B2-2; Analysis RE-02-C12-2004-011, "U2C12 Spent Fuel Selection for Dry Casks 19 through 22 Storage", Revision 0; Analysis RE-03-C11-2004-001, "U3C11 Spent Fuel Selection for the 2nd Group of Dry Casks", Revision 0; Analysis RE-02-C12-2004-003, "U2C12 Spent Fuel Selection for Dry Casks 17 and 18 Storage", Revision 0; Analysis RE-01-C12-2004-012, "U1C12 Spent Fuel Selection for Dry Casks 23 through 28 Storage", Revision 0; Analysis RE-03-C11-2003-018, "U3C11 Spent Fuel Selection for First Dry Cask", Revision 01

Category:	Fuel Verification	**Topic:**	Total Decay Heat Limit of 23 kW

Reference: FSAR 1015, Sect 1.3.1.2

Requirement The total decay heat of the stored PWR fuel shall not exceed 23 kW.

Finding: This requirement was implemented by procedure 72DP-9NF02, that listed the fuel assembly selection criteria for loading the NAC-UMS canisters. Procedure 72DP-9NF02 limited the allowable individual decay heat load per assembly to less than or equal to 958.3 watts and the total cask heat load to less than or equal to 20 kW. Several of the spent fuel selection analysis reports prepared by the licensee were reviewed to verify that the individual assembly heat loads and the total cask heat loads were within the limits specified in procedure 72DP-9NF02. The records indicated that the individual assembly heat loads were well below the limit of 958.3 watts and the total cask heat loads were well below the maximum limit imposed by the licensee of 20 kW.

Documents Reviewed: Procedure 72DP-9NF02, "Fuel Assembly Selection For Dry Cask Storage", Revision 5; Analysis RE-02-C12-2004-011, "U2C12 Spent Fuel Selection for Dry Casks 19 through

22 Storage", Revision 0; Analysis RE-03-C11-2004-001, "U3C11 Spent Fuel Selection for the 2nd Group of Dry Casks", Revision 0; Analysis RE-02-C12-2004-003, "U2C12 Spent Fuel Selection for Dry Casks 17 and 18 Storage", Revision 0; Analysis RE-01-C12-2004-012, "U1C12 Spent Fuel Selection for Dry Casks 23 through 28 Storage", Revision 0; Analysis RE-03-C11-2003-018, "U3C11 Spent Fuel Selection for First Dry Cask", Revision 01

Category: Operations/Maintenance **Topic:** Annual Cask Inspections

Reference: FSAR 1015, Sect 9.2.1

Requirement An annual inspection of the concrete cask is required to include visual inspection of concrete surfaces for chipping, spalling or other surface defects. Defects larger than 1" in diameter and deeper than 1" shall be regrouted and concrete-inhibiting (external) coatings re-applied on accessible corroded surfaces, including concrete cask lifting lugs, if present.

Finding: This requirement was implemented by the licensee through the use of Preventative Maintenance Basis (PMB) instructions. The most recent annual inspection for concrete storage cask numbers 1-23 was completed on February 15-16, 2005 with no abnormal cask deterioration observed. PMB 2590668 provided the instructions for the annual cask inspections and the results were documented in Component Observation Report (COR) 05-9-001. There were no indications of leaching, chemical attack, erosion, mechanical abrasion, popouts or voids greater than ½" in depth, scaling or spalling, rebar or anchor bolt corrosion, or coating damage observed. The vent covers and screens, conduit, flex conduit, electrical boxes, and security tamper seals were in good condition.

Two minor discrepancies were discovered and repaired. Storage cask 4 exhibited a loose bottom vent anchor bolt, which was re-installed under CWMO 2722592. Storage cask 23 was discovered to have carbon steel (rather than stainless steel) washers on the vent screens. The washers were replaced under CWMO 2770533.

The NRC inspectors independently toured the ISFSI area and observed the condition of selected concrete casks. There were no indications of cask deterioration noted by the inspectors.

Documents Reviewed: Component Observation Report (COR), 05-9-001, Revision 0; Preventative Maintenance Basis (PMB) 2590668, "VCC Annual Inspection"; Corrective Maintenance Work Order (CWMO) 2722592 and 2770533

Category: Operations/Maintenance **Topic:** NDE of Critical Areas

Reference: NUREG-0554

Requirement The nondestructive examination of critical areas of the single failure-proof crane should be repeated at 4-year intervals or less for those welds whose failure could result in the drop of a critical load.

Finding: This requirement had been implemented by the performance of nondestructive examinations on the licensee identified critical welds for all 3 Fuel Building 150-ton single-failure-proof cranes. The Work Orders associated with the most recent

nondestructive examinations were reviewed and found to be within the recommended 4-year inspection interval as required by NUREG 0554, with no identified deficiencies.

The 4-year NDE examination of the Unit 1 Fuel Building 150-ton crane critical welds was last completed on February 26, 2003 by Work Order 2452130. Visual examinations of the splice welds on the bottom flanges of both girders, the east webs of both girders, and the east web of girder "A" were conducted in accordance with Test Instruction 73TI-9ZZ17. Magnetic Particle examinations of the splice welds on the top flanges of both girders and the west web of girder "A" were conducted in accordance with Test Instruction 73TI-9ZZ05.

The 4-year NDE examination of the Unit 2 Fuel Building 150-ton crane critical welds was last completed on May 16, 2002 by Work Order 2452132. Visual examinations of the splice welds on the top flanges and the east and west webs of both girders were conducted in accordance with Test Instruction 73TI-9ZZ17. Magnetic Particle examinations of the splice welds on the bottom flanges and west web of girder "A" were conducted in accordance with Test Instruction 73TI-9ZZ05.

The 4-year NDE examination of the Unit 3 Fuel Building 150-ton crane critical welds was last completed on July 10, 2003 by Work Order 2452134. Visual examinations of the splice welds on the bottom flanges of girder B, the east webs of both girders, and the west web of girder "B" were conducted in accordance with Test Instruction 73TI-9ZZ17. Magnetic Particle examinations of the splice welds on the top flanges of both girders, the bottom flanges of girder "A", and the west web of girder "A" were conducted in accordance with Test Instruction 73TI-9ZZ05.

Documents Reviewed: Test Instruction 73TI-9ZZ05, "Magnetic Particle Examination," Revision 10; Test Instruction 73TI-9ZZ17, "Visual Examination of Welds" Revision 8; Work Order 2452130; Work Order 2452132; Work Order 2452134

Category: Operations/Maintenance **Topic:** Registration of Casks with NRC

Reference: 10 CFR 72.212(b)(1)(ii)

Requirement The general licensee shall register the use of each cask with the NRC no later than 30 days after using the cask to store spent fuel.

Finding: The licensee had registered all the NAC casks within the required 30 limit. At the time of the inspection, 25 casks had been placed on the ISFSI. A summary of the dates the casks were placed on the ISFSI pad and the associated letters for the casks are provided below:

NAC Cask #1 in service March 15, 2003; registered March 19, 2003
NAC Cask #2 in service April 15, 2003; registered April 25, 2003
NAC Cask #3 in service May 15, 2003; registered June 4, 2003
NAC Cask #4 in service May 29, 2003; registered June 4, 2003
NAC Cask #5 in service June 12, 2003; registered June 20, 2003
NAC Cask #8 in service July 24, 2003; registered July 31, 2003
NAC Cask #7 in service August 7, 2003; registered August 8, 2003
NAC Cask #6 in service August 21, 2003; registered August 28, 2003

NAC Cask #9 in service September 5, 2003; registered September 12, 2003
NAC Cask #10 in service September 18, 2003; registered September 23, 2003
NAC Cask #11 in service January 23, 2004; registered January 29, 2004
NAC Cask #12 in service February 6, 2004; registered February 13, 2004
NAC Cask #13 in service February 26, 2004; registered March 5, 2004
NAC Cask #14 in service March 11, 2004; registered March 18, 2004
NAC Cask #15 in service March 25, 2004; registered April 1, 2004
NAC Cask #16 in service May 27, 2004; registered June 9, 2004
NAC Cask #17 in service July 15, 2004; registered July 22, 2004
NAC Cask #18 in service July 29, 2004; registered August 5, 2004
NAC Cask #19 in service August 12, 2004; registered August 18, 2004
NAC Cask #20 in service August 26, 2004; registered August 31, 2004
NAC Cask #21 in service September 10, 2004; registered September 16, 2004
NAC Cask #22 in service September 23, 2004; registered September 28, 2004
NAC Cask #23 in service January 22, 2005; registered February 1, 2005
NAC Cask #24 in service February 17, 2005; registered March 1, 2005
NAC Cask #25 in service February 24, 2005; registered March 1, 2005

Documents Reviewed: Palo Verde Letter Numbers 102-05218, 102-05219, 102-05205, 102-05156, 102-05153, 102-05145, 102-05140, 102-05137, 102-05129, 102-05109, 102-05077, 102-05073, 102-05063, 102-05049, 102-05042, 102-05001, 102-04997, 102-04991, 102-04981, 102-04980, 102-04956, 102-04951, 102-04950, 102-04932, 102-04908

Category: Operations/Maintenance **Topic:** Returning Canister to Spent Fuel Pool

Reference: CoC 1015, Tech Spec A.3.1.1.2

Requirement If the time limit for drying the canister cannot be achieved, the canister must be cooled. This can be accomplished by either returning the canister to the spent fuel pool or supplying air to the transfer cask annulus fill/drain lines for a minimum of 24 hours. Tech Spec A.3.1.1.2 provides limits for the amount of time that the canister can be in the vacuum drying stage after the canister cooling has been completed.

Finding: This requirement was implemented by procedure 78O-9ZZ02, Appendix N, step 2.4.2 that specified the time limits from the end of the 24-hours of the in-pool cooling period through completion of vacuum dryness testing and the introduction of helium backfill. The time limits specified in procedure 78O-9ZZ02 matched the "PWR In-Pool" requirements specified in Tech Spec 3.1.1.2.

At the time of the inspection, the licensee was vacuum drying canister 27 in accordance with the requirements of procedure 78O-9ZZ02. The initial vacuum drying activities were unable to achieve a pressure less that 2.6 torr, therefore in-pool cooling was implemented for the canister. Vacuum drying re-commenced on March 8, 2005 at 0445 hours for canister 27 after 24-hours of in-pool cooling. Appendix N, step 2.4.2 specified a time limit for additional vacuum drying associated with canister 27 (heat load of 12.403 kW) as 24 hours. Canister 27 achieved a final test pressure of 1.469 torr on March 8, 2005 at 0609 hours and the helium backfill was completed at 0711 hours, stopping the 24-hour time clock. The second vacuum drying time limit of 24-hours was met in slightly less than 2.5 hours and further in-pool cooling was not required.

Documents Reviewed:	Procedure 780P-9ZZ02, "NAC-UMS Cask Loading Operations," Rev. 15

Category:	Operations/Maintenance	**Topic:**	Spacing of Casks on ISFSI Pad
Reference:	FSAR 1015, Sect 8.1.3.5		
Requirement	Spacing between concrete casks must not be less than 15 feet center-to-center.		
Finding:	This requirement was achieved through the design of the ISFSI pads including a minimum spacing requirement of 15' center-to-center between the loaded concrete casks. The ISFSI pad had been clearly marked to identify where the concrete casks would be placed. The electrical conduits for the thermal monitoring system had been embedded in the concrete with allowance for terminations at the precise locations where the casks would be placed. The inspectors toured the ISFSI pad and performed independent measurements between selected concrete casks. The cask spacing met the NAC-UMS FSAR requirement to maintain a minimum of 15' center-to-center spacing.		
Documents Reviewed:	None.		

Category:	Operations/Maintenance	**Topic:**	Temperature Monitoring of Cask
Reference:	CoC 1015, Tech Spec A.3.1.6		
Requirement	On a 24-hr basis, verify that the difference between the average concrete cask air outlet temperature and ISFSI ambient temperature is less than or equal to 102 degrees Fahrenheit for the PWR canister.		
Finding:	This requirement was implemented by recording the cask differential temperatures each shift and through verification that selected cask temperatures were within Technical Specification limits. The storage cask differential temperatures were being monitored and logged each shift in accordance with directions contained in Procedure 78ST-1ZD01. The acceptance criteria in procedural step 8.7 stated, "The difference between the average concrete cask air outlet temperature and ISFSI ambient temperature for each NAC-UMS System containing spent fuel located on the storage pad within the ISFSI perimeter is less than or equal to 90 degrees Fahrenheit". The inspectors randomly selected and reviewed the following surveillance test packages and found the maximum temperatures were all below the maximum requirement contained in Tech Spec A.3.1.6 of 120 degrees Fahrenheit: September 26, 2003, the highest temperature differential was 60.44 degrees Fahrenheit June 1, 2004, the highest temperature differential was 60.47 degrees Fahrenheit June 24, 2004, the highest temperature differential was 60.42 degrees Fahrenheit July 25, 2004, the highest temperature differential was 60.83 degrees Fahrenheit August 3, 2004, the highest temperature differential was 60.26 degrees Fahrenheit August 13, 2004, the highest temperature differential was 60.96 degrees Fahrenheit September 26, 2004, the highest temperature differential was 69.38 degrees Fahrenheit February 6, 2005, the highest temperature differential was 65.90 degrees Fahrenheit		
Documents Reviewed:	Procedure 78ST-1ZD01, "Daily ISFSI Temperature Monitoring Surveillance," Revision 3 . .		

Category:	Operations/Maintenance **Topic:** Time Limit after Helium Backfill
Reference:	CoC 1015, Tech Spec A.3.1.4
Requirement	For all canisters there is a 600 hour limit for how long the canister can be in the transfer cask from the time of completion of helium backfill to the time the canister is inserted into the storage cask. For PWR canisters with a heat load of 20 kW or greater, there is a time limit of 20 hours for how long the canister can be in the transfer cask from the time of completion of helium backfill to the time the canister is inserted into the storage cask.
Finding:	The licensee administratively limited the canister heat load to a maximum of 20 kW, thereby defaulting to the Technical Specification 600-hour limit for transfer operations. Procedure 780P-9ZZ02, step 3.19 limited decay canister heat loads to a maximum of 20 kW for the NAC-UMS storage system. Accordingly, procedure 780P-9ZZ02, step 8.11 specified 600 hours (25 days) as the maximum time allowed between helium backfill of the canister and transfer of the canister from the transfer cask into the storage cask. At the time of the inspection the licensee was loading canister 27. The helium backfill operations for canister 27 was completed on March 8, 2005 at 0711 hours, as documented in step 8.9 of procedure 780P-9ZZ02. This started the 600-hour time clock. The canister transfer into the storage cask was completed on March 9, 2005 at 1940 hours, and Tech Spec A.3.1.4 was exited. Canister 27 was helium backfilled and held in the transfer cask for 36.5 of the 600-hours allowed.
Documents Reviewed:	Procedure 780P-9ZZ02, "NAC-UMS Cask Loading Operations," Rev. 15

Category:	Operations/Maintenance **Topic:** Time Limit for Vacuum Drying
Reference:	CoC 1015, Tech Spec A.3.1.1.1
Requirement	The technical specifications provide various time limits for vacuum drying based on the kW of the cask. Exceeding the time limit requires the licensee to initiate actions to cool the fuel within a certain time frame.
Finding:	This requirement was implemented through procedure 78OP-9ZZ02, step 7.1.16.2 that provided a table with vacuum drying time limits for a range of canister heat loads expressed in kilowatts (kW) that matched the time limits specified in Tech Spec 3.1.1.1. The vacuum drying time clock started when canister drain down commenced in step 7.1.14 and ended when helium backfill was completed in step 8.9. At the time of the inspection, the licensee was vacuum drying canister 27 in accordance with procedure 780P-9ZZ02. Canister 27 had a heat load of 12.403 kW and an associated vacuum drying time limit of 40-hours from the table. Canister 27 drain down commenced on March 5, 2005 at 1600 hours. The 40-hour vacuum drying time limit expired on March 7, 2005 at 0800 hours. Early in the morning of March 7, the Cask Loading Coordinator determined that the canister would not be dry and backfilled with helium before the 40-hour time clock expired at 0800 hours. He secured the vacuum drying pump, backfilled the canister with helium and raised the cask loading pit water level above the transfer cask. In-pool cooling commenced at 0443 hours on March 7, 2005 in accordance with step 7.1.16.4 and Appendix N, "Canister In-Pool Cooling Operation". The minimum in-pool cooling time was 24-hours as specified by Tech Spec

3.1.1, Action A.2.1.2.

The licensee had conservatively started the vacuum drying time clock when the canister drain down operations commenced rather than when the drain down had been completed as stated in Tech Spec A.3.1.1. This change was implemented by the licensee after an event occurred where another utility utilizing a similar NAC system, allowed multiple blowdowns during the drain down time clock that was contrary to the NAC thermal analysis. Condition Report / Disposition Request (CRDR) 2751244 had been initiated by the licensee to evaluate the event and associated potential consequences. After reviewing the other utility's root cause report and reviewing the cask vendor thermal analysis, the licensee determined that administrative controls should be implemented to 1) assure that the drain down time for the canister is either limited to 2 hours or that draindown time is included in the vacuum drying clock for LCO 3.1.1 and removed from the time to boil clock and 2) assure that the helium backfill time is included in the vacuum drying time clock for LCO 3.1.1. The licensee also opened action item 2764883 to determine if the previously loaded 22 casks were outside the bases of the NAC thermal analyses based on the revised application of the Technical Specification limits. The NRC will conduct a follow-up review of the licensee's evaluation of the previously loaded 22 casks (Inspection Follow-up Item 072-0044/0501-01).

Documents Reviewed: Procedure 780P-9ZZ02, "NAC-UMS Cask Loading Operations," Revision 15

Category: Operations/Maintenance **Topic:** Transfer Cask Trunnion Annual Inspection

Reference: FSAR 1015, Sect 9.2.2

Requirement Annually the lifting trunnions, shield door and shield door rails shall be either dye penetrant or magnetic particle examined in accordance with ASME Section V. Acceptance criteria shall be in accordance with Section III, Subsection NF, Article NF-5350 or NF-5340. Also, the coating applied to any carbon steel surfaces of the transfer cask shall be inspected annually and any chips, cracks or other defects in the coating repaired.

Finding: This requirement was implemented by Work Order 2732610 conducted on December 12, 2004. Magnetic Particle Examinations of the Transfer Cask load bearing welds were conducted on December 12, 2004 in accordance with instructions contained in Work Order 2732610 . The weld inspections included the lifting trunnions to inner and outer shells, shield door rails to bottom plate, bottom plate to inner and outer shells, and inner and outer girth welds, as shown on drawing CN014B-A00001. The NDE results were documented in NDE Reports 04-672 and 04-673.

The coatings on the carbon steel surfaces were removed for the Magnetic Particle Examinations under Work Order 2665967. The coatings were re-applied at the conclusion of the NDE and other minor defects in the coatings were touched up at the same time.

Documents Reviewed: Work Order 2732610; Work Order 2665967; NDE Reports 04-672 and 04-673, "Magnetic Particle Examination"; Drawing CN014B-A00001, "Transfer Cask Weld Map For Annual ANSI 14.6 Inspection"

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Category:	Operations/Maintenance **Topic:** Vacuum Drying Pressure
Reference:	CoC 1015, Tech Spec A.3.1.2
Requirement	The canister vacuum drying pressure shall be less than or equal to 3 mm of mercury. Pressure shall be held for not less than 30 minutes.
Finding:	This requirement was implemented through procedure 780P-9ZZ02, step 7.7.21 that specified a vacuum drying acceptance criteria of less than or equal to 2.6 torr after a minimum of 30 minutes had elapsed since canister isolation. The licensee had implemented a procedural acceptance limit of 2.6 torr to allow for potential instrument error in achieving the required Technical Specification limit of 3.0 torr. The licensee was vacuum drying canister 27 at the time of the inspection. The licensee documented in Procedure 780P-9ZZ02, Appendix N, step 2.7.26 that canister 27 achieved a final dryness of 1.469 Torr on March 8, 2005 at 0609 hours. The dryness was measured using Measuring and Test Equipment (M&TE) calibrated in accordance with the licensee QA program. Stopwatch EG 2565, with a calibration due date of November 8, 2006, was used for measuring the 30-minute time period. MKS Absolute Manometer pressure transducer 4345 and pressure display 4346, both with calibration due dates of August 20, 2005, were used for verification of the final vacuum pressure.
Documents Reviewed:	Procedure 780P-9ZZ02, "NAC-UMS Cask Loading Operations," Revision 15

Category:	QA **Topic:** Corrective Action
Reference:	10 CFR 72.172
Requirement	The licensee shall establish measures to ensure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances, are promptly identified and corrected. In the case of a significant condition identified as adverse to quality, the measures must ensure that the cause of the condition is determined and corrective action is taken to preclude repetition.
Finding:	The licensee utilized Procedure 90DP-0IP10 to control identification and correction of conditions adverse to quality. Section 3.7.1 of Procedure 90DP-0IP10 required that corrective actions associated with a SIGNIFICANT condition correct the nonconforming condition and take actions to prevent recurrence. By contrast, those condition reports classified as ADVERSE required that the nonconforming condition be corrected but did not require actions to prevent recurrence. Appendix G of the procedure 90DP-0IP10 listed conditions that would require a condition report to be classified as SIGNIFICANT. However, the conditions listed in Appendix G did not include conditions associated with 10 CFR Part 72 or the NAC Certificate of Compliance that would require a dry fuel related condition report to be classified as SIGNIFICANT. A Condition Report / Disposition Request (CRDR) number 2781509 was initiated by the licensee to improve the guidance included in Appendix G for classification of dry fuel related condition reports classified as SIGNIFICANT. The discrepancy is not safety significant due to the non-recurrence of adverse conditions that could have been prevented by the licensee. Although this condition requires correction, it constitutes a violation of minor significance that is not subject to enforcement in accordance with Section IV of the Enforcement Policy.

The licensee had initiated 55 CRDR reports associated with dry fuel operations since April 2003. The inspectors selected 6 of the CRDR reports to review. The CRDR reports reviewed were determined to adequately correct the conditions adverse to quality.

Documents Reviewed: Procedure 90DP-0IP10, "Condition Reporting," Revision 20; CRDR 2730052; CRDR 2729174; CRDR 2729066; CRDR 2713902; CRDR 2732108; CRDR 2751244; CRDR 2781509

Category: QA **Topic:** QA Audits

Reference: 10 CFR 72.176

Requirement The licensee shall carry out a comprehensive system of planned and periodic audits to verify compliance with all aspects of the QA program and to determine the effectiveness of the program.

Finding: The licensee had performed annual ISFSI Operation Audits, source surveillances of NAC fabrication activities and evaluations of other primary vendors performing quality related activities associated with dry fuel storage activities. The licensee had conducted ISFSI Operation Audits during 2003 and 2004. Both audits were conducted by a team of auditors assisted by technically competent personnel that were knowledgeable in dry storage operations. The most recent audit also included a representative from the cask vendor's staff on the audit team. The focus of the audits varied, but included some of the following major topical areas: organizational effectiveness, conditions of the NAC-UMS CoC, ISFSI operational requirements, plant program interfaces, and industry operating experience. A number of deviations were identified by the audit team and corresponding Condition Reports were initiated when necessary.

The QA organization implemented source surveillances of NAC fabrication activities and evaluations of other primary vendors performing quality related activities associated with dry fuel storage activities.

Documents Reviewed: Palo Verde ISFSI Operations Audit Number 2003-002; Palo Verde ISFSI Operations Audit Number 2004-010; Source Surveillances (SVs) dated from June 25-26, 2003 to December 14-16, 2004; Nuclear Assurance Evaluation Reports of Primary Vendor Evaluations dated from January 7, 2003 to August 27, 2004

Category: Radiological **Topic:** ALARA

Reference: 10 CFR 72.104(b)

Requirement Operational restrictions must be established to meet as low as is reasonably achievable objectives for radioactive materials in effluents and direct radiation levels associated with ISFSI operations.

Finding: This requirement was implemented through use of Procedure 75DC-9SF01 and good rad-worker practices. At the time of the inspection, the licensee was in the process of loading NAC canister 27 in Unit 1 using Procedures 75DC-9SF01and 78OP-9ZZ02, and Work Order 2620376.

Procedure 75DC-9SF01 identified the radiological control practices to be applied at specific times throughout the loading process. These practices included the imposing

dose rate limits on workers; the use of temporary shielding, contamination limits / controls, use of appropriate radiological postings , access controls, air sampling / use of HEPA filters, and radiological surveys. Procedure 780P-9ZZ02 was designed to minimize ISFSI crew member time in high dose rate areas during each segment of the operation.

The inspectors attended the As Low As Reasonably Achievable (ALARA) pre-job briefing for transferring canister 27 from the Transfer Cask to its Storage Cask. The briefing was comprehensive and included discussion of the Radiation Exposure Permit (REP) information, Radiation Protection coverage levels, use of neutron badges, anticipated dose rates, access controls, use of radio communications, proper tools and low dose waiting areas. The on-duty Unit 1 Shift Manager was also present.

Due to continued dry fuel cask loading efforts, the Palo Verde ISFSI team remained principally intact and proficient in their assigned dry fuel tasks. Team members were experienced in assigned phases of loading operations and had developed efficiencies that reduced their radiological exposure. Canister 25 had been loaded with the smallest total exposure to date of 0.095 person-rem. This indicated that effective use of ALARA pre-job briefings, radiological controls included in the radiation protection procedure and loading procedure, and work practices had all contributed toward lower total radiological exposures. The NRC inspectors concluded that the licensee controls for dry fuel loading operations met the requirements of 10 CFR 72.104(b).

Documents Reviewed: Procedure 75DC-9SF01, "Radiation Protection Requirements for Dry Cask Storage," Revision 2; Procedure 780P-9ZZ02, "NAC-UMS Cask Loading Operations," Revision 15,

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Category: Radiological **Topic:** Contamination Limits for Canister

Reference: CoC 1015, Tech Spec A.3.2.1

Requirement Removable contamination on the accessible exterior surfaces of the canister or accessible interior surfaces of the transfer cask shall not exceed 10,000 dpm/100 cm2 from beta and gamma sources; and 100 dpm/100 cm2 from alpha sources prior to transport operations.

Finding: This requirement was implemented through the use of Procedure 75DC-9SF01, that specified contamination limits for the canister and transfer cask. The licensee continuously flushed the annular gap between the canister and transfer cask whenever the transfer cask was submerged in the cask loading pit. The water utilized to flush the annulus had been filtered to reduce the activity to less than 1.0 X 10-6 micro-curries/milliliter to prevent contamination of the canister exterior surface. Once the transfer cask was removed from the cask loading pit and placed into the cask wash pit, the annular gap was flushed again with demineralized water prior to transfer operations.
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Procedure 75DC-9SF01, step 3.1.1 contained the limits for removable contamination of 10,000 dpm/100 cm2 (beta/gamma) and 100 dpm/100 cm2 (alpha) as required by Tech Spec A.3.2.1. Step 3.1.3 imposed administrative limits of 8,000 dpm/100 cm2 (beta/gamma) and 100 dpm/100 cm2 (alpha) on any single smear; and 2,000 dpm/100

cm2 (beta/gamma) and 40 dpm/100 cm2 (alpha) on the average of all smears.

Procedure 75DC-9SF01, Appendices B, C, D, and F provided the instructions for performing contamination smear surveys on the canister exterior and the transfer cask interior surfaces. Appendix E required 16 smears of the canister external surface. These smears covered the full length and circumference of the canister.

The inspectors reviewed the Appendix E surveys for the last 15 canisters loaded (VCC numbers 11-26) and found removable surface contamination levels below 1000 dpm/100 cm2 (beta/gamma) and 20 dpm/100 cm2 (alpha). These contamination levels were within the limits required in Tech Spec A.3.2.1.

Documents Reviewed: Procedure 75 DC-9SF01, "Radiation Protection Requirements for Dry Cask Storage," Revision 2

Category: Radiological **Topic:** Radiation Limits for Storage Cask

Reference: CoC 1015, Tech Spec A.3.2.2

Requirement The average surface dose rate of each concrete cask shall not exceed the following limits; 50 mrem/hr (neutron + gamma) on the side, 50 mrem/hr (neutron + gamma) on the top, and 100 mrem/hr (neutron + gamma) at the air inlets and outlets.

Finding: This requirement was controlled through Procedure 75 DC-9SF01, step 3.2.1 that stated the average surface dose rate allowable limits were 50 mrem/hour (neutron + gamma) on the side; 50 mrem/hour (neutron + gamma) on the top; and 100 mrem/hour (neutron + gamma) at the air inlets and outlets.

Procedure 75 DC-9SF01, Appendix F, provided instructions for performing radiation surveys on the loaded cask prior to moving it to the ISFSI pad. The NRC inspectors reviewed the Appendix F radiation surveys for the last 15 casks loaded (VCC numbers 11-26) and found the range of surface dose rates varied from 0.956 to 1.50 mrem/hour on the sides, 0.910 to 3.05 mrem/hour on the tops, and 5.030 to 7.40 mrem/hour on the air inlet and outlet vents.

The average surface dose rates for the last 15 casks loaded were all less than 10 percent of the Tech Spec A.3.2.2 limits.

Documents Reviewed: Procedure 75 DC-9SF01, "Radiation Protection Requirements for Dry Cask Storage," Revision 2

Category: Radiological **Topic:** Radioactive Materials

Reference: 10 CFR 72.104(a)

Requirement During normal operations and anticipated occurrences, the annual dose equivalent to any real individual who is located beyond the controlled area must not exceed 25 mrem to the whole body, 75 mrem to the thyroid and 25 mrem to any other critical organ.

Finding: This requirement was verified as having been met through review of the licensee annual radioactive effluent release report. The Palo Verde Nuclear Generating Station 2003 Annual Radioactive Effluent Release Report was submitted to the NRC on April 21,

2004, in accordance with Technical Specification 5.6.3. Appendix C, Table 45 of the report contained the 2003 Thermo-Luminescent Dosimeter (TLD) results at the site boundary. The net dose from direct radiation was 8-14 micro-rem per hour or 17-30 mrem per standard quarter. These values were indistinguishable from the background levels measured in 1984-1985 prior to reactor operations. The ISFSI operations have not caused elevated dose readings at the site boundary.

Documents Reviewed: Palo Verde Nuclear Generating Station 2003 Annual Radioactive Effluent Release Report, dated April 21, 2004.

Category: Safety Reviews **Topic:** Changes, Tests, and Experiments

Reference: 10 CFR 72.48(c)(1)

Requirement A licensee can make changes to their facility or storage cask design if certain criteria are met as listed in this section.

Finding: The licensee utilized Procedure 93DP-0LC07, that provided instructions for performing safety reviews associated with both the nuclear plant and dry fuel storage changes, tests and experiments. The procedure contained instructions for performance of 10 CFR 72.48 applicability determinations, screenings and evaluations.

The licensee had performed eighteen 10 CFR 72.48 screenings/evaluations since April 2003. The inspectors selected one screening and one evaluation for review. The 10 CRF 72.48 screening and evaluation appeared to be thorough and comprehensive.

Documents Reviewed: Procedure 93DP-0LC07, "10 CFR 50.59 and 72.48 Screenings and Evaluations," Revision 7; Screening Number 72.48 S-05-001, Revision 0; Evaluation Number 72.48 E-03-001, Revision 0

Category: Safety Reviews **Topic:** Conditions of General License

Reference: 10 CFR 72.212(b)(2)(ii)

Requirement The licensee shall evaluate any changes to the written evaluations required by this paragraph using the requirements of 72.48(c). A copy of this record shall be retained until spent fuel is no longer stored under the general license.

Finding: This requirement was implemented through use of Procedures 93DP-0LC07 and 93DP-0LC03. The licensee revised the 72.212(b) report by incorporating 10 CFR 72.48 screenings / evaluations performed by the cask vendor and by incorporating NRC approved license amendment requests. The licensee procedure 93DP-0LC07, section 3.3.3.7. specified that a separate 10 CFR 72.48 screening / evaluation was not required if the proposed activity was within the scope of the dry cask certificate holder and the activity already had a 10 CFR 72.48 screening / evaluation performed by the CoC holder in accordance with their 72.48 program.

The licensee review and approval of NAC generated 10 CFR 72.48 screenings / evaluations were accomplished through the Licensing Document Change Request (LDCR) in accordance with procedure 93DP-0LC03. Revisions to the 72.212(b) report were made by incorporating LDCRs. A database was maintained that listed the LDCR numbers associated with each revision of the 72.212(b) report. The inspectors reviewed

LDCR 04-D003 associated with revision 4 of the 72.212(b) report. LDCR 04-D003 updated the NAC-UMS FSAR from revision 3 to revision 4 and incorporated several of the NAC 10 CFR 72.48 safety reviews.

Documents Reviewed: Procedure 93DP-0LC07, "10 CFR 50.59 and 72.48 Screenings and Evaluations," Revision 7; Procedure 93DP-0LC03, "Licensing Document Maintenance," Revision 12; LDCR 04-D003