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

June 9, 2003

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

SUBJECT: NRC INSPECTION REPORT 50-528/02-08; 50-529/02-08; 50-530/02-08; 72-44/02-03

Dear Mr. Overbeck:

NRC inspections were conducted between November 11, 2002, and March 21, 2003, at your Palo Verde nuclear reactor facility to evaluate the dry cask storage activities for your Independent Spent Fuel Storage Installation (ISFSI). These inspections included observation of activities associated with your pre-operational testing program and the loading of your first cask. The inspections were conducted to confirm compliance of your program and activities with the requirements specified in the license, technical specifications, Final Safety Analysis Report and the NRC's Safety Evaluation Report for the NAC-UMS cask system. The enclosed report presents the results of this inspection. Overall, the inspection found that activities were being performed in accordance with procedural and regulatory requirements. No violations of NRC regulations were identified.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be made 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).

If you have any questions concerning this inspection, please contact Mr. Vincent Everett, Senior Health Physicist, at (817) 860-8198 or the undersigned at (817) 860-8191.

Sincerely,

/RA/

D. Blair Spitzberg, Chief
Fuel Cycle Decommissioning Branch

Docket Nos.: 50-528, 50-529, 50-530, 72-44
License Nos.: NPF-41, NPF-51, NPF-74

Enclosure:
NRC Inspection Report
50-528/02-08; 50-529/02-08; 50-530/02-08; 72-44/02-03

cc w/enclosure:
Steve Olea
Arizona Corporation Commission
1200 W. Washington Street
Phoenix, Arizona 85007

Douglas K. Porter, Senior Counsel
Southern California Edison Company
Law Department, Generation Resources
P.O. Box 800
Rosemead, California 91770

Chairman
Maricopa County Board of Supervisors
301 W. Jefferson, 10th Floor
Phoenix, Arizona 85003

Aubrey V. Godwin, Director
Arizona Radiation Regulatory Agency
4814 South 40 Street
Phoenix, Arizona 85040

Craig K. Seaman, Director
Regulatory Affairs/Nuclear Assurance
Palo Verde Nuclear Generating Station
Mail Station 7636
P.O. Box 52034
Phoenix, Arizona 85072-2034

Hector R. Puente
Vice President, Power Generation
El Paso Electric Company
2702 N. Third Street, Suite 3040
Phoenix, Arizona 85004

Terry Bassham, Esq.
General Counsel
El Paso Electric Company
123 W. Mills
El Paso, Texas 79901

John W. Schumann
Los Angeles Department of Water & Power
Southern California Public Power Authority
P.O. Box 51111, Room 1255-C
Los Angeles, California 90051-0100

John Taylor
Public Service Company of New Mexico
2401 Aztec NE, MS Z110
Albuquerque, New Mexico 87107-4224

Jarlath Curran
Southern California Edison Company
5000 Pacific Coast Hwy. Bldg. DIN
San Clemente, California 92672

Robert Henry
Salt River Project
6504 East Thomas Road
Scottsdale, Arizona 85251

Brian Almon
Public Utility Commission
William B. Travis Building
P.O. Box 13326
1701 North Congress Avenue
Austin, Texas 78701-3326

Technical Services Branch Chief
FEMA Region IX
1111 Broadway, Suite 1200
Oakland, California 94607-4052

Electronic distribution by RIV:

Acting Regional Administrator **(TPG)**
DNMS Director **(EEC)**
DRP Director **(ATH)**
Acting DRS Director **(TWP)**
Resident Inspector **(NLS)**
Branch Chief, DRP/D **(LJS)**
Branch Chief, DNMS/FCDB **(DBS)**
Project Engineer, DRP/D **(ELC1)**
Staff Chief, DRP/TSS **(PHH)**
SFPO Project Manager **(SCO)**
RITS Coordinator **(NBH)**
Brian McDermott **(BSM)**
PV Site Secretary **(vacant)**
Dale Thatcher **(DFT)**

GKMorell **(GKM)**
WAMaier, RSLO, **(WAM)**
RRTemps **(RRT)**
JVEverett **(JVE)**
EMGarcia **(EMG)**
JDParrott **(JDP1)**
GWarnick **(GXW2)**
LEEllershaw **(LEE1)**
JFMelfi **(JFM1)**
TWDexter **(twdexter@sccoast.net)**
Bill Bezanson **(bezanson@mindspring.com)**
JAClark **(JAC)**
ERZiegler, SFPO **(ERZ)**

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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket Nos.:	50-528, 50-529, 50-530, 72-44	
License Nos.:	NPF-41, NPF-51, NPF-74	
Report No:	50-528/02-08; 50-529/02-08; 50-530/02-08; 72-44/02-03	
Licensee:	Arizona Public Service Company	
Facility:	Palo Verde Nuclear Generating Station, Units 1, 2, and 3 Palo Verde Independent Spent Fuel Storage Installation	
Location:	5951 S. Wintersburg Road, Tonopah, Arizona	
Dates:	November 13-14, 2002	(Welding - exit conducted via phone on November 20, 2002)
	February 4-5, 2003	(Welding - exit on February 5, 2003)
	February 10-14, 2003	(Pre-operational demonstration, Part 1 - exit on February 14, 2003)
	February 25-27, 2003	(Pre-operational demonstration, Part 2 - exit on February 27, 2003
	March 3-21, 2003	(Loading of first cask - exit conducted via phone on March 21, 2003)
Inspectors:	J. V. Everett, Team Leader, Region IV G. K. Morell, Health Physicist, Region IV J. F. Melfi, Resident Inspector G. G. Warnick, Resident Inspector E. M. Garcia, Health Physicist, Region IV L. E. Ellershaw, Senior Reactor Inspector, Region IV J. D. Parrott, Senior On-Site Representative, DWM R. R. Temps, Safety Inspector, SFPO J. E. Whittemore, Senior Reactor Inspector, Region IV J. A. Clark, Senior Project Engineer J. S. McAnallen, Nuclear Safety Intern, NMSS T. W. Dexter, Security Consultant	
Approved By:	D. Blair Spitzberg, Ph. D., Chief, Fuel Cycle Decommissioning Branch	
Attachment 1:	Supplemental Information	
Attachment 2:	Inspector Notes	
ADAMS Entry:	IR 05000528-02-08;05000529-02-08;05000530-02-08;07200044/02-03 on 11/13/02-03/21/03; Arizona Public Service; Palo Verde Nuclear Plant; ISFSI Report; No violations	

EXECUTIVE SUMMARY

Palo Verde Nuclear Generating Station, Units 1, 2, and 3
NRC Inspection Report 50-528/02-08; 50-529/02-08; 50-530/02-08; 72-44/02-03

The Palo Verde Nuclear Generating Station had developed and implemented a dry cask storage program to begin removing spent fuel from the reactor spent fuel pools for storage at the Palo Verde Independent Spent Fuel Storage Installation (ISFSI). The ISFSI was located within the current reactor site exclusion area. The ISFSI pad was sized to eventually hold 336 casks. The current inventory of spent fuel at the three reactors would fill 81 casks. On March 3, 2003, the licensee began loading the first canister with spent fuel and on March 15, 2003, placed the loaded canister on the ISFSI pad. A second canister was placed on the ISFSI pad on April 15, 2003.

The licensee was using the NAC-UMS cask design. This consisted of a stainless steel canister in which the spent fuel was placed. The canister was welded shut and placed in a vertical concrete cask that was moved to the ISFSI pad by rail from the fuel building. All handling and movement of the canister prior to insertion into the concrete cask was performed with the canister inside the transfer cask. The steel transfer cask provided the necessary shielding of the canister to allow workers to perform duties near the canister including welding, vacuum drying, backfilling with helium and performing the necessary tests on the welds to ensure the quality of the weld.

The NRC conducted four onsite inspections of the activities associated with the licensee's pre-operational test program. In addition, the NRC provided 24-hour coverage of the loading, drying, helium backfilling and welding activities of the first cask. NRC Inspectors were also present for the heavy lift of the loaded canister from the cask loading pit, movement of the canister from the decontamination pit to the concrete cask and the lowering of the canister into the concrete cask. The NRC inspections focused on the licensee's efforts to demonstrate that adequate equipment, procedures and personnel were in-place to safely move spent fuel from the reactor spent fuel pools to the ISFSI. The pre-operational test requirements covered all key activities related to loading a cask and moving the cask to the ISFSI. Demonstrations also included the process for unloading spent fuel from a cask, should that be necessary. Throughout the demonstrations observed by the NRC, the Palo Verde staff functioned professionally and performed their assigned functions safely. The staff was well trained and had committed significant resources and time to preparing for the critical activities associated with safely moving spent fuel. Personnel interviewed during the inspections were enthusiastic about the effort at Palo Verde and presented a positive attitude toward safety.

The primary inspection procedures used for guidance during the pre-operational inspections were Inspection Procedure 60854 “Pre-operational Testing of an ISFSI,” Inspection Procedure 60855 “Operations of an ISFSI,” Inspection Procedure 60856 “Review of 10 CFR 72.212(b) Evaluations,” Inspection Procedure 60857, “Review of 10 CFR 72.48 Evaluations,” and Inspection Procedure 81001, ”ISFSI Security.” The NRC inspectors reviewed 15 key technical areas against the requirements in the NAC-UMS Final Safety Analysis Report, NAC-UMS Certificate of Compliance #1015, the technical specifications associated with the NAC-UMS cask design and 10 CFR Part 50, Part 72 and Part 73. Attachment 2 of this report provides the inspector notes documenting the findings in each of the technical areas reviewed. The following provides a summary of these

findings and conclusions.

- The reactor facility emergency planning program had been revised to incorporate provisions for responding to an emergency condition at the ISFSI (Attachment 2 - Emergency planning).

- The Pre-Fire Strategy Manual included the shed near the ISFSI pad, which was the only structure that required consideration for fire planning near the ISFSI pad. (Attachment 2 - Fire Protection).

- Provisions had been incorporated into procedures to limit flammable and explosive liquids near the loaded cask during movement from the fuel building to the ISFSI pad (Attachment 2 - Fire Protection).

- Classification criteria for determining whether spent fuel was damaged or intact had been incorporated into procedures and was consistent with the criteria established by the NRC. The licensee had spent fuel that was determined to be damaged but did not plan to load any of this fuel into the first round of cask loadings (Attachment 2- Fuel Verification).

- The NAC-UMS casks being used at Palo Verde were rated for heat loads up to 23 kW. Palo Verde had limited the heat load to 14 kW for the spent fuel selected for storage. This was necessary because the licensee did not have available a forced air cooling system required by Technical Specification A.3.1.4 for cooling casks greater than 14 kW if delays were encountered between completing the helium backfill of the canister and transferring the canister to the concrete cask (Attachment 2 - Fuel Verification).

- The licensee had completed an evaluation of the Palo Verde reactor programs to verify compliance with the conditions of the NAC-UMS cask design, Certificate of Compliance, Final Safety Analysis Report and requirements in 10 CFR Part 72. The evaluation included a review of the Palo Verde Part 50 programs related to emergency planning, radiation protection, training, quality assurance and various other programs. Several exemptions were requested and were received from the NRC related to seismic criteria for the ISFSI pad, contamination limits for the cask and record retention requirements (Attachment 2 - General License).

- The licensee had constructed an earthen berm around three sides of the ISFSI to reduce the dose rates to the public and to workers. Evaluation of the potential doses to members of the public from storage of spent fuel at the ISFSI pad determined that the radiation levels were well below the 25 mrem/year limit at the nearest exclusion area boundary for the site (Attachment 2 - General License).

- Evaluation of site environmental conditions determined that flooding and high/low temperature extremes would not present problems for storage of the spent fuel at the Palo Verde site (Attachment 2 - General License).

- The licensee had installed a new trolley for the fuel building crane and had conducted an extensive analysis and review to determine that no single failure of the new systems could result in failure of the crane to maintain the load. The new system included a below -the-hook lifting device called the SAFLIFT. The SAFLIFT replaced the yoke and slings that would normally be used for heavy load activities of moving the canister and transfer cask (Attachment 2 - Heavy Loads).

- The licensee had established a safe loads path for moving the loaded canister such that it was not moved over the spent fuel pool. The cask would be near the safety related air handling system in the fuel building when the loaded transfer cask was placed on top of the concrete cask for insertion of the canister. However, the single failure proof aspects of the new fuel building crane allowed the cask to be within the “zone of influence” around the air handling system (Attachment 2 - Heavy Loads).

- The licensee had incorporated into procedures the correct pressure requirements for helium backfill of the canister after drying (Attachment 2 - Hydro/Drying/Helium).

- The requirement for helium leak testing of the canister lid welds was incorporated into procedures. The acceptable leak rates for passing the test were consistent with the requirements in the technical specifications. Personnel assigned to performed the leak tests were qualified to the appropriate leak test certification requirements (Attachment 2 - Hydro/Drying/Helium).

- Vacuum drying time limits and acceptance criteria had been incorporated into procedures. The acceptance criteria had been adjusted to account for instrument error on the pressure gauge (Attachment 2 - Hydro/Drying/Helium).

- The licensee conducted an extensive pre-operational test program to prepare for the loading of the first cask. The NRC observed the required demonstrations during four inspection trips to the site. The first attempt to demonstrate welding of the canister lid resulted in a number of issues identified. As a result, Palo Verde conducted a second demonstration which resulted in a very high quality weld. Demonstrations related to heavy loads and the vacuum drying and helium backfill operations were very successfully performed. Personnel assigned to the ISFSI project were knowledgeable in their work assignments and the design aspects of the cask system and participated in the pre-operational tests realistically as if an actual canister was being loaded (Attachment 2 - Pre-Operational Tests).

- The licensee was required by the technical specifications to perform a heat characteristics test of the first cask with a heat load exceeding 10 kW. The licensee planned to load the third cask with spent fuel with a heat load of 10.17 kW and to conduct the required test. An appendix to the loading procedure included the instructions for conducting the test and reporting the results to the NRC (Appendix 2 - Procedures & Tech Specs).

- The licensee had incorporated the appropriate procedural information from Chapter 8 of the NAC-UMS Final Safety Analysis Report into the Palo Verde procedures for loading,

sealing, moving and unloading a cask. Written procedures for all activities related to cask loading and ISFSI operations had been developed (Attachment 2 - Procedures & Tech Specs).

- Verification of the operability of the temperature monitoring system for the casks on the ISFSI pad every 24 hours and confirmation that the temperature limits specified in the technical specifications were not exceeded had been incorporated into procedures (Appendix 2 - Procedures & Tech Specs).

- The reactor facility Part 50 quality assurance program was used for ISFSI activities. Structures, systems and components that were “important to safety” for ISFSI activities were identified and a graded quality assurance approach consistent with NRC guidance was applied (Appendix 2 - QA).

- The quality assurance program was being effectively implemented for procurement controls, control of measuring and test equipment, operating status, quality assurance audits, tracking problems and identifying corrective actions (Appendix 2 - QA).

- Strong radiological controls had been established to support cask activities. Observation during the pre-operational tests and during the loading of the first canister confirmed that the radiological staff had effectively evaluated the types of problems that could occur during cask activities and had made provisions to closely monitor workers and the work activities to minimize the spread of contamination and maintain radiological exposures ALARA (Attachment 2 - Radiological).

- Provisions had been established to account for the various neutron energy spectrums that could be encountered during the different phases of cask loading activities. Two neutron dosimeters were available for use. One for when the canister was inside the concrete cask and the neutrons spectrum was a lower energy due to the concrete shielding and another for when the canister was in the steel transfer cask. An extensive and well documented evaluation had been performed related to the neutron spectrum issue (Attachment 2 - Radiological).

- The licensee's records program had incorporated the various requirements for creating and maintaining ISFSI records. The required 90 day notice of intent to load fuel into the ISFSI had been received by the NRC as well as the 30 day notifications that the first two casks had been placed at the ISFSI (Attachment 2 - Records).

- A considerable amount of time during this inspection was directed toward review of safety evaluations associated with the ISFSI and in particular, the safety reviews associated with the replacement of the fuel building crane trolley. All safety reviews and screenings completed by the licensee were well documented with a good level of detail (Attachment 2 - Safety Reviews).

- The licensee had implemented an ISFSI security program consistent with the reactor facility security program including response to events, offsite support, training and

certification of security force personnel, lock and key controls and search requirements (Attachment 2 - Security).

- Intrusion and detection alarm systems for the ISFSI were tested during both daylight and night time conditions and successfully detected attempts to enter the protected area. Alarms were received in the security alarm station (Attachment 2 - Security).

- The training program for personnel assigned to the ISFSI provided a good basis for understanding the requirements and safe practices associated with dry cask loading operations (Attachment 2 - Training).

- Provisions had been established to monitor for hydrogen during cask lid welding. A value of 2.4 percent hydrogen had been established above which welding was not allowed (Attachment 2 - Welding).

- Personnel performing the welding were qualified to Section IX of the ASME Code and had been certified as either welders and/or welding operators for the gas tungsten arc welding process used at Palo Verde (Attachment 2 - Welding).

- Personnel performing the weld examinations were appropriately certified for liquid penetrant exams for both normal temperature weld examinations and high temperature weld examinations. Personnel were also certified for visual exams (Attachment 2 - Welding).

- Procurement and control of weld filler material was being performed in accordance with procedures and was adequately documented. This included both shim material and weld wire (Attachment 2 - Welding).

- Weld procedures were written and qualified in accordance with the requirements in Section IX of the ASME Code. Weld procedures had been reviewed and approved by Palo Verde (Attachment 2 - Welding).

ATTACHMENT 1

PARTIAL LIST OF PERSONS CONTACTED

Arizona Public Service

G. Andrews, Section Leader, Reactor Engineering
R. Arellanes, Security Support Team
R. Bandera, Department Manager, Nuclear Fuel Analysis
M. Barcom, Security Support Team
R. Bayless, Senior Engineer, Operations Computer Systems
M. Berryman, Team Leader, Fuel Services
R. Bouquot, Section Leader, Quality Assurance
R. Buzard, Senior Consultant, Regulatory Affairs
B. Chapin, Department Leader, Nuclear Fuels Management
D. Cole, Section Leader, Security Operations
S. Dodd, Fire Marshal
D. Edmunds, Section Leader, Maintenance Training
M. Fladager, Department Leader, Radiation Protection
J. Flynn, Project Manager, Nuclear Projects
B. Giles, Senior Evaluator, Nuclear Assurance
D. Gregoire, Senior Consultant, Regulatory Affairs
B. Hansen, Section Leader, Nuclear Fuels Management
W. Hendrix, Security Leader, Security Operations
R. Huffman, Section Leader, Fuel Services
R. Hunnicutt, Senior Operations Standards Advisor, Fuel Services
D. Huttie, Department Leader, Emergency Services (ESD) Programs
A. Jackson, Senior Project Manager, Steam Generator Services
P. Johnson, Senior Evaluator, Nuclear Assurance
N. Khanchandani, Senior Technical Architect, Data Services
A. Krainik, Director, Emergency Services Division
M. Lantz, Senior Health Physicist, Radiation Protection
L. Leavitt, Senior Advisor, Program Support
D. Leech, Department Leader, Nuclear Assurance
D. Leith, Section Leader, Radiation Protection
L. Leavitt, Senior Advisor, Emergency Services (ESD) Program Support
M. Melton, Section Leader, ISI Engineering
G. Michael, Senior Engineer, Regulatory Affairs
A. Morrow, Senior Engineer, ISI Engineering
H. Nelson, Department Leader, Maintenance
R. Neville, Senior Engineer, Reactor Engineering
E. O'Neill, Section Leader, Emergency Services (ESD) Training
G. Overbeck, Senior Vice President, Nuclear
F. Poteet, Senior Engineer, ISI Engineering
P. Relph, Senior Engineer, Design Civil Engineering
M. Rhodes, Team Leader, Security
W. Ryder, Senior Engineer, Fuel Services
K. Schrecker, Section Leader, Design Engineering

J. Scott, Department Leader, Quality Assurance
R. Stagner, Security Support Team
D. Straka, Senior Consultant, Regulatory Affairs
P. Tacy, QC/Receiving Inspector
G. Toner, Senior Engineer, Nuclear Fuel Management
C. Wandell, Senior Engineer, Civil Engineering
D. Wanslee, Senior Technician, Radiation Protection
D. Wheeler, Section Leader, Nuclear Assurance
R. Williams, Senior Technician, Radiation Protection
J. Zalitis, Level 3 Receiving Inspector

Welding Services, Inc.

R. Aggen, QA/QC Inspector
D. Antoine, Welding Supervisor
L. Baca, Welder
M. Bankston, Welder
D. Barndollar, Welder
J. Boswell, Welder
B. Chapman, Welder
R. Friscia, Level II NDE Inspector
R. Gray, Welding Supervisor
R. Hilton, QA/QC Inspector
R. Johnson, Welder
R. Leimenstoll, Level III NDE Inspector
T. McVicker, Welder
M. Ruis, Project Manager
F. Thompson, Level II NDE Inspector

INSPECTION PROCEDURES USED

60854	Preoperational Testing of an ISFSI
60855	Operations of an ISFSI
60856	Review of 10 CFR 72.212(b) Evaluations
60857	Review of 10 CFR 72.48 Evaluations
81001	ISFSI Security

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

None

Discussed

None

Closed

None

LIST OF ACRONYMS

ALARA	as low as reasonably achievable
ANSI	American National Standards Institute
APS	Arizona Public Service
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
B-10	Boron-10
CCTV	Closed Circuit Television
CFR	Code of Federal Regulations
CoC	Certificate of Compliance
CRDR	Condition Report/Disposition Request
dpm	disintegrations/minute
EPIP	Emergency Plan Implementing Procedure
ESD	Emergency Services Division
FSAR	Final Safety Analysis Report
GWD	Giga-Watt Days
ISFSI	Independent Spent Fuel Storage Installation
kW	kilowatt
MBA	Material Balance Accountability
MTU	Metric Tons Uranium
MPC	Multi-Purpose Canister
MWD	Mega-Watt Days
NAC	NAC International, Inc
NDE	Nondestructive Examination
NDT	Nondestructive Testing
NRC	Nuclear Regulatory Commission
PT	Liquid Penetrant Testing
PVNGS	Palo Verde Nuclear Generating Station
PWR	Pressurized Water Reactor
QA/QC	Quality Assurance/Quality Control

QAG	Quality Augmented
SNT-TC	American Society for Nondestructive Testing - Technical Council
SSCs	Structures, Systems and Components
SSE	Safe Shutdown Earthquake
SWMS	Site Wide Management System
TFR	Transfer Cask
TLD	Thermoluminescent Dosimeter
TSC	Transportable Storage Canister
UMS	Universal MPC System
UPS	Uninterruptible Power Supply
UT	Ultrasonic Testing
VCC	Vertical Concrete Cask
VT	Visual Testing
WSI	Welding Services Incorporated