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**Do not include proprietary materials.**

DATE OF MEETING

05/30/2002

The attached document(s), which was/were handed out in this meeting, is/are to be placed in the public domain as soon as possible. The minutes of the meeting will be issued in the near future. Following are administrative details regarding this meeting:

Docket Number(s) 50-528, 50-529, and 50-530

Plant/Facility Name Palo Verde Nuclear Generating Station, Units 1, 2, and 3

TAC Number(s) (if available) \_\_\_\_\_

Reference Meeting Notice Meeting Notice dated May 2, 2002

Purpose of Meeting  
(copy from meeting notice) The licensee will provide the NRC staff with the status of  
fuel performance, control rod replacement, and imple-  
mentation of the approved CENTS Code, at the units.

NAME OF PERSON WHO ISSUED MEETING NOTICE

Jack Donohew

TITLE

Senior Project Manager

OFFICE

Office of Nuclear Reactor Regulation

DIVISION

Division of Licensing Project Management

BRANCH

Project Directorate IV

Distribution of this form and attachments:

Docket File/Central File  
PUBLIC

DF01

# **Nuclear Fuel Update**

## **Palo Verde Nuclear Generating Station**

May 30, 2002  
Meeting with US NRC

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## **Review of 2001**

- ◆ **March 2001 Meeting with NRR**
- ◆ **Approval of new MDNBR Limit**
- ◆ **Progress with Clad Performance**
- ◆ **Alloy A LFA Approved For 4<sup>th</sup> Burn**
- ◆ **CENTS Code Added to COLR**
- ◆ **Begin Transition to Westinghouse Rod**
- ◆ **Zirlo Tech Spec Submitted**

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## **Agenda Today**

- ◆ **Review of Unit 2 Cycle 11**
- ◆ **CENTS Implementation & Licensing**
- ◆ **Integrated Clad Performance Strategy**
- ◆ **Update on CEA Investigation**
- ◆ **Dry Cask Storage Update**

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## **Unit 2 Cycle 11**

**Activities Incorporated in the  
Reload Safety Analyses**

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## **U2C11 Reload Analyses**

- ◆ **Implementation of New MDNBR Limit**
- ◆ **Manufacturing Transition to Columbia**
- ◆ **Implementation of Zirlo Clad & New LOCA Methodology**
- ◆ **Implementation of New CENTS AORs**

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## **CENTS System Code**

### **Implementation & Licensing**

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## **CENTS Implementation Plan**

- ◆ **Generic Letter 83-11 Supplement 1**
- ◆ **All UFSAR Chapter 15 Analyses**
- ◆ **Two Events Remain In Progress**
  - **Steam Generator Tube Rupture**
  - **CEA Ejection Dose Consequences**

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## **Steam Generator Tube Rupture**

- ◆ **Consequences Increase > Minimal**
- ◆ **Principal Contributors**
  - **Timing of Aux FW & ADV opening**
  - **New Limiting SG Level**
- ◆ **Retain Current CESEC AOR Until CENTS Analysis Reviewed & Approved**
- ◆ **Consistent With RSG/PUR Submittal**

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## **CEA Ejection Dose Consequences**

- ◆ **Evaluating CENTS Applicability**
- ◆ **Will Submit if Required**
- ◆ **Retain Current CESEC AOR Until  
CENTS Implemented**
- ◆ **Will Not Impact RSG/PUR  
Submittal**

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## **Palo Verde Integrated Clad Performance Strategy**

**Review of Recent Capabilities  
U2 Uprate Corrosion Strategy**

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## **Integrated Fuel Clad Strategy**

- ◆ **Advanced Clad Alloys**
- ◆ **Primary System Chemistry**
- ◆ **Higher Order Modeling**
- ◆ **Low Duty Core Designs**

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## **Advanced Clad Alloys**

- ◆ **Full Batch Zirlo starting U2C11 (Spring 2002)**
- ◆ **Alloy A LTA in U3C10 (Spring 2003)**
- ◆ **Continuing Discussions with Westinghouse**

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## Primary Chemistry

- ◆ Additional RCS Cleaning at EOC Shutdown
- ◆ Early Lithium Injection During Startups
- ◆ Elevated-Coordinated Lithium Strategy
  - Currently 7.1 pH
  - Inspection U1R10 (Fall 2002)
  - Gradual Increase to  $\geq 7.2$  pH

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## Higher Order Modeling

- ◆ Uncertainty in Behaviors  $\Rightarrow$  Multiple Models
- ◆ Steaming Rate Function in Design Tools
  - U3C9 Benchmark
- ◆ APS CRUD/Oxide Model
  - Pin x Pin Colorset and Coarse Mesh Octant
- ◆ Vendor Fuel Duty Model
  - Oxide and FDI for all Clads

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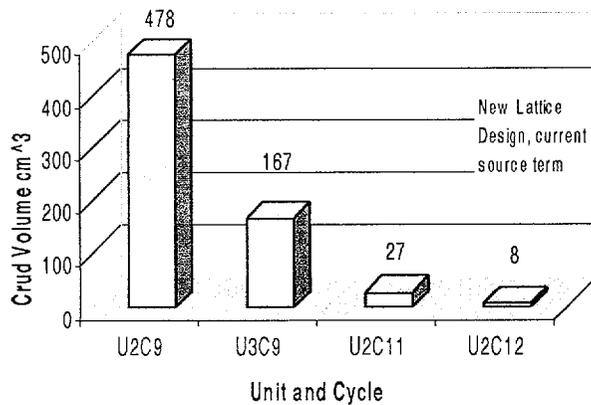
## Low Duty Core Designs

- ◆ Increase Feed Batch Size
  - 104 vs 96 Assemblies
- ◆ Minimal Feed-Face-Feed
- ◆ U2 Uprate Corrosion Strategy
  - 3% Power and 2°F Coolant Temperature
  - Zirlo Clad
  - Re-design Lattice Pattern

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Total Core Crud Volume - Predicted



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# Palo Verde CEA Replacement

## Update on CEA Investigation

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# Review of CEA Replacement

- ◆ **CEA Finger Failures Observed - all Units**
  - Significant Cracks in High Fluence CEAs
  - Boron Loss in U1 Lead Group
  - Some Medium Fluence CEA Cracking
  - U2R8 CEA Found Cracked (Jan. 2002)
- ◆ **All Full Length CEAs Replaced**
  - Two Different Tip Designs
  - Replaced by Design with Smallest Pellet

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## Apparent Cause of Failures

- ◆ IASCC of Cladding
  - Irradiation Sensitized Inconel
  - Swelling-induced Strain
- ◆ Less than Adequate Design Testing
  - Fuelmetal Properties Unverified at High Duty
  - Pellet-Fuelmetal Interaction
- ◆ Lifetime Predictive Software
  - Models Not Fully Benchmarked

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## Remaining Actions

- ◆ Determine Conservative Estimate of Life
  - 2 Cycle Fingers OK
  - Possible YGN Inspections
  - Possible Hot Cell Exams
  - $2 \times 10^{21}$  n/cm<sup>2</sup> Threshold?
- ◆ CEA re-Design for the Future

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# Palo Verde Dry Cask Storage

## Plan Overview

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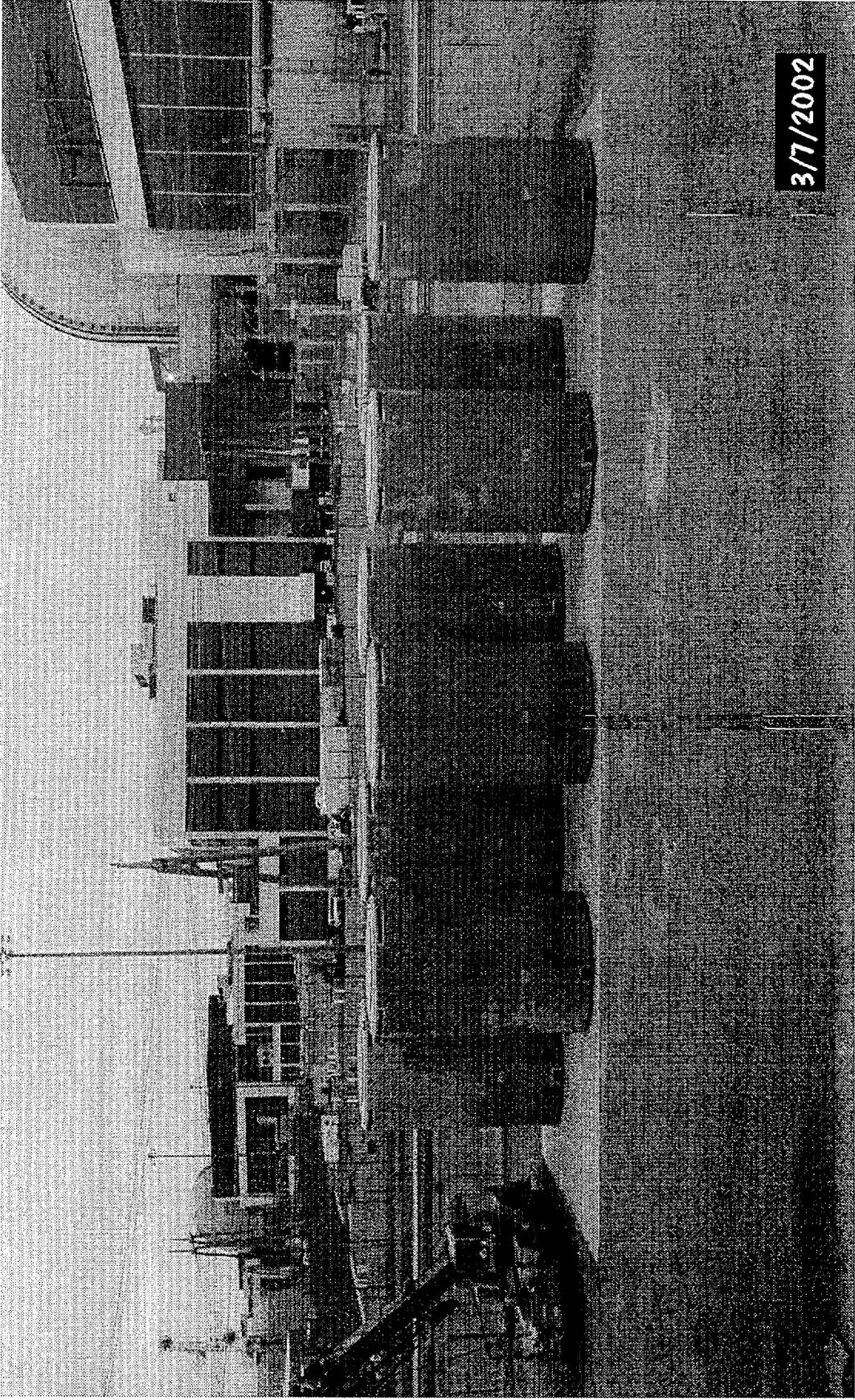


# Project Schedule

- ◆ Concrete Cask fab completed 3/31/02
- ◆ First Canister delivery 6/28/02
- ◆ ISFSI Construction complete 8/19/02
- ◆ Security features installed 9/15/02
- ◆ Dry run practice begins 8/1/02
- ◆ NRC dry run observations mid November
- ◆ First system on the pad by Christmas



# Completed VCCs

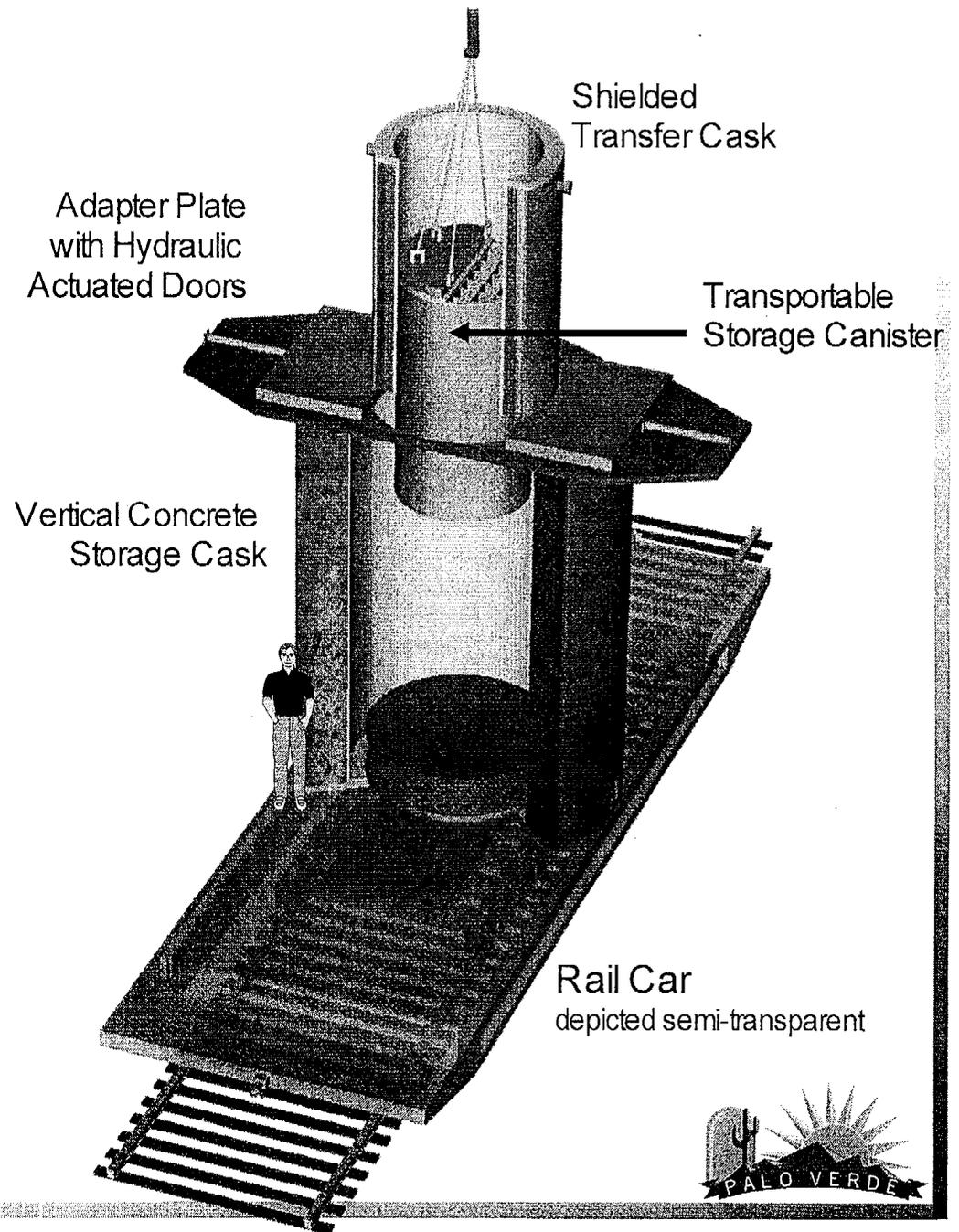


3/7/2002



# Palo Verde Dry Cask Storage Principal Components

(Cut-away View)



Dimensions:

Transfer cask	Ht. 16 ft. 11 in. Dia. 7 ft. 1 in.
Loaded canister	Ht. 15 ft. 11 in. Dia. 5 ft. 7 in.
VCC	Ht. 18 ft. 10 in. Dia. 11 ft. 4 in.

Weight:

Transfer cask	60 tons
Loaded canister	35 tons
VCC	119 tons
Loaded system	154 tons

