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

August 24, 2005

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

SUBJECT: MEETING SUMMARY DISCUSSING PALO VERDE PERFORMANCE ISSUES

Dear Mr. Overbeck:

This refers to the management meeting conducted at the U.S. Nuclear Regulatory Commission (NRC) Region IV Office, Arlington, Texas, on August 18, 2005. The meeting attendance list and a copy of the presentations are included as Enclosures 1 and 2. No commitments were made by the licensee during the conference.

In accordance with Section 2.390 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and its enclosures will be available electronically for public inspection in the NRC's 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 matter, we will be pleased to discuss them with you.

Sincerely,

Troy W. Pruett, Chief
Project Branch D
Division of Reactor Projects

Dockets: 50-528
50-529
50-530
Licenses: NPF-41
NPF-51
NPF-74

Enclosures:
1. Attendance List
2. Presentations

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

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

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

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

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

Hector R. Puente
Vice President, Power Generation
El Paso Electric Company
310 E. Palm Lane, Suite 310
Phoenix, AZ 85004

Jeffrey T. Weikert
Assistant General Counsel
El Paso Electric Company
Mail Location 167
123 W. Mills
El Paso, TX 79901

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

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

Thomas D. Champ
Southern California Edison Company
5000 Pacific Coast Hwy, Bldg. D1B
San Clemente, CA 92672

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

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

Karen O'Regan
Environmental Program Manager
City of Phoenix
Office of Environmental Programs
200 West Washington Street
Phoenix, AZ 85003

Electronic distribution by RIV:
Regional Administrator **(BSM1)**
DRP Director **(ATH)**
DRS Director **(DDC)**
DRS Deputy Director **(KMK)**
Senior Resident Inspector **(GXW2)**
Branch Chief, DRP/D **(TWP)**
Senior Project Engineer, DRP/D **(NFO)**
Team Leader, DRP/TSS **(RLN1)**
RITS Coordinator **(KEG)**

SISP Review Completed: NHT ADAMS: ☒ Yes ☐ No Initials: NHT
☒ Publicly Available ☐ Non-Publicly Available ☐ Sensitive ☒ Non-Sensitive

R:/Reactor/_PV/MS 8-18-05.wpd

RIV:DRP:SRI/D	C:DRP/D			
NHTaylor	TWPruett			
NHT	TWP			
8/23/05	8/23/05			

OFFICIAL RECORD COPY T=Telephone E=E-mail F=Fax

PUBLIC MEETING ATTENDANCE

LICENSEE/FACILITY	Palo Verde Nuclear Generating Station
DATE/TIME	August 18, 2005 12:00 p.m.
MEETING LOCATION	Region IV Offices, Arlington, Texas

NRC REPRESENTATIVES

NAME (PLEASE PRINT)	ORGANIZATION	TITLE
NICK TAYLOR	DRP BRANCH D	PROJECT ENGINEER
VICTOR DRICKS	OPA	PUBLIC AFFAIRS OFFICER
Thomas Woodson	DRS Engineering Branch 2	Engineering Associate
JERRY HOLSOMBACK	DRS - NASA ROTATION	
Neil O'Keefe	DRS - EB1	Acting Branch Chief
Jeremy Groom	DRS	Reactor Inspector (NSPDP)
Jared Nadel	DRS	Reactor Inspector, NSPDP
Cale Young	DRP	Reactor Engineer
Matthew Young	DRS ~~Engineering Associate~~ Engineering Branch 1	Engineering Associate
Steven Alferink	DRS	Reactor Inspector (NSPDP)
PABLO BENVENUTO	DRP	RESIDENT INSPECTOR
Greg Warnick	NRC/DRP	Senior Resident Inspector
ART Howell	NRC/DRP	Director
Kriss Kennedy	DRS	Acting Deputy Director

PUBLIC MEETING ATTENDANCE

LICENSEE/FACILITY	Palo Verde Nuclear Generating Station
DATE/TIME	August 18, 2005 12:00 p.m.
MEETING LOCATION	Region IV Offices, Arlington, Texas

NRC REPRESENTATIVES

NAME (PLEASE PRINT)	ORGANIZATION	TITLE
RYAN LANTZ	DRS OPERATIONS BRANCH	ACTING BRANCH CHIEF
GEROND GEORGE	DRS	
ART HOWELL	DRP	DIVISION DIRECTOR
KRISS KENNEDY	DRS	DEPUTY DIVISION DIRECTOR
TROY PRUETT	DRP BRANCH D	BRANCH CHIEF
JEFF CLARK	DRS ENGINEERING BRANCH 1	BRANCH CHIEF
GREG WARNICK	DRP	SENIOR RESIDENT INSPECTOR
BRUCE MALLETT	REGION IV	REGIONAL ADMINISTRATOR
MEL FIELDS	NRR	PROJECT MANAGER
LISA MARIE JARRIEL	OFFICE OF ENFORCEMENT	
JULIUS PERSENSKY	OFFICE OF RESEARCH	

PUBLIC MEETING ATTENDANCE

LICENSEE/FACILITY	Palo Verde Nuclear Generating Station
DATE/TIME	August 18, 2005 12:00 p.m.
MEETING LOCATION	Region IV Offices, Arlington, Texas

LICENSEE REPRESENTATIVES

NAME (PLEASE PRINT)	ORGANIZATION	TITLE
David Mauldin	Eng & Support	Vice President
Craig Seaman	Reg. Affairs	Director
Carl Churchman	Engineering	Director
Gayle Schiavone	Human Resources	Dept Leader
Steve Coppock	Engineering	Dept Leader
Mike Sontag	Perf. Improvement	Dept. Leader
Jeanne Copsey	Employee Concerns	Dept. Leader
Chris Andersen	Communications	Communications Representative

PUBLIC MEETING ATTENDANCE

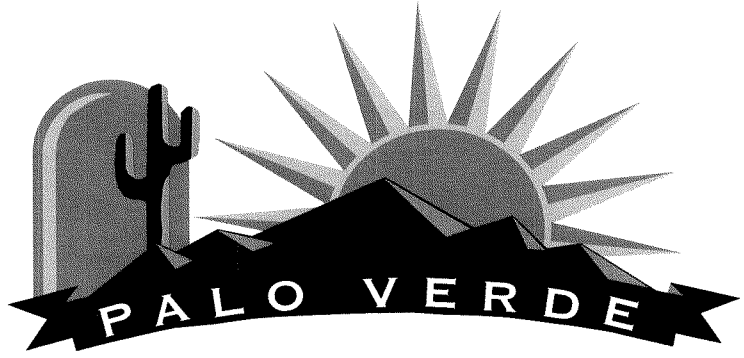
LICENSEE/FACILITY	Palo Verde Nuclear Generating Station
DATE/TIME	August 18, 2005 12:00 p.m.
MEETING LOCATION	Region IV Offices, Arlington, Texas

PUBLIC PARTICIPANTS

NAME (PLEASE PRINT)	ORGANIZATION	TITLE
TOM HARRISON	PLATTS	MANAGING EDITOR
KEN ALLUCKER	ARIZONA REPUBLIC	REPORTER
ROB HENRY	SALT RIVER PROJECT	

Enclosure 2

NRC Management Meeting



August 18, 2005

Introduction

David Mauldin

Vice President, Nuclear Engineering & Support

Palo Verde Condition Reporting (CRDR) Trending Process

Mike Sontag,

Department Leader,

Performance Improvement

Presentation Overview

- Overview of Condition Reporting Disposition Request Trending Process
- Coding Specifics/Details
- Trending Data Utilization
- Sample Information
- Outputs of Trending Activities
- Challenges/Weaknesses
- Future Actions
- Conclusion

CRDR Trending Baseline Information

- Approximately 4,000 CRDRs per year
- CRDR Trending and coding controlled by two procedures:
  - Condition Reporting
  - Trend Analysis and Coding
- Codes applied by dedicated group of personnel within the Performance Improvement Department
- CRDR codes applied twice as applicable
  - All coding information maintained in an electronic database which allows for custom reports, queries and graphs via a frontline user tool called "Trend-O-Matic"

Coding Specifics/Details

- Codes applied to each and every CRDR
- Each CRDR is coded, as a minimum, for:
  - Category (Program, Process, or Sensitive Issue)
    - Subcategory (where category is broad enough to require further subdivision)
  - Cause
  - Causal Organization

Coding Specifics/Details

- Approximately 80 major trending categories
- 200+ subcategories
  - Not all categories have subcategories
  - Categories and subcategories developed based on known industry issues, operating experience (internal/external), and topic sensitivity — both nuclear safety and industrial safety
- Approximately 125 Cause Codes initially derived from INPO Human Performance Enhancement System (HPES) model

Coding Specifics/Details

Active CRDR Trending Category + Sub Category Descriptions

Tagging Clearance

Process/Activity (Operations) *NAO*

Any condition reported which involves inadequate implementation of Tagging and Clearance program requirements. This could be administrative in nature or it can be problems with actual equipment, hardware (condition or positions), or tags out in the field.

TC-Administrative

CRDRs associated with Tagging and Clearance (Permit and Tagging Process, 40DP-9OP29) administrative issues, (Permit Generation and Audits per 40DP-9OP29); e.g., permit procedure deficiencies, inadequate creation of permits, etc. Contact Ed Sonn @ ext. 6175 for info.

TC-Caution Tag

CRDRs associated with errors involving Caution / Yellow tags. Sub-category added per recommendation from
INPO 01-002 (Guidelines for the Conduct of Operations at Nuclear Power Plants), dated May 2001, Chapter VI
(Plant Status and Configuration Control), Section C.3 (pg 109). CRDRs populated starting in January 2000.
Contact Ed Sonn @ ext. 6175 for info.

TC-Field Implementation

CRDRs associated with Tagging and Clearance (Permit) field implementation issues (Permit Processing per 40DP-9OP29) e.g., hanging of tags, tag verification, component positioning during permit process, etc. Contact Ed Sonn @ ext. 6175 for info.

Trending categories and subcategories:

- **Each has description available on the Performance Monitoring web site for all to use**
- **New categories and subcategories can be established or modified as needed**
- **Changes are documented in Trending Database to provide continuity**
  - Link to descriptions

Coding Specifics/Details
Categories and Subcategories

- An Upper Control Limit (UCL) is set for each category and subcategory
  - Adjustable limit typically based on two standard deviations above the statistical mean for an 18-month period (norm)
  - Some set more conservatively at management discretion
  - Used as an early-warning flag, one of several factors causing us to "go look" for potential trend
  - UCL values reviewed every six-months for validity, reset as needed, applying conservative approach
    - Lower UCL values as performance improves
    - Resist increasing UCL values if occurrence rates increase

PALO VERDE

Coding Specifics/Details

Initial Cause	Code
* = Code added or description revised 2/4/2004	
Work Practices (WP) Relates to methods worker uses to provide assurance of safe and successful task performance.	WP
Self-checking not applied to ensure correct unit or train	WP01
System alignment, tagout, restoration not verified	WP02
Equipment condition not checked (temperature, pressure, etc.) before starting work	WP03
Self-checking not applied to ensure correct component prior to each action	WP04
Self-checking not applied to ensure intended action is correct before it is performed	WP05
Self-checking not applied to ensure expected response	WP06
Procedures, drawings, etc., when required not used	WP07
****Documents not followed correctly*** when used or referenced in the conduct of tasks and activities. [This is not a default for "procedure non-adherence" unless no other cause for the non-adherence can be found]	WP08
Up-to-date documents not used	WP09

Initial Cause	Code
* = Code added or description revised 2/4/2004	
****Improper Operator response to abnormal conditions***, especially where protective or safety functions are bypassed or defeated	WP16
****Operator failure to shutdown when required*** by procedures or administrative limits to protect core	WP17
Work Schedule (WS) Relates to the **Worker's Schedule**, not the work scheduling process.	WS
Alertness / vigilance reduced	WS01
Drowsiness on the job	WS02
Reaction time slowed	WS03
Ability to control movement precisely reduced	WS04
Ability to interpret, comprehend, and diagnose reduced	WS05
Judgments or decisions impaired	WS06
Repetitive tasks performance problems	WS07
Attention span reduced	WS08
Day dreaming, frequent attention to non-work subjects	WS09
Work schedule conflicts with worker preference	WS10
****Pressure to continue to operate*** when conditions warrant safe shutdown	WS11

Cause Codes used in Trending:

- **Each has description available on the Performance Monitoring web site for all to use**
- **Can be rolled up to summary level in major areas of human performance**

PALO VERDE

Coding Specifics/Details

Cause Codes used in Trending:

Can be rolled up to higher level code groupings, as well as to individual codes. Major groupings include:

- **WP**-Work Practices; **WS**-Work Schedule;
- **VC**-Verbal Communication; **WC**-Written Communication;
- **ID**-Interface Design; **EC**-Environmental Conditions;
- **WO**-Work Organization & Planning; **SM**-Supervisory Methods;
- **TM**-Training/Qualification Methods; **CM**-Change Management;
- **RM**-Resource Management; **MM**-Managerial Methods
  - Link to current cause codes

Trending Data Utilization

"Trend-O-Matic"

- Electronic data collection and analysis tool
- Single database for corrective action program data, with links to industry data
- "Click of the mouse" produces trend graphs, charts, reports and raw data on human errors and program performance
- Accessible to all site personnel on PC desktop and through Performance Monitoring Intranet web site

Trending Data Utilization

Trend-O-Matic Attributes

- User-friendly – available on every computer
- Line organizations use to track performance in areas of interest
- Nuclear Assurance and Performance Improvement use to help detect trends and identify focus areas
- Tailored to individual needs
  - User-selectable report parameters
  - Extract raw data for further analysis
- Limitation:
  - Not substitute for detailed analysis to determine what the data means and its significance

Trending Data Utilization

Trend-O-Matic

Extracts Information Based on CRDR Coding

- Types of errors, organizations in which they are occurring in and their frequency (trends)
- Trends in CRDRs related to categories (programs, processes, activities or sensitive issues) and related subcategories
- Coding and trends for human performance causes and causal organizations
- Correlation to higher-level INPO Plant Information Center (PIC) data

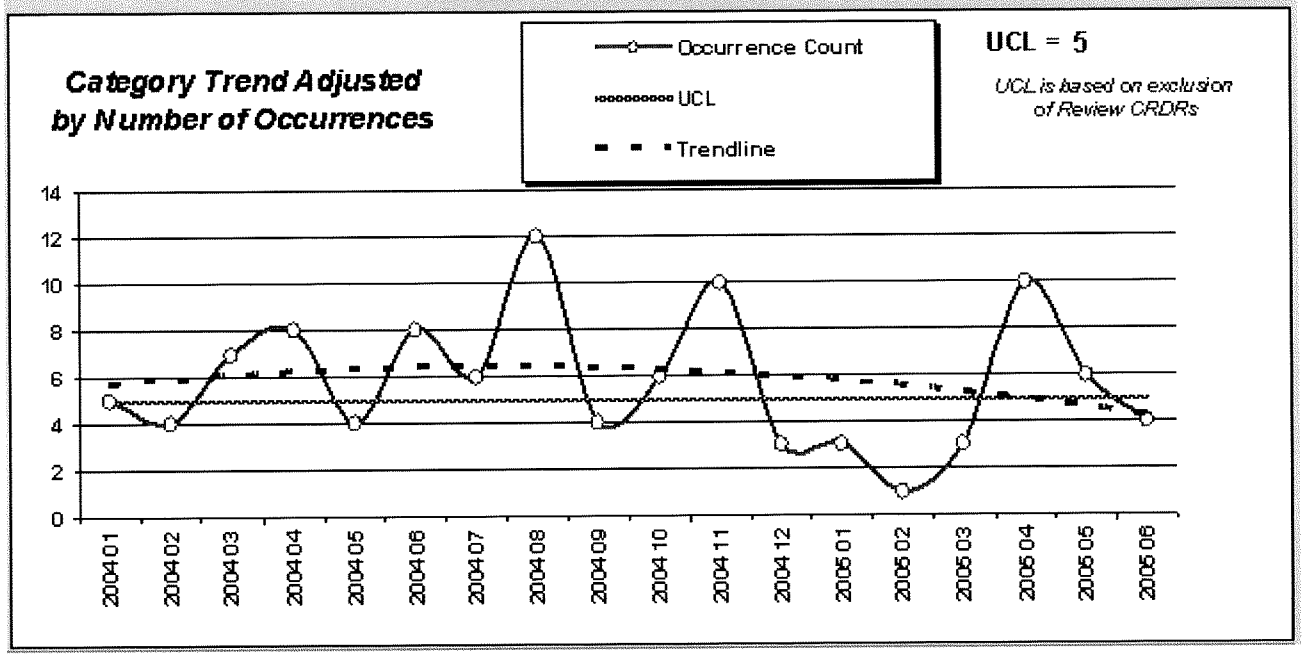
Sample Information

Typical Category Trend Chart and Data Report

Category Trend Analysis
(Adjusted for Number of Occurrences)

On-Line Trending

Category:	Start Date:	End Date:	CRDR Types
Tagging Clearance	01/01/04	06/30/05	Significant Adverse Potentially_Significant

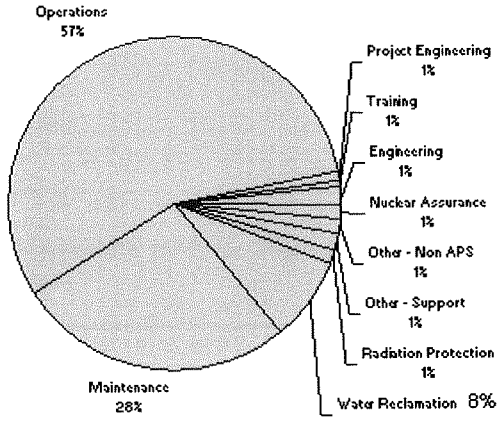


Standard Report includes:

- **Distribution by causal organizations**
- **Narratives for all items making up the data points**
- **Raw data for export to other applications**
  - Link to sample detailed report

Sample Information

Typical Category Trend Chart & Data Report



Approximate Distribution of Tagging & Clearance Error Occurrences Causal Organization

Category Trend Analysis (Details)

Category: *Tagging Clearance*

Start Date: 01/01/04

End Date: 06/30/05

CRDR Types: Significant Adverse, Potentially_Significant

On-Line Trending

Year Month	CRC Date	CRDR#	Occurrences within this CRDR	
2005 06	6/24/2005	2810845	1	Details:
Summary:	The Maintenance Dept permit and tagging performance indicator was RED for the April, 2005 Tagging annunciator window. ADVERSE SHEA			The Maintenance Dept permit and tagging performance was RED for the April 2005 Tagging Annunciator Window. This red window requires an improvement plan per the "Top Ten" tagging improvement action plan. The events that led to the red window are documented under CRDRs 2796847 and 2780264. A review of these two events needs to be performed and an improvement plan developed to address any overall issues that the individual CRDRs did not address.ss
2005 06	6/22/2005	2808915	1	Details:
Summary:	(U-3) An RP practice of keeping permit sign on sheets at the RP island has resulted in some unanticipated problems. ADVERSE FLADAGER			Contrary to 400 P-90 PZ9, Power Block Permit and Tagging, Rev 29, step 4.2.2, RP made a practice of keeping Permit Sign on Sheets (Appendix C) at the R P Island. It is important to note that RP was not the exception for the permits in question (see attached media file). This is in apparent conflict with step 4.1.2 of 400 P-90 PZ9. The result of this procedural non-compliance is that personnel were still signed in on to the unauthorized Appendix C when the Permit was released. In the case of Work Mech 2792357 / Permit # 116367 the permit has been released, tags removed, system restored and re-energized with 29 personnel still signed in on the Appendix C, Permit Sign-on sheet
2005 06	6/15/2005	2808762	1	Details:
Summary:	(U-1) Permit 116421, hung for pre SGRP outage work had unexpected impacts. ADVERSE COXON (WC)			In preparation for the steam generator replacement outage, permit 116421 was generated and hung to allow installation and subsequent removal of the outside lift system (O LS) and runway system for SG R. Unknown to the control room this permit de-energized the power to the Emergency Diesel Generator's Cathodic Protection System (TLCO 3.8.1 .100). This condition was discovered while performing 32ST-1Q RD1 (STWO # 2696153) on 05/14/2005.o o The permit was hung on 05/16/2005 at 16:41. This means that currently the permit will be hanging for 29 days. The TRM has a 30 Completion Time to restore the system to OPERABLE status. At 12:45 TLCO 3.8.100.A was exited when the Cathodic System was declared OPERABLE.o
2005 06	6/7/2005	2797214	1	Details:
Summary:	(U-3) Permit 114751 was not hung for WO 2780217. ADVERSE KIRKER			Permit 114751 was not hung for WO 2780217. There was a discrepancy with the drain values on the TD for the permit.
2005 05	5/24/2005	2800974	1	Details:
Summary:	During the implementation of Permit #114734 for maintenance on valve 1PLRNVU13 it was discovered that permit boundaries were inadequate. ADVERSE COXON (WC)			During the implementation of Permit 114734 for maintenance on valve 1PLRNVU13 it was discovered that permit boundaries were inadequate. This was discovered PRIOR to any tags making it into the field and being hung. Due to the testing discovered prior to the tags being hung, this considered as tagging issue and not as tagging event. In summary the preparer and tech reviewer did not recognize the need to isolate the AB supply to this valve. From the preparers perspective he does not know why the AB supply was inexplicably omitted. The tech reviewer was

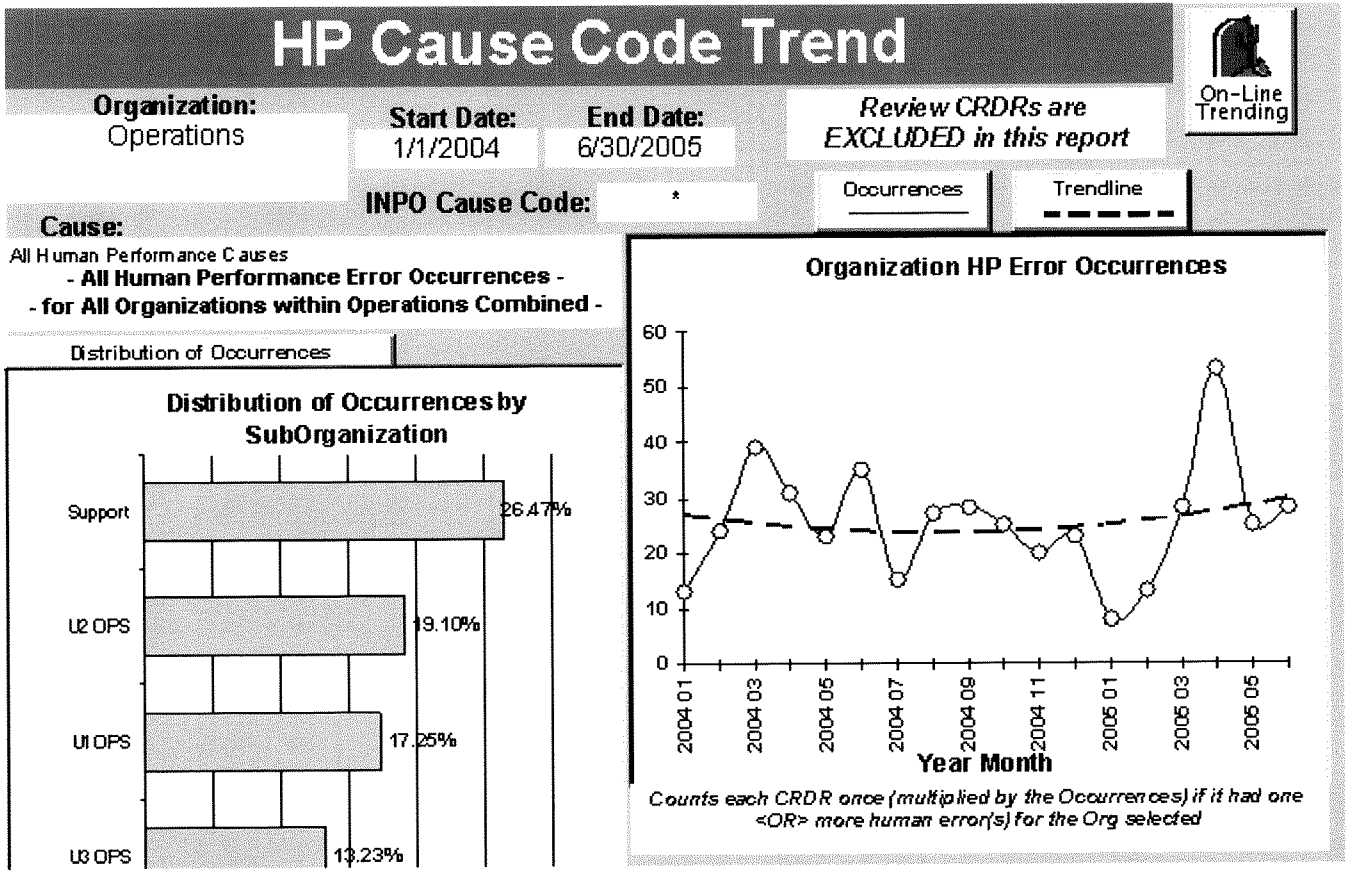
Standard Report includes:

- Distribution by Causal Organizations
- Narratives for all items making up the data points
- Raw Data for export to other applications

PALO VERDE

Sample Information

Typical Human Error Trend Chart & Data Report



- Link to sample HP Cause detailed report

Standard Report includes:

- **Trend in selected type of error for a given organization**
- **Distribution by Causal Organizations**
- **Narratives for all items making up the data points**
- **Raw Data for export to other applications**

Outputs of Trending Activities

Monitoring for and Identifying Trends Using CRDR Data

- Monthly – review trend data for categories, subcategories and human performance errors in each major area and organization
  - Upper Control Limits (UCL) for categories and subcategories provide one of several tools used to trigger closer look
  - Equally important considerations:
    - Shape, slope and duration of trends
    - Proximity to UCL and how long sustained
    - Magnitude of "noise level"
    - Acceptable level based on significance and impact
  - PID communicates results to line and oversight counterparts

Outputs of Trending Activities

Monitoring for and Identifying Trends Using CRDR Data

- Semi-annual trend report rolls up higher-level issues and confirmed adverse trends
  - Hard copy distribution to executive management and oversight groups
  - Electronic distribution to department leaders and above for dissemination within their organizations
- As needed – when daily CRDR reviews, trending and other activities indicate a new issue may be emerging

Output of Trending Activities

Trend CRDRs June 2003 – June 2005

- 91 CRDRs placed in "Trend" Category
- 20 Initiated by Nuclear Assurance / Performance Improvement
  - 4 for INPO/NRC-identified issues
- 71 initiated by line organizations
  - 4 for INPO/NRC-identified issues
  - Many based on data provided by NAD/PID
  - Line encouraged to write own trend CRDRs

Challenges/Weaknesses

- **Upper Control Limits**
  - Too high in some areas
    - All have been re-evaluated
    - Approximately 60% were reset, majority were minor changes of less than 10%
    - Established 6-month periodicity for reevaluation
  - No UCLs for Human Performance Cause Codes
    - More complex than category UCLs
    - Benchmark options and best practices at Corrective Action Program Owner's Group (CAPOG) Conference at end of August

Challenges/Weaknesses

- High norms in some areas had become acceptable
  - Factored into re-evaluation of UCLs
  - Some UCLs now set more conservatively than purely statistical calculated value to help drive acceptable norms down
- Management involvement and engagement in trending issues

Future Actions

- Change Performance Improvement Department reporting structure to report through the Vice President-Operations
  - Improve line ownership of corrective action program
  - Date: November 30, 2005
- Designate Corrective Action Program Coordinators within major line organizations
  - Improve line ownership and accountability
  - Date: November 30, 2005
- Senior Vice President Nuclear meeting presentation of Trend Report content upon distribution
  - Date: On next scheduled report issuance

Future Actions

- Benchmark established best practice programs for development of human performance upper control limits
  - Date: September 30, 2005
- Reinstitute site-level human performance cause trend reporting as separate section in semi-annual trend report
  - Date: End of 2005 Trend Report

Conclusion

- Overview of CRDR trending process
- Coding specifics/details
- Trending data utilization
- Sample information
- Outputs of trending activities
- Challenges/weaknesses
- Future actions
  - Closing remarks

Equipment Trending

Steve Coppock

Department Leader, System Engineering

Carl Churchman

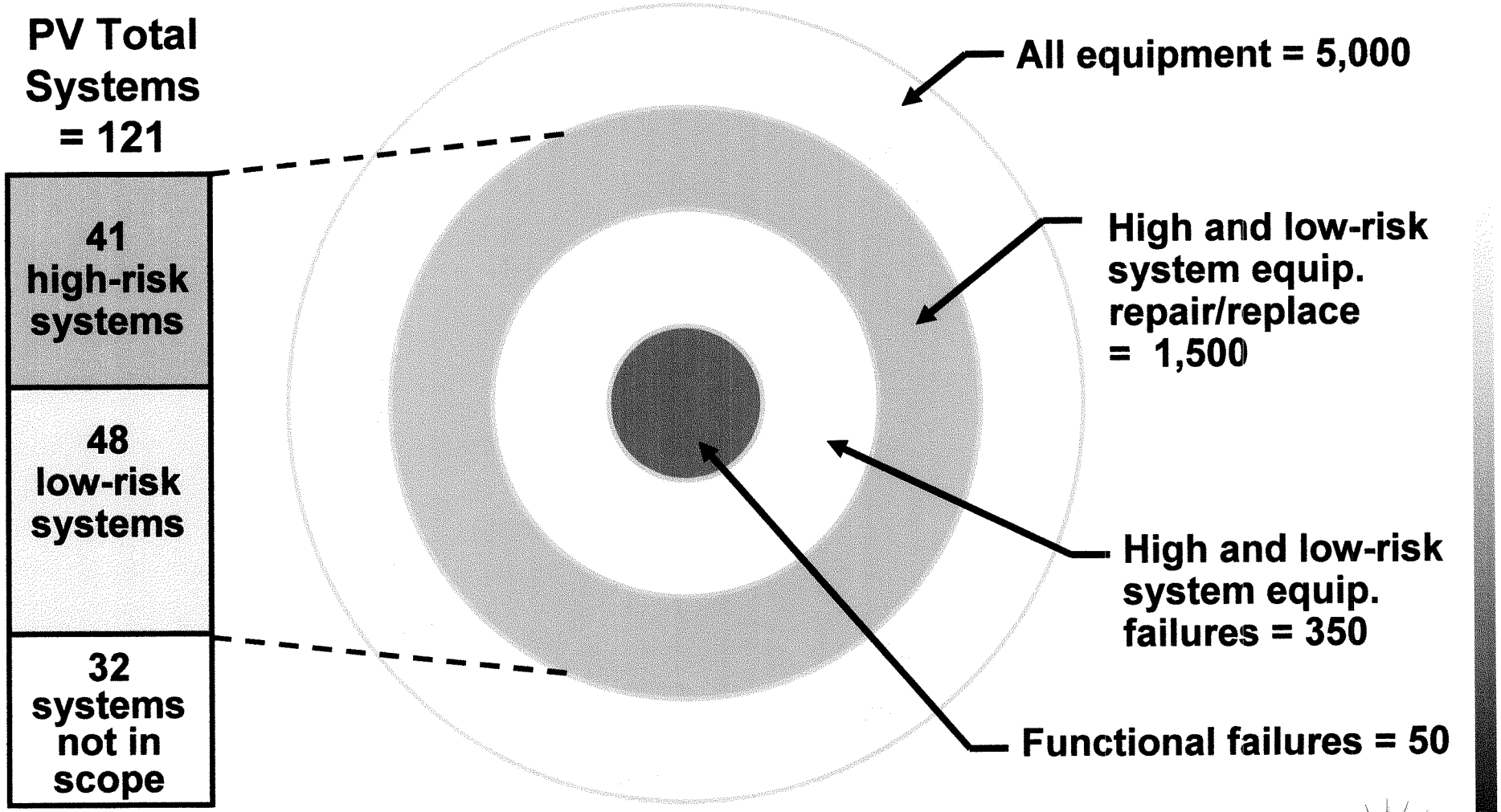
Director, Nuclear Engineering

Presentation Outline

- Maintenance Rule Trending
- Failure Data Trending
- Equipment Performance Trending
- Further Actions
- Conclusion

Corrective Maintenance Work Orders

(Approximate Per Year)



Maintenance Rule Trending

- Reliability and unavailability performance criteria are established in accordance with 10CFR50.65
- Equipment failures are entered into the corrective action program
- About 350 failures per year, approximately 50 are functional failures
- Reliability and unavailability performance criteria are tracked and reported monthly by Engineering Services

Maintenance Rule Trending

PVNGS - Maintenance Rule Unavailability Performance Report

Date of Report 8/11/05 8:11

Time Period - Year 05, Month July

MR System	Description	Unit 1 Unavailability Value	1st%	2nd%	Unit 2 Unavailability Value	1st%	2nd%	Unit 3 Unavailability Value	1st%	2nd%
Risk Category	HRS									
AFA	Auxiliary Feedwater Train A	0.45	1.20	1.60	0.31	1.20	1.60	0.43	1.20	1.60
AFB	Auxiliary Feedwater Train B	0.04	0.68	0.90	0.16	0.68	0.90	0.13	0.68	0.90
AFN	Auxiliary Feedwater Train N	0.04	0.68	0.90	0.03	0.68	0.90	0.02	0.68	0.90
CDN	Condensate System	0.00	5.00		0.00	5.00		0.00	5.00	
CHA	Chem & Vol Control / Charging Pmp A	2.65	7.50	10.00	2.12	7.50	10.00	2.49	7.50	10.00
CHA APSS	Chem & Vol Control - Aux Press Spray Val	0.00	1.50	2.00	0.00	1.50	2.00	0.00	1.50	2.00
CHB	Chem & Vol Control / Charging Pmp B	2.09	7.50	10.00	3.09	7.50	10.00	6.60	7.50	10.00
CHB APSS	Chem & Vol Control - Aux Press Spray Val	0.00	1.50	2.00	0.00	1.50	2.00	0.00	1.50	2.00
CHE	Chem & Vol Control / Charging Pmp E	2.77	7.50	10.00	2.32	7.50	10.00	2.41	7.50	10.00
CON	Control Oil	1.60	3.75	5.00	0.58	3.75	5.00	0.49	3.75	5.00
CSA	Containment Spray Train A	1.35	1.50	2.00	1.00	1.50	2.00	1.23	1.50	2.00

PALO VERDE

Maintenance Rule Trending

PVNGS - Maintenance Rule Reliability Performance Report

Date of Report 8/11/05 8:33

Time Period - Year 05, Month July

Unit	MR System	Description	Risk	Goal #	Failure Goals	Failures
1	AFA	Auxiliary Feedwater Train A	HRS	1st	2 failures for 20 demands	0
	AFB	Auxiliary Feedwater Train B	HRS	1st	2 failures for 30 demands	0
	AFN	Auxiliary Feedwater Train N	HRS	1st	2 failures for 30 demands	0
	CHA	Chem & Vol Control / Charging Pmp A	HRS	1st	4 failures for 18 months	0
	CHA APSS	Chem & Vol Control - Aux Press Spray Valves Train A	HRS	1st	3 failures for 36 months	0
	CHB	Chem & Vol Control / Charging Pmp B	HRS	1st	4 failures for 18 months	0
	CHB APSS	Chem & Vol Control - Aux Press Spray Valves Train B	HRS	1st	3 failures for 36 months	0
	CHE	Chem & Vol Control / Charging Pmp E	HRS	1st	4 failures for 18 months	0
	CSA	Containment Spray Train A	HRS	1st	2 failures for 12 demands	0
	CSB	Containment Spray Train B	HRS	1st	2 failures for 12 demands	0
	ECA	Essential Chilled Water Train A	HRS	1st	2 failures for 30 demands	0
	ECB	Essential Chilled Water Train B	HRS	1st	2 failures for 30 demands	0

PALO VERDE

Maintenance Rule Trending

- System Engineers meet with the Maintenance Rule Expert Panel when performance criteria are exceeded
- Corrective action program is used to establish corrective actions when performance criteria have been exceeded
  - Recent examples:
    - Unit 2 Start-up Channel Reliability criteria not met
    - Unit 3 Plant Level Unplanned Capability Loss criteria was exceeded due to reactor coolant pump oil seal performance

Summary/Challenges

- Good over-all management of establishing and monitoring against performance criteria
- Good ownership of maintenance rule process by the system engineers, probabilistic risk-assessment group, and the expert panel
- Improvement is needed to resolve equipment for systems in a(1), some equipment issues are long-standing

Failure Data Trending

- System Engineers look at corrective maintenance work orders quarterly
  - Various reports are available for review (failures by system, and by cross system)
  - Primary focus is on ensuring Maintenance Rule Functional Failures have not been missed
  - Other sources include system team meetings and condition reports
- Engineers also look for trends at the component level
  - Motor-operated valves
  - Air-operated valves
  - Check valves
  - Breakers
  - Large motors

Quarterly Failure Data by System

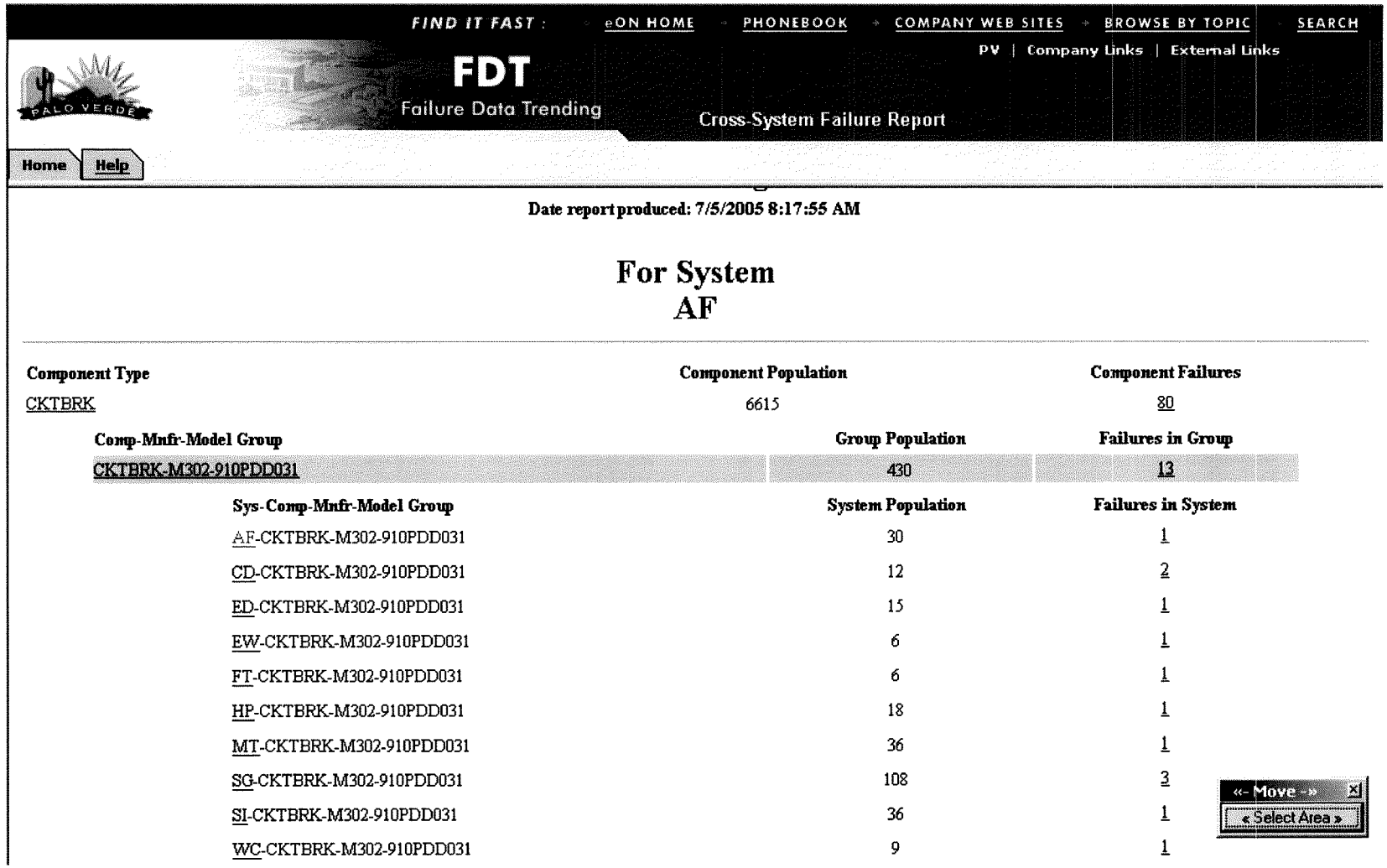
FDT
Failure Data Trending

05Q2 FDT Quarterly Failure Report -- 4/1/2005 thru 6/30/2005

Date produced: 7/5/2005 8:03:38 AM

SYSTEM	COUNT	SYSTEM	COUNT	SYSTEM	COUNT
CD	5	CE	1	CH	3
CP	1	CW	2	DG	4
DS	1	ED	7	EW	1
FP	7	FW	1	GH	1
GR	2	HF	2	IA	2
MA	2	MB	1	MT	13
MX	1	NG	2	NH	2
PB	1	PH	1	PN	1
QF	8	RC	4	RJ	15
RK	2	RM	1	SA	2
SB	1	SC	10	SD	4
SF	2	SG	14	SH	2
SI	7	SK	2	SP	14
SQ	5	WC	1		

Quarterly Cross-System Failure Report



FIND IT FAST : eON HOME | PHONEBOOK | COMPANY WEB SITES | BROWSE BY TOPIC | SEARCH

PV | Company Links | External Links

FDT

Failure Data Trending

Cross-System Failure Report

Home | Help

Date report produced: 7/5/2005 8:17:55 AM

For System AF

Component Type	Component Population	Component Failures
CKTBRK	6615	80

Comp-Mnfr-Model Group	Group Population	Failures in Group
CKTBRK-M302-910PDD031	430	13

Sys-Comp-Mnfr-Model Group	System Population	Failures in System
AF-CKTBRK-M302-910PDD031	30	1
CD-CKTBRK-M302-910PDD031	12	2
ED-CKTBRK-M302-910PDD031	15	1
EW-CKTBRK-M302-910PDD031	6	1
FT-CKTBRK-M302-910PDD031	6	1
HP-CKTBRK-M302-910PDD031	18	1
MT-CKTBRK-M302-910PDD031	36	1
SG-CKTBRK-M302-910PDD031	108	3
SI-CKTBRK-M302-910PDD031	36	1
WC-CKTBRK-M302-910PDD031	9	1

«- Move -» | « Select Area »

Examples of recent trends identified

- Spent fuel pool clean-up pump seal leakage
- Safety injection tank vent valve leakage
- Main control board switch contact block cracking
- Emergency light lamp failures
- The four above items were entered into corrective action program
- Some items are handled by managing the issue at the system team level or by initiating corrective maintenance

Summary/Challenges

- **The effectiveness of the cross-system failure data trending process needs improvement**
  - **Upfront coding by maintenance needs improvement for equipment repaired or replaced; Nuclear assurance department input**
  - **Cause codes require improvement; existing codes are not typically used by maintenance or engineering**
  - **Consistency needs improvement; many people input cause codes**
  - **Procedures need clarification; process and expectations are not clear**

Performance Trending

- System Engineering Equipment Trending is based on EPRI's "SYSMON"
  - Important functions are identified
  - Equipment important to maintaining the functions are identified and the failure modes determined
  - Monitoring plans are established around these failure modes and trended using a site computer code (SENTRI)

SYSMON Example

Mechanism	Decreased pump flow for a given pump head due to pump wear and/or degradation.
Indicator	Pump mini-flow and full flow surveillance testing.
Data Source	73ST-9SI10 (HPSI Miniflow) 73ST-9XI33 (HPSI Full Flow) IPDAS
Collection Frequency	Quarterly Refueling Dependent upon ST to IPDAS input.
Monitoring Frequency	Quarterly Refueling SENTRI SE notification of new IPDAS data.
Trending Method	Reviewed by Operations and reviewed by IST. Completed by Operations and reviewed by IST. Plot DP and Flow versus time for both mini-flow and full flow.
Acceptance Bands	Per 73ST-9SI10 Per 73ST-9XI33 Look for a degrading trend.
Action	Per 73ST-9SI10, LCOs 3.5.3 & 3.5.4 Per 73ST-9XI33, LCOs 3.5.3 & 3.5.4 Notify IST Pump Engineer
Industry/Regulatory Requirements	yes

Component	Source	Grade
1MSIAP02	IPDAS	GREEN
1MSIAP02	IPDAS	GREEN
1MSIBP02	IPDAS	GREEN
1MSIBP02	IPDAS	GREEN
2MSIAP02	IPDAS	GREEN
2MSIAP02	IPDAS	GREEN
2MSIBP02	IPDAS	GREEN
2MSIBP02	IPDAS	GREEN
3MSIAP02	IPDAS	GREEN
3MSIAP02	IPDAS	GREEN
3MSIBP02	IPDAS	GREEN
3MSIBP02	IPDAS	GREEN

SYSMON Example

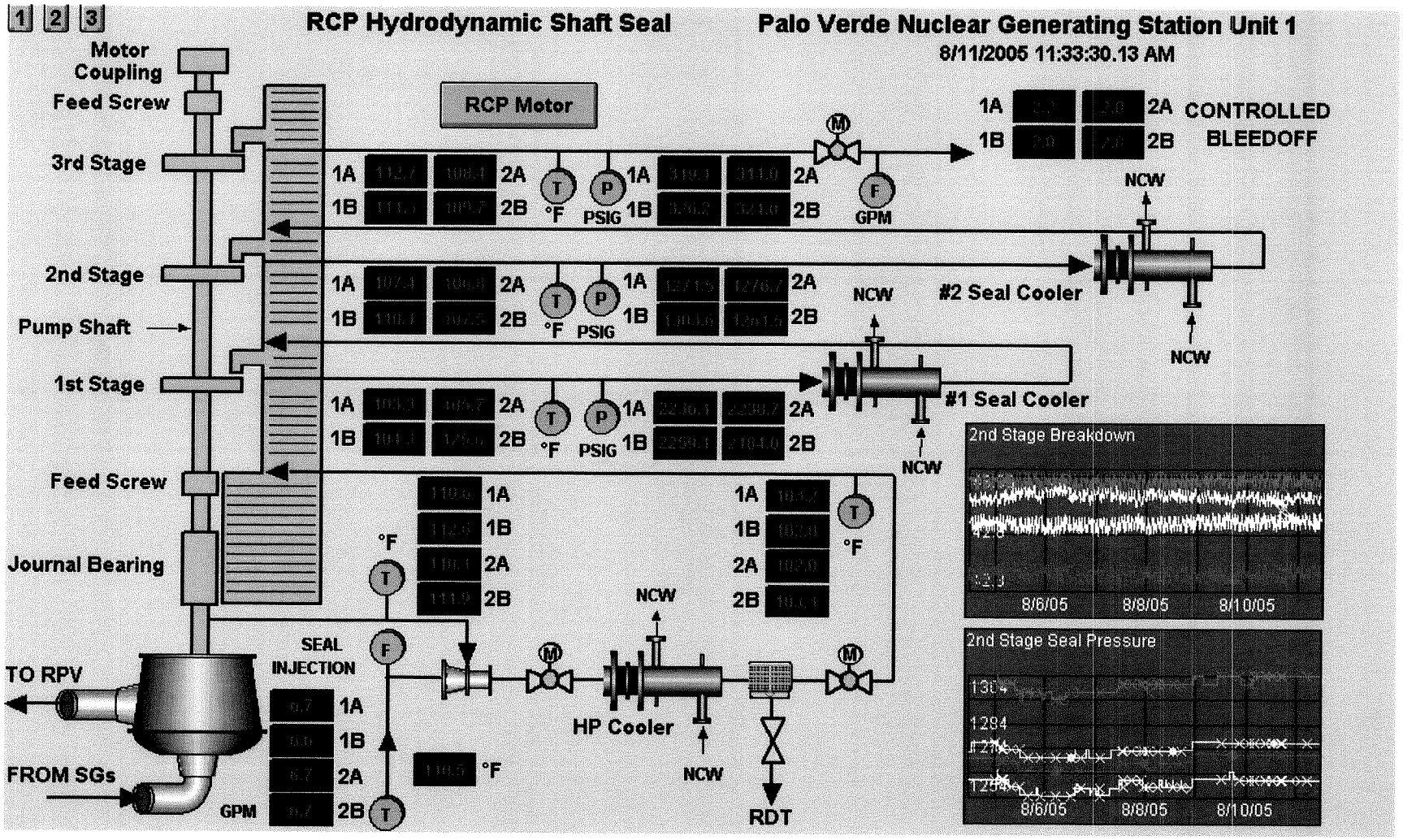
Degradation Mechanism		
Decreased pump flow for a given pump head due to pump wear and/or degradation.		
Degradation Indicator		
Pump mini-flow and full flow surveillance testing.		
Latest Date	**Latest Value**	**Latest Status**
4/23/2004 12:00:00 AM	1078.5	P
Previous Date	**Previous Value**	**Previous Status**
4/23/2004 12:00:00 AM	1078.5	P
Alarm Indicator	**Active**	
	Yes	
Unit	**EQ Tag**	
UNIT 1	MSIAP02	
Source Location	**Point(s) to match**	
IPDAS	**Appl ID** 35852 **Program ID** PV **Measurement category** FULL FLOW **Measurement type** DP **Measurement point** N/A **Measurement unit** PSID	
Comparison Type	**Value(s)**	
Range (2 High / 2 Low)	**Low Low** 1000 **Low** 1050 **High** 1100 **High High** 1134.7	

Other forms Performance Trending

OS PI

- Engineering's primary tool for equipment performance trending
- Tied to the plant computer, CORA, and other sources: about 70,000 data points available for monitoring
- Many custom screens for systems have been developed

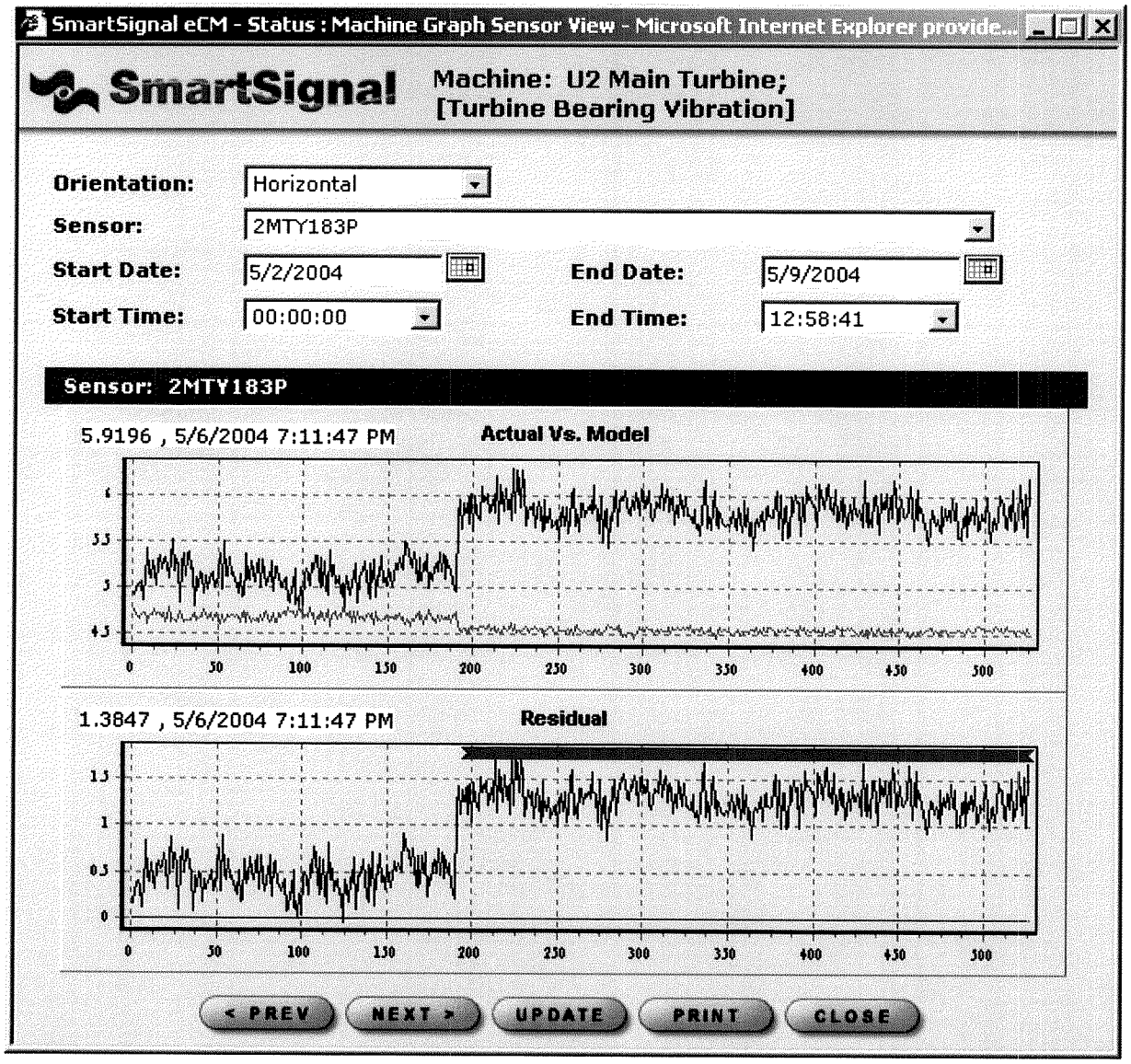
Example of OS PI Screen



Other Forms Of Equipment Trending

- SmartSignal
  - Advanced condition monitoring software
  - Provides a much earlier warning of performance degradation than other technologies
  - Used for monitoring equipment such as RCP seals, turbine, feedwater pumps/turbines, most safety related instrumentation

SmartSignal Example



Monitoring Catches

- Containment spray header over-fill (level fluctuations seen with changing containment pressure)
- Safety Injection check valve back leakage (SIT level changes)
- Degrading 1st stage RCP seal
- Failed turbine oil discharge check valve
- Degrading capacitors in station battery chargers
- Degrading non-class station batteries
- Examples above entered into CAP via WO process

Summary/Challenges

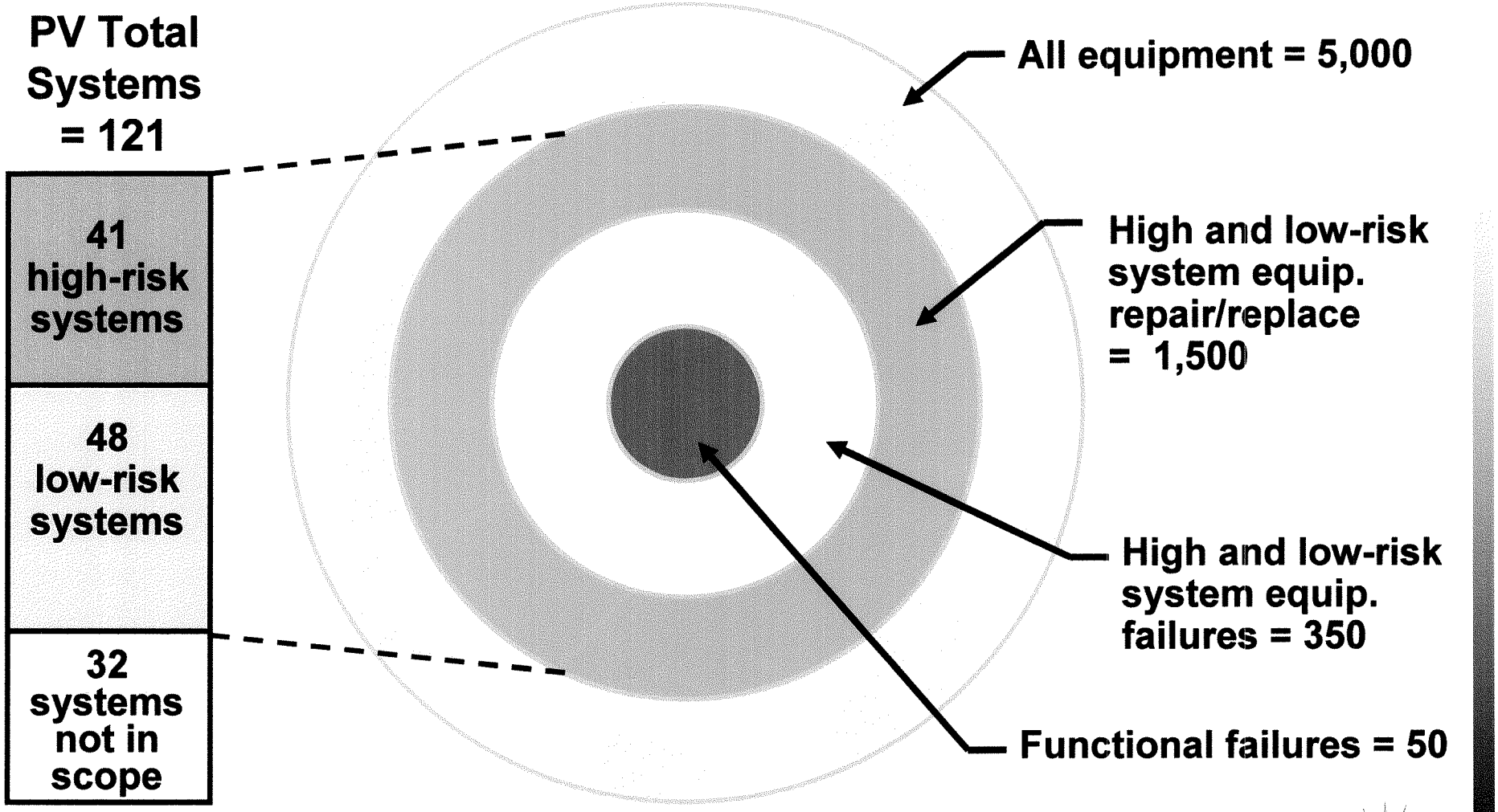
- Several good monitoring "catches" have been identified
- The focus of some system engineers has been side tracked by emergent plant issues; some gaps exist with implementation
- Attrition in system engineering has reduced resources and challenged effectiveness
- Procedure requirements are weak, too much flexibility

Future Actions

- **Revise procedures to provided improved guidance for cross system trending and performance trending (3rd quarter 2005)**
  - **"Repair/Replacement" coding by maintenance**

Corrective Maintenance Work Orders

(Approximate Per Year)



Future Actions

- Revise procedures to provide improved guidance for cross system trending and performance trending (3rd quarter 2005)
  - "Repair/Replacement" coding by maintenance
  - New failure cause codes
  - Expectations for cross-system and performance trending
- Improve System Team Steering Committee effectiveness (ongoing)
- Address resource allocation issues in System Engineering (4th quarter 2005)

Synergy Report
Nuclear Safety Culture and Safety Conscious Work Environment

Jeanne Copsey
Department Leader
Employee Concerns

Presentation Outline

- Results of 2005 Synergy Assessment
- Actions Taken in Response to 2005 Synergy Assessment
- Future Actions to Promote NSC/SCWE
- Conclusion

Results of 2005 Synergy Assessment

Scope and Methodology

- 155 questions
- 2 opportunities for write-in comments – more than 1,700 comments received
- Focused on
  1. Nuclear Safety Culture (NSC)
     - Nuclear safety values, behaviors and practices including CRDR process
     - Safety Conscious Work Environment (SCWE)
     - Employee Concern Program (ECP) effectiveness
  2. General Culture and Work Environment (GCWE)
  3. PVNGS Requested Special Topics
     - Leadership, Management and Supervision Topics
     - MITR and DPO Process Effectiveness
     - Industrial Safety and Health Program Effectiveness

Results of 2005 Synergy Assessment

Administration of Survey

- February/March 2005
- 1861 responses = 86.6% participation
- Results provided to Palo Verde May 2005

Results of 2005 Synergy Assessment

Report Conclusions

"PVNGS personnel are strongly committed to Nuclear Safety (NS) excellence as evidenced through their demonstrated willingness to take appropriate actions in response to potential Nuclear Safety (NS) issues or concerns and their supporting behaviors and practices aimed at operational NS and continuous improvement."

- **97.3% believe NS is the first and over-riding priority at PVNGS**
- **98.5% would inform their supervision and/or document using the corrective action process (CRDR report)**
- **96.3% would escalate the matter up the management chain if not satisfied with response**

Results of 2005 Synergy Assessment

Report Conclusions (cont.)

- SCWE is strong and relatively uniform across the site
- Work culture in work groups is generally considered strong
  - Frontline exhibit questioning attitudes
  - PVNGS is a "good place to work"
- PVNGS culture has served well in producing strong Nuclear Safety and business performance results
- PVNGS at an important "crossroads"
  - Culture will have to develop greater capacities to align with current business needs
- Growing concerns about allocation of resources, lost expertise and workload

Results of 2005 Synergy Assessment

Report Conclusions (cont.)

- Culture has benefited from several inherent strengths
  - e.g. high standards, teamwork, trust and dedication of the workforce, etc.
- Emerging pressures appear to be exposing weaknesses in areas which are becoming more critical at times of change
  - e.g. communications, change management, recognition and personnel development
- Uneasiness about whether or not "critical" standards will continue to be maintained while PVNGS faces the need to conduct business with fewer resources

Results of 2005 Synergy Assessment

Rating Scale	Metric Mean Range
Significantly Less-than-Adequate (S-LTA)	< 2.50
Less-than-adequate (LTA)	2.50-2.84
Nominally LTA (N-LTA)	2.85-2.99
Nominally Adequate (NA)	3.00-3.15
Adequate (A)	3.16-3.30
Adequate-to-Good (A-G)	3.31-3.50
Good (G)	3.51-3.70
Good-VG (G-VG)	3.71-3.90
Very Good (VG)	3.91-4.20
VG-Excellent (VG-E)	4.21-4.50
Excellent (E)	> 4.50

PALO VERDE

Results of 2005 Synergy Assessment

Cultural Model / Metric	**Nuclear Safety Culture (NSC)**	NS Values, Behaviors & Practices (NS VBP)	Safety Conscious Work Env. (SCWE)	Employee Concerns Program (ECP)	**General Culture & Work Env. (GCWE)**
- Measured Status	Very Good	Very Good	VG-Exc.	Good-VG	Good
- Cultural Metric / Trend[1]	4.07 +2.9%	3.95 n/a	4.47 n/a	3.77 n/a	3.70 n/a
- 2005 Industry Percentile	86th percentile	85th percentile	85th percentile	76th percentile	91st percentile

Very Good overall response rate of 86.6% (1,861 / 2,150).

[1] Based upon the Integrated Performance Indicator (IPI), which is a less robust measure of the NSC and includes nominal GCWE influence. This indicator is computed based upon respondents' current ratings and retrospective inquiries for the same areas looking back approx. one year.

Results of 2005 Synergy Assessment

Special Topic	Status	Ratings (mean / neg. %)
Leadership, Mgmt. & Supv. Topics	**Adeq. - Good**	**3.50 / 16.1%**
- Exhibiting PVNGS Values & Principles	Good	3.54 / 15.6%
- Department Leader Communications	Good	3.62 / 12.8%
- Senior Management Leadership	Adeq. - Good	3.35 / 19.7%
Mgmt. Issues Tracking Resolution (MITR)	**Good**	**3.56 / 12.9%**
Diff. Prof. Opinion (DPO) Process	**Good - VG**	**3.89 / 6.9%**
Industrial Safety & Health Program	**Good - VG**	**3.88 / 6.6%**

Results of 2005 Synergy Assessment

Nuclear Safety Culture Relative Strengths

The following NSC survey questions were rated >4.25 ('Very Good to Excellent'):

- Nuclear safety is the first and over-riding priority (4.26, 97.3% aff.)
- Raising potential Nuclear Safety issues / concerns being favorably received by:
  - Immediate supervision (4.44, 97.6% aff.)
  - Management (4.29, 96.2% aff.)
- If one identified a potential Nuclear Safety issue or concern, would:
  - Inform supv. and/or document on CRDR (4.56, 98.5 aff.)
  - For any activity that could potentially compromise economic viability or security of PVNGS (4.73, 99.4% aff.)
  - Take up the mgmt. chain if unsatisfied by supv.'s response (4.43, 96.3% aff.); supported by perceptions of an "open door" (4.38, 97.0% aff.)

PALO VERDE

Results of 2005 Synergy Assessment

Nuclear Safety Culture Relative Strengths (cont.)

- No negative reaction (during the past year) for having raised an issue or concern related to nuclear safety by:
  - Supervision (4.86, 96.4% affirmative)
  - Peers (4.84, 95.9% affirmative)
  - Mgmt. (4.82, 95.4% affirmative)
- Unawareness of someone who, during the past year, had experienced a negative reaction from supervision or management for having raised an issue/concern related to nuclear safety (4.43, 85.8% affirmative)

Results of 2005 Synergy Assessment

GCWE Relative Strengths

The following GCWE survey questions were rated >4.00 'VG':

- **High-performing work culture within work groups:**
  - **Quality consciousness and attention to details (4.15, 97.6% aff.)**
  - **Obtaining supv. / mgmt. input before taking actions on matters beyond normal work procedures / processes (4.13, 97.1% aff.)**
  - **Self-critical and having questioning attitudes (4.09, 96.5% aff.)**
  - **Striving to improve performance (4.09. 95.3% aff.)**
  - **Identifying one's own problems (4.09, 97.2% aff.)**
  - **Holding selves accountable for high performance (4.08, 94.3% aff.)**
  - **Making conservative, well-balanced decisions (4.02, 96.5% aff.)**

Results of 2005 Synergy Assessment

GCWE Relative Strengths (cont.)

- Within Departments:
  - Having high standards and applying these in the conduct of business (4.10, 95.7% aff.)
  - Placing importance on performance and results (4.06, 94.6% aff.)
  - Having personal satisfaction in current work assignments (4.01, 93.4% aff.)

Results of 2005 Synergy Assessment

Special Topics – Relative Strengths

The following survey questions were rated >3.90 ("Very Good"):

- Industrial Safety and Health (ISH) program:
  - Adhering strictly with ISH requirements (4.06, 95.9% aff.)
  - Department Leaders effectively communicating needs for improving ISH behaviors (3.93, 94.8% aff.)
- DPO process effectiveness:
  - Management support for using the DPO process (3.90, 93.7% aff.)
  - Willingness to use the DPO process for potential Nuclear Safety issues or concerns – based upon the absence of negative reactions (4.05, 94.2% aff.)

Results of 2005 Synergy Assessment

NSC Relative Weaknesses

All NSC survey questions were rated >3.60 ("Good" or better) with the following exceptions:

- **Confidence management is making well thought-out decisions in the allocation of resources to assure that NS is maintained (3.42, 19.4% neg.)**
- **Confidence in CRDR process ensuring potential NS problems are:**
  - **Addressed in a timely manner (3.50, 11.5% neg.)**
  - **Resolved in an effective manner (3.55, 11.1% neg.)**

Results of 2005 Synergy Assessment

"During the past year, do you know someone who has experienced a negative reaction from supv. or mgmt. for having raised an issue or concern related to NS?"

- 4.43 mean
- 14.2% indicating "Yes" (industry median = 17.9%)
- 77th industry percentile

The following organizations were notably lower than the PVNGS 'norm':

	Mean	Aff.%
Project Eng.	3.86	28.6%
Nuclear Fuels Mgmt.	3.92	27.0%
Rad Services	3.94	26.5%
I&C – Maint. Programs	3.97	25.8%
Maint. Planning	4.05	23.8%
Unit 3 Ops	4.20	20.0%

Results of 2005 Synergy Assessment

GCWE Relative Weaknesses

All GCWE survey questions were rated >3.50 ("Good" or "Better") with the following exceptions:

- Satisfaction with communications:
  - On priorities as used in decisions and resource allocation (3.29, 21.1%neg.)
  - On future plans for PVNGS (3.47, 14.4% neg.)
  - Department management effectively communicating the basis for changes in programs, policies and procedures (3.43, 16.1% neg.)
- Concerns about workload having an adverse impact on:
  - Maintaining plant material condition or reliability (3.37, 19.7% neg.)
  - Assuring the quality of work products (3.47, 17.4% neg.)

Results of 2005 Synergy Assessment

GCWE Relative Weaknesses (cont.)

Personnel development and management:

- Effectiveness in developing people through coaching, training and mentoring (3.23, 24.5% neg.)
- Supervision and management holding people accountable for performance and results (3.27, 23.6% neg.).
- Effectively recognizing performance and accomplishments (3.29, 23.3% neg.)
- Effective training on technical / functional aspects of peoples' jobs (3.37, 20.3% neg.)

– Departmental effectiveness in planning and implementing changes in the way business is done (3.38, 16.6% neg.)

Results of 2005 Synergy Assessment

Special Topics – Relative Weaknesses

All Special Topic survey questions were rated >3.50 ("Good" or "Better"), with the following exceptions:

LMS Relative Weaknesses

Dept. supv. & mgmt. exhibiting PVNGS Values and Principles:

- **Helping to execute work with maximum efficiency (3.43, 18.7% neg.)**
- **Develop effective and efficient plans and processes (3.48, 17.2% neg.)**

- **Dept. Leaders effectively communicating improvement needs associated with:**
  - **Attaining appropriate staffing levels and expertise in each org (3.24, 24.9% neg.)**
  - **Management leadership, personnel management and business management effectiveness (3.47, 16.5% neg.)**

Results of 2005 Synergy Assessment

LMS Relative Weaknesses (cont.)

Senior Management leadership:

- Establishing a clear strategy for success (3.45, 15.6% neg.)
- Demonstrating teamwork (3.38, 18.1% neg.)
- Openness and honesty in communications and interactions (3.34, 20.2% neg.)
- Setting positive example practicing what preached (3.32, 21.9% neg.)
- Providing effective leadership ensuring that necessary changes are being made (3.31, 20.1% neg.)
- Being sufficiently visible and accessible to employees (3.30, 22.6% neg.)

Results of 2005 Synergy Assessment

The following orgs triggered the PVNGS 'relative norms' targeting criteria based upon low means and/or high negative response rates:

Organization	Priority Level	NSC	SCWE	GCWE
Operations Support	1	3.78 12.1% neg.	7.2% neg.	3.32 23.9% neg.
Project Eng.	2	3.85 14.2% neg.	4.10 11.8% neg.	
I&C - Maint. Programs	2	3.84 9.9% neg.	4.24 7.9% neg.	
Proc.-Stores-Finance	3			3.31 23.5% neg.
Valve Services	3	8.5% neg.		3.41 19.5% neg.
RP Operations	3			3.43
Work Management	3			3.48 18.3% neg.
Rad Services	3	9.3% neg.		3.50 17.7% neg.
Maint. Planning	4	9.6% neg.		

Results of 2005 Synergy Assessment

Recommendations

- **Nuclear Safety Culture:**
  - Continue to reinforce 'standards' related to NS performance expectations
  - Continue to improve the effectiveness of the CRDR, ECP and self-assessment processes
  - Address locales with SCWE opportunities
- **General Culture and Work Environment / Leadership, Management and Supervision:**
  - More effective communications of the bases for decisions on staffing and resource allocation, on work management and on change management practices
  - Increased visibility and involvement of senior management
  - Greater attention to personnel management practices and personnel development
- **Organizational Initiatives:**
  - Address opportunities in the identified organizations

PALO VERDE

Actions Taken in Response to 2005 Synergy Assessment

Actions Taken

- Site-wide FYI communication on results of the Synergy Assessment issued
- Action plan developed for communicating results of Synergy Assessment
- Leaders provided with results related to their area:
  - Focus on 6-8 questions with lowest mean score
  - Engage team in discussion about assessment results to better understand issues
  - Develop plans as necessary to address issues

Actions Taken (cont)

- The 9 Departments that fell below PV "norm" developed formal action plans to address areas of concern
  - These action plans are currently being tracked by ECP in review CRDR
- Other more general recommendations from the assessment have been evaluated and cross-referenced to existing corrective actions, tracked against progress with the 2005 Business Plan or specific actions are being developed to address relative weaknesses or other recommendations

Actions Taken

- Ongoing Leadership Assessment and Training
  - 360-degree evaluations
  - Crucial Conversations
  - CRDR 101
  - Industrial Safety Awareness Training
  - Performance Management Process
- Standards and Expectations White Book
- Procedural Use and Adherence Training
- Issuance of 'Nuclear Safety Principals' Policy
- Benchmarking of Self-Assessment Process
- Increased Leader Meetings with Senior Management
- Process Simplification Team

Priority Level 2
I&C Maintenance Programs

- Continue to communicate the changes and/or enhancements being made to the CRDR process. 10/1/05
- Periodically pulse the I&C team members for issues relative to the CRDR program requiring resolution. 7/15/05
- ECP Department Leader to discuss EC Program with I&C team members. 10/1/05
- ECP Department Leader to spend day as helper to the I&C Technicians to better establish relationship and build rapport. 10/1/05

Priority 3
RP Ops/Rad Svcs Action Plan

- Reinstitution of all-hands meetings to improve communications. 10/1/05
- Publish weekly summary of department issues and events. 9/1/05
- Address accountability concerns with mid-year performance assessment feedback. 9/2/05
- Implement recognition initiatives. Complete
- Employ field observation program with revised criteria for field time. 8/19/05

Future Actions to Promote NSC/SCWE

Future Actions to Promote NSC/SCWE

- NSC/SCWE components of Annual Site Access Training updated
- Continue focus on visibility of ECP program
- ECP Website
- Issuance of new Integrated Issues Resolution Process (IIRP) brochure and posters
- Updated SCWE Training for Leaders in 2006
- IIRP Self Assessment 2006
- Conduct Synergy Assessment in 2007

Conclusion

- A positive and healthy nuclear safety culture and safety conscious work environment exists at Palo Verde
- APS will continue to take actions to foster and promote a NSC and SCWE at Palo Verde