



A subsidiary of Pinnacle West Capital Corporation

Palo Verde Nuclear
Generating Station

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102-05606-JML/SAB/JAP/DJS/DCE
December 08, 2006

Dr. B. S. Mallett
Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
611 Ryan Plaza Dr., Suite 400
Arlington, TX 76011-4005

Dear Sir:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Docket Nos: 50-528, 50-529, 50-530
Human Performance Cross-cutting Issue Closure Plan**

Please find enclosed Arizona Public Service (APS) plans to improve human performance at PVNGS. The enclosure provides discussion of the station's actions to close the human performance cross-cutting issue and measures to ensure the effectiveness of the actions.

The actions are currently in various stages of implementation and completion, as noted. Once we have implemented these actions and demonstrated progress through the related metrics, we will ask for a follow-up assessment.

The actions described in this letter represent corrective action plans; they are not considered to be regulatory commitments.

U. S. Nuclear Regulatory Commission
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Human Performance Cross-cutting Issue Closure Plan
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Should you have any further questions, please contact Craig Seaman at (623) 393-5421.

Sincerely,

A handwritten signature in black ink, appearing to read "James M. Seaman". The signature is fluid and cursive, with a large initial "J" and a distinct "S" at the end.

JML/SAB/JAP/DJS/DCE/gt

Enclosure:
Human Performance Cross-cutting Issue Closure Plan

cc: B. S. Mallett NRC Region IV Regional Administrator
 M. B. Fields NRC NRR Project Manager
 G. G. Warnick NRC Senior Resident Inspector for PVNGS

ENCLOSURE

Human Performance Cross-cutting Issue Closure Plan

Human Performance NRC Cross-cutting Issue Closure Action Plan

Action Item 1: Organizational Structure and Strategic Plan

Problem Statement: Station does not understand the integrated strategy for improving performance, and standards and expectations. Human performance indicators/metrics did not provide a clear measure of performance and the organization did not have the required level of understanding needed to create and implement effective performance improvement initiatives.

Action Plan Goal: Develop a single integrated human performance strategy and communicate it effectively to align station leadership and frontline on actions to be taken to improve human performance. The strategy will provide mentoring and coaching to leaders through use of standards, indicators/metrics, and knowledge in human performance to create a continuous improvement culture.

Actions Previously Taken:

- a) INPO conducted Human Performance (HU) Fundamental Training with members of the Performance Improvement Department and ten human performance advocates.
- b) Hired a known industry Human Performance expert to lead site Human Performance initiatives.
- c) Revised human performance indicators/metrics based on behavior, program/process and organizational weaknesses, management discretion, or less than top quartile performance.
- d) Created Performance Improvement department to mentor and develop employees in human performance and to monitor/measure performance for continuous improvement.
- e) Station implemented a single set of standards and expectations for all station personnel.

Current Status: There is inconsistent understanding of standards and expectations. Revision is required to ensure that expected behaviors are clearly understood. An integrated strategic plan has not been consistently communicated and understood.

Actions to be taken:

- a) Site standards and expectations will be revised to outline behaviors expected for each standard and human performance tool (One example is the expected level of detail for pre-job brief for a simple versus a complex task.).
- b) Develop change management plan, including communication, training, and roll-out to site personnel.
- c) Prepare and distribute booklets outlining updated standards/expectations.
- d) Effectively implement and communicate the integrated strategic plan to station personnel, as outlined by this plan.

Metric Intent: To provide the management team with performance indicators for Station Clock Reset Events, Department Clock Reset Events, Human Error Rate, Industrial Safety Accident Rate, and Procedure Use and Adherence Errors.

Human Performance NRC Cross-cutting Issue Closure Action Plan

Metrics: Site metric for Human Performance Improvement.

1. Site Clock Reset.
2. Department Clock Reset.
3. Human Performance Error Rate.
4. Industrial Safety Accident Rate (ISAR).
5. Procedure Use and Adherence Errors.

Effectiveness Review: Perform effectiveness review and self-assessment of HU fundamentals, ownership of the HU program and Palo Verde's implementation of the INPO document for Performance Objectives & Criteria (PO&C) for human performance.

Due Date: Complete actions by 04/01/2007.

Human Performance NRC Cross-cutting Issue Closure Action Plan

Metric Description

Site Clock Reset

Criteria: A reset is a Condition Report that identifies an event attributed to human performance including lost-time injuries.

When an error (Re) committed by personnel during the execution of an activity (work package, procedure, etc.) or when an activity is executed as planned (Md - work package, procedure, etc.) and results in one of the following, it is considered a site event.

1. Nuclear Safety / Operational Event

- Emergency plan activation.
- A reactor trip or turbine trip.
- Unplanned mode change.
- Unexpected/Unplanned reactivity change greater than or equal to 3% power.
- Unplanned entry into a technical specification action statement less than or equal to 72 hours.
- Fuel handling errors that result in a damaged fuel bundle, or misplaced bundle ungrappled.
- Switching/tagging/wrong component error that results in work being released to the field and clearance verified by the performing department, or work performed that results in inadequate equipment or personnel protection.
- Unplanned increase to the on-line or shutdown risk threshold color/number.
- Misoperation, misposition, or improper configuration that creates significant transient or challenge to nuclear safety.
- Property damage to the facility in excess of \$50,000.00.

2. Radiological Safety

- Radiological event that would generate a Licensee Event Report (LER).
- Unplanned exposure that exceeds 100 mrem over the estimate for an individual's exposure.
- Loss of radiological control: Loss of radioactive material which creates a measurable exposure rate at 30 centimeters outside the protected area, any technical specification high radiation area occurrence, or any technical specification very high radiation area occurrence.
- Misoperation, misposition, or improper configuration that creates significant transient or challenge to radiological safety.

3. Industrial Safety

- Any event that results in a fatality or lost-time accident.
- Misoperation, misposition, or improper configuration that creates significant transient or challenge to personnel safety.

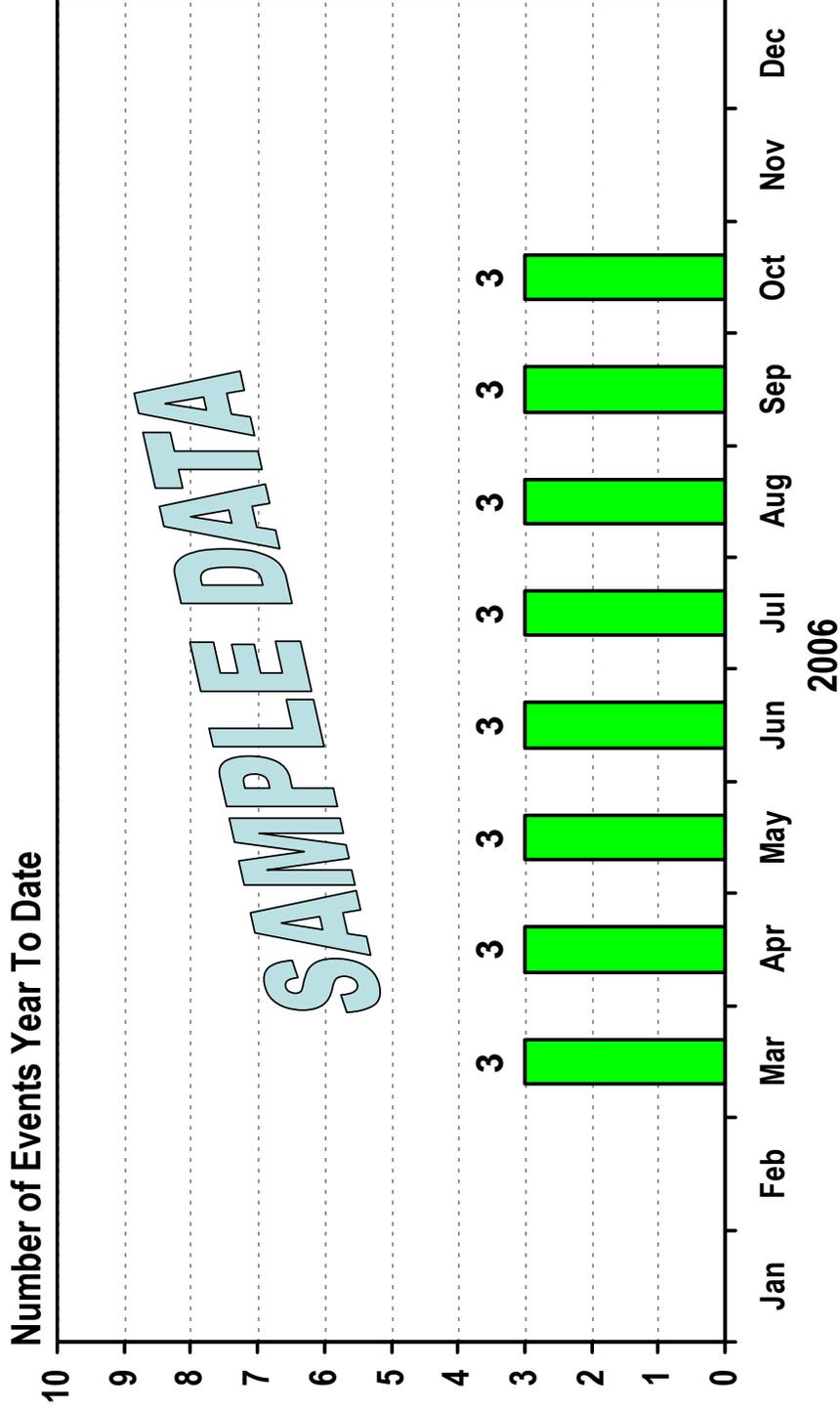
4. Regulatory Event

- Arizona Pollutant Discharge Elimination System (AZPDES) or OSHA violation or Hazmat emergency.
- Security report per 10 CFR 73.71 (excluding loggables).
- Licensee Event Report (LER) per 10 CFR 50.72 or 10 CFR 50.73.

Data goal: The goal is 5 or less for the year.

Data comes from: Corrective Action Program.

Site Clock Reset



Human Performance NRC Cross-cutting Issue Closure Action Plan

Metric Description

Department Clock Reset

Criteria: A reset is a Condition Report that identifies a “lower threshold event” attributed to human performance.

1. Nuclear Safety / Operational Event

- Inadvertent increase in on-line or shutdown risk level.
- Unplanned technical specifications LCO Action Statement entries.
- Event classified as a reactivity management precursor.
- Unexpected / Unplanned reactivity change greater than or equal to .5 percent power.
- Property damage greater than \$10,000.00.
- Component mispositioning without impact to operations.
- Foreign Material Exclusion program violation or intrusion that results in rework or scheduling impact.
- Rework (Definition: Human Performance Error (HPE) that caused failed retest).
- Procedure Use and Adherence Error (A continuous or reference use procedure and the error has actual or potential consequences).
- Unqualified Worker Events.

2. Radiological Safety

- Violation of Radiological Exposure Permit (REP) or Radiological Controls.
- Uncontrolled Radioactive material found outside the RCA.
- Unplanned release of radioactive material to the environment.

3. Industrial Safety

- OSHA Recordable Injury.
- A preventable motor vehicle accident involving company vehicle or personal vehicle on site property.
- Chemical Control Program Violation.
- Industrial Safety Program Violations (OSHA) with actual or potential consequences. (i.e., lifting, rigging, confined space, fall protection, etc.)
- Dropped items.
- Tagging violations where personnel / equipment safety is not in jeopardy.

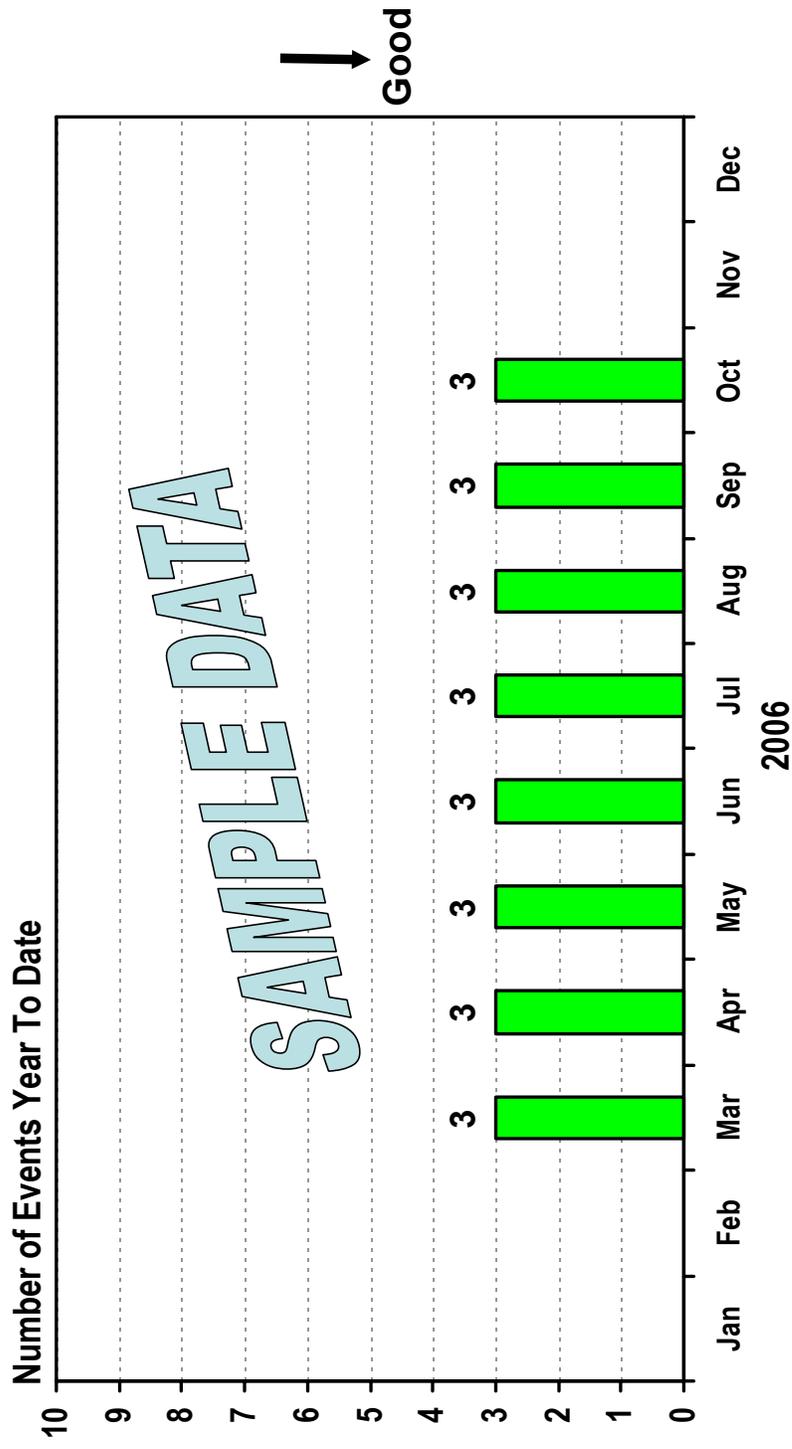
4. Regulatory Action

- Security loggable event as per Reg Guide 5.62.
- Missed technical specification / TRM / ODCM Surveillance.
- NRC green finding or Non-Cited Violation (NCV).
- ADEQ or Maricopa County Permit Violation.

Data goal: Trend only.

Data comes from: Corrective Action Program.

Department Clock Reset



Human Performance NRC Cross-cutting Issue Closure Action Plan

Metric Description

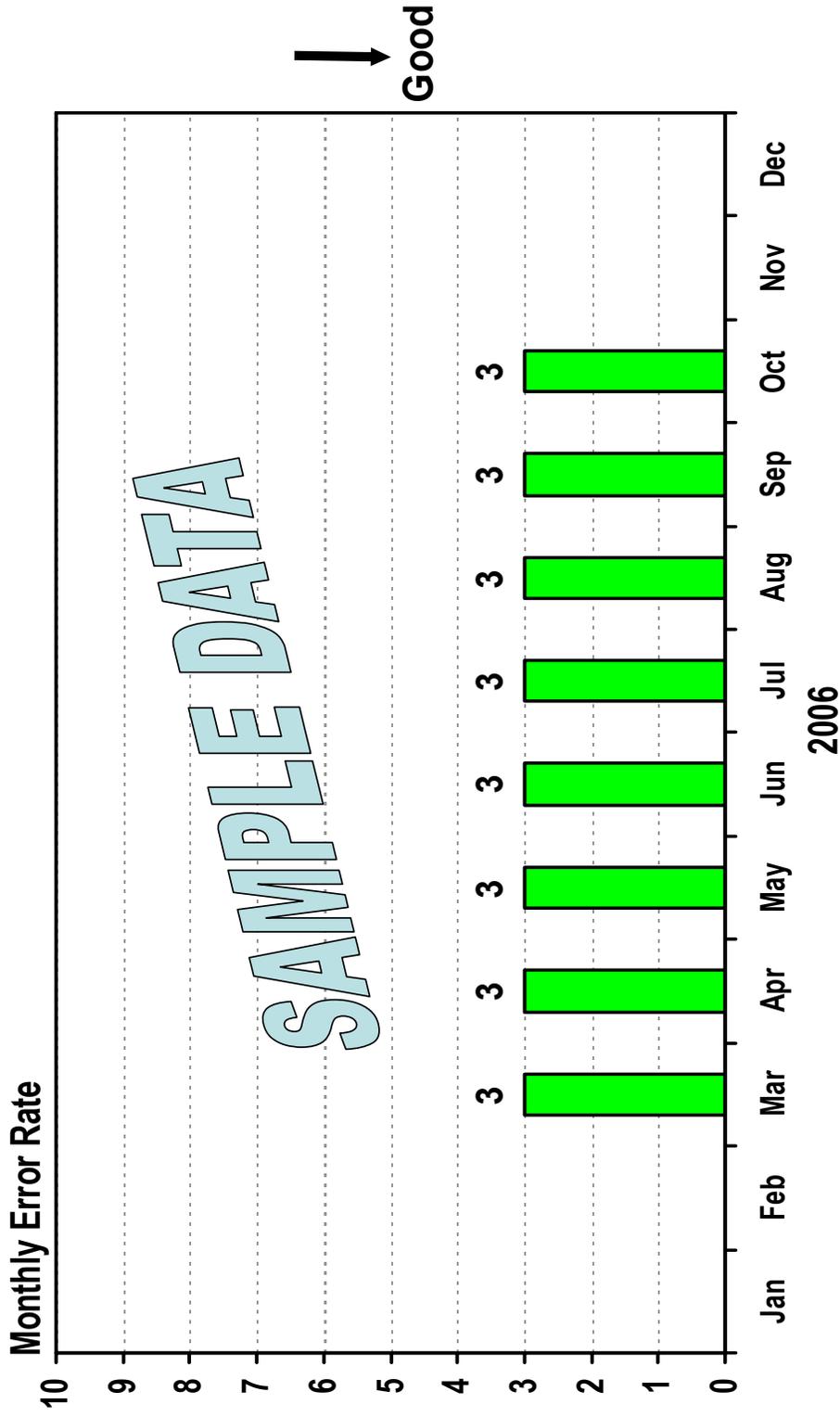
Human Performance Error Rate

Criteria: A human error is an occurrence in which a planned sequence of mental or physical activities fails to achieve its intended outcome, and when this failure can not be attributed to chance. The human performance error rate is calculated by taking the total HU errors for the last 18 months, multiplying by 10,000 man-hours (to levelize the data) and dividing by the total man-hours for the last 18 months. This is a nuclear industry standard for human performance measurement.

Data goal: Trend only.

Data comes from: Corrective Action Program.

Human Performance Error Rate



Human Performance NRC Cross-cutting Issue Closure Action Plan

Metric Description

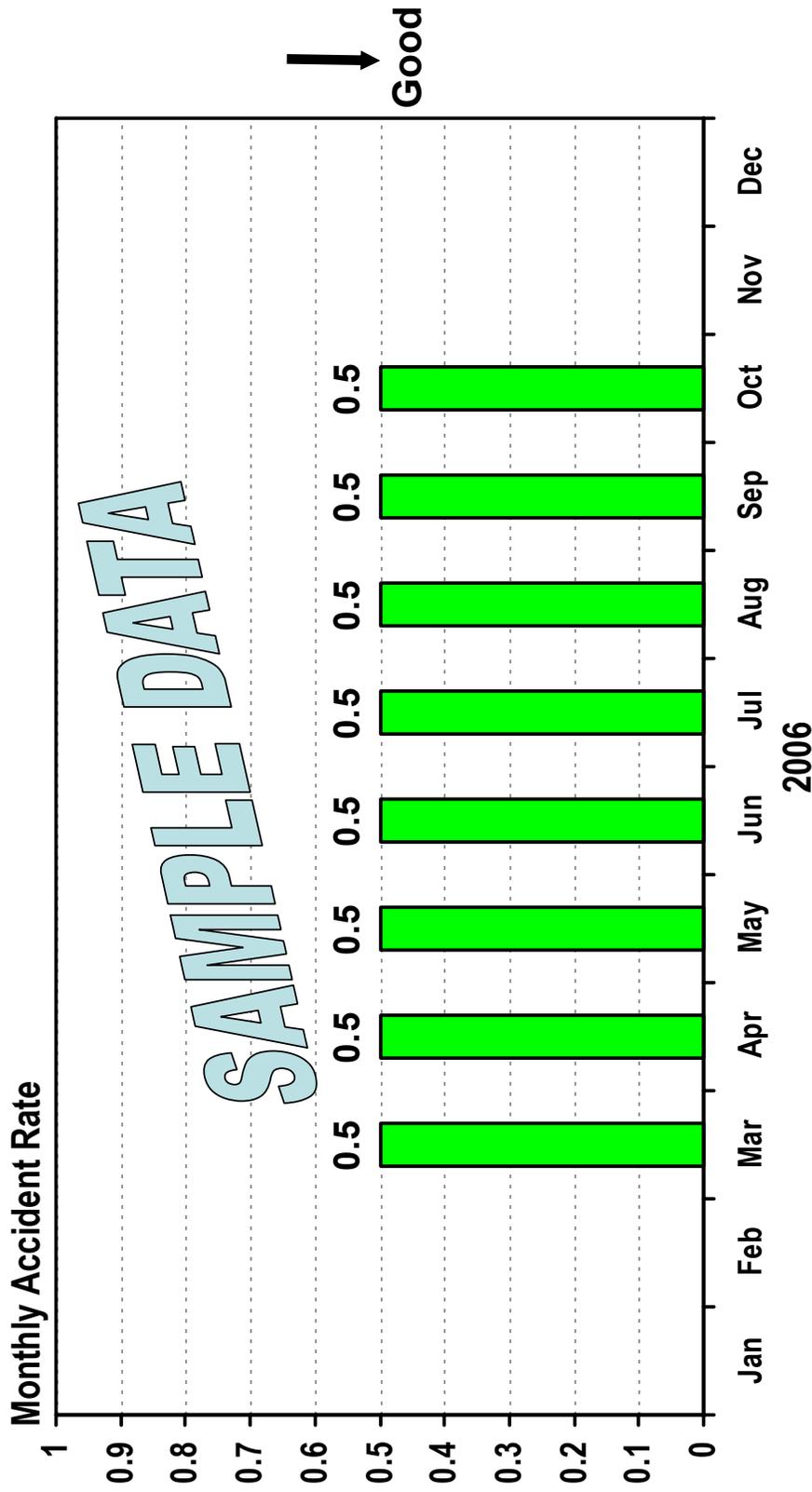
Industrial Safety Accident Rate (ISAR)

Criteria: This indicator is defined as the number of injuries for all personnel permanently assigned to the station, that result in days away from work (excluding the day of the accident) days of restricted work (excluding the day of the accident), or fatalities, per 200,000 hours of employee exposure. The indicator is based on a 12-month rolling average.

Data goal: The goal is to be in the Industry Top Quartile.

Data comes from: Industrial Safety department (Corrective Action Program).

Industrial Safety Accident Rate (ISAR)



Human Performance NRC Cross-cutting Issue Closure Action Plan

Metric Description

Procedure Use and Adherence Errors

Note: *As of 01/01/2007 the criteria for procedure use and adherence will be revised based on industry benchmarking currently in progress.*

Criteria: Procedure Use and Adherence Error involves a continuous or reference use procedure error that has actual or potential consequences. The criteria used are as follows:

1. It must involve a continuous or reference use procedure.
2. It must be other than a program issue.

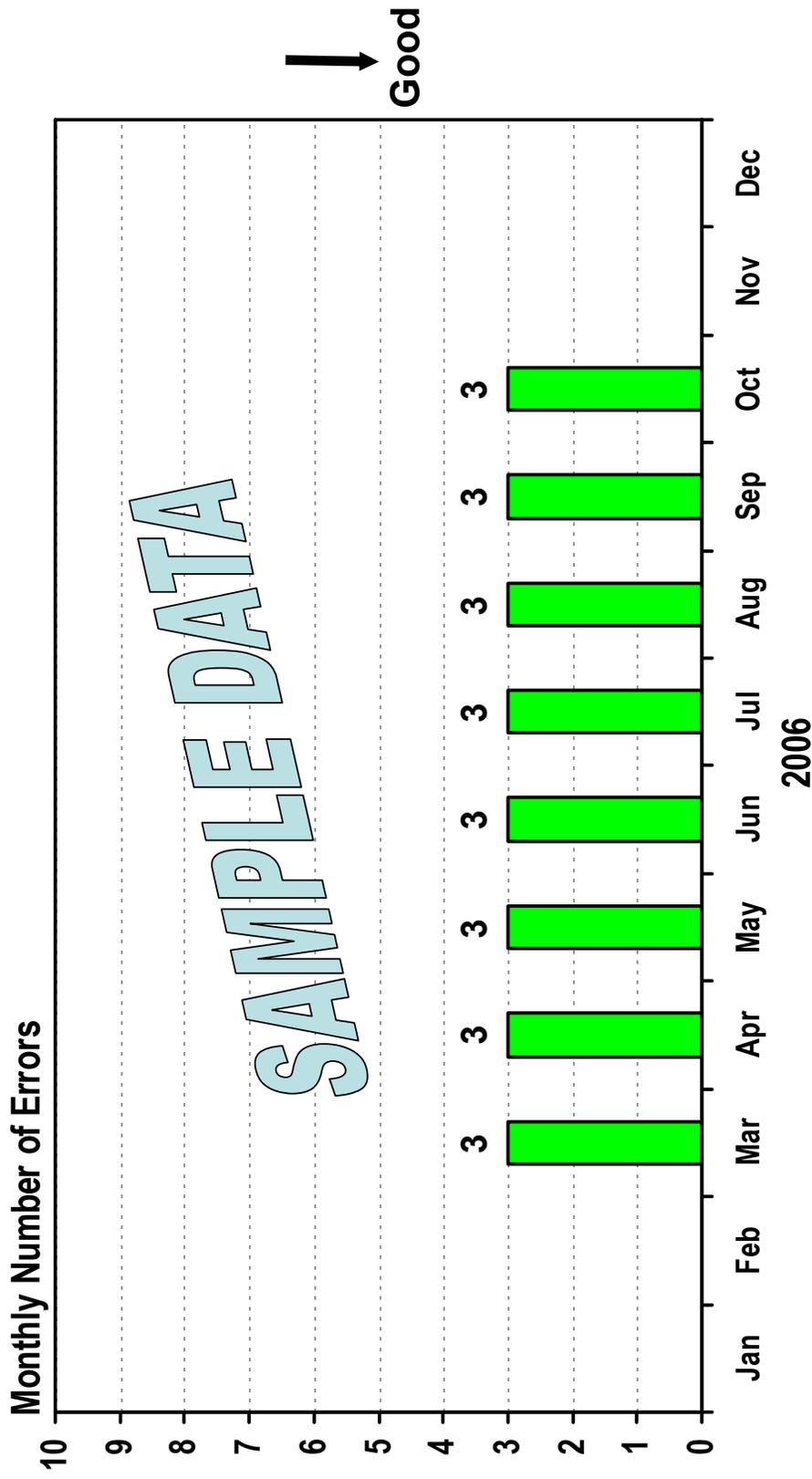
Examples of what it is and what it is not:

- It is working without fall protection.
- It is leaving safeguards information unattended.
- It is leaving doors open that result in logging a 10 CFR 73.71 report.
- It is tagging violations.
- It is consequential or potentially consequential safety infractions, such as using a grinder without a guard.
- It is leaving terminations loose and not using a lifted leads log.
- It is doors left open if the error is consequential.
- It is not minor safety violations, such as someone forgetting to put on their safety glasses.
- It is not something caused a long time ago, such as confined space signage worn by weather.
- It is not exceeding overtime limitations with prior approval.
- It is not Nuclear Information Records Management (NIRM) process items.
- It is not an incorrect Chemical Use Permit (CUP) label.

Data goal: The monthly goal of five (5) or less procedure use and adherence Condition Reports.

Data comes from: Corrective Action Program.

Procedure Use and Adherence Errors



Human Performance NRC Cross-cutting Issue Closure Action Plan

Action Item 2: Implement Actions to Change Behaviors

Problem Statement: Some site personnel lack knowledge about human performance fundamentals and use of a graded approach to error-prevention tools. This includes how to reduce errors (Re) through behaviors and manage defenses (Md) through organization (e.g., culture, leadership, vision, etc.) and programs and processes. In addition, previous actions taken have not achieved the level of mentoring, coaching and reinforcing of behaviors required to improve performance.

Action Plan Goal: Leadership is in the field mentoring and coaching on HU fundamentals and error-prevention tools and are managing defenses through organization (e.g., culture, leadership, vision, etc.) and programs and processes to prevent events. Frontline personnel understand HU fundamentals and error-prevention tools and are using the expected behaviors to reduce errors.

Actions Previously Taken:

- a) Developed HU simulator training for leaders and frontline personnel.
 - Developed training material based on INPO HU Fundamental course material provided to Palo Verde in July 2006.
 - Benchmarked and incorporated industry recognized “best practice” for HU simulators into training material.
- b) Implemented a +/- log book that requires the leader to “get in the field” to influence personnel behaviors relative to site Standards and Expectations.
- c) Partnered with Industrial Safety to enhance weekly safety communication meetings by including human performance awareness topics.
 - Developed themes for weekly messages that reinforce error prevention and the desired behaviors to improve performance.
 - Issuing weekly communication to include error-prevention standards or expectations, appropriate operating experience, reinforcement of station standards/expectation by providing questions to stimulate discussion, and weekly status of HU and industrial safety metrics.

Current Status: There is inconsistent use of a graded approach to HU tools and reinforcement of HU behaviors. Site leaders and frontline personnel are being trained on HU fundamentals and error-prevention tools.

Actions to be taken:

- a) Conduct HU tools training for site leaders and frontline personnel.
- b) Implement Management Observation Program to observe, correct, monitor and trend employee behaviors.
 - Evaluate lessons learned from pilot observation program conducted in 2006.
 - Develop training on situational awareness, observations, how to provide feedback and coaching, and how to analyze observation data. This will be provided to the management team and other leaders.
 - Conduct training with management team and leaders for observation skills.
 - Conduct training for significant investigators and HU advocates on analyzing data from observation programs.
 - Set expectations for conducting observations and communicate to leaders.
 - Implement observation program and monitor effectiveness. Evaluate additional or modified changes to the site integrated HU improvement plan based on trends from the observation program.

Human Performance NRC Cross-cutting Issue Closure Action Plan

- c) Implement standards for a graded approach to use of HU error-prevention tools, including prejob and reverse prejob briefings (when frontline individual provides briefing to leader vs. leader to frontline).
 - Identify station procedures that contain direction for use of HU tools and revise as appropriate.
 - Involve frontline in recommend standard for graded-approach. Incorporate changes into the final Standards and Expectations handbook and procedures.

- d) Implement an Outage High Impact Team (HIT) for HU/Industrial Safety for 1R13.
 - Identify a multi-discipline team to provide coaching and mentoring to outage personnel in the area of human performance and industrial safety behaviors.
 - Develop a charter for the HIT, which will include roles/responsibilities, outage goals, scope of team, etc.
 - Train HIT on coaching/feedback and situational awareness for coaching/intervention during the outage.
 - Implement method to trend observations to provide “real time” feedback to the outage control center.
 - Incorporate information into outage handbook to highlight safety and human performance expectations, standards, and behaviors.
 - Implement HIT during outage for immediate coaching/mentoring.
 - Evaluate effectiveness and lessons learned for future outages.
 - Analyze the outage data for the five (5) metrics to see if HIT is effective.

Metric Intent: To provide the management team with performance indicators for Station Clock Reset Events, Department Clock Reset Events, Human Error Rate, Industrial Safety Accident Rate, and Procedure Use and Adherence Errors.

Metrics: Site Metric for Human Performance Improvement

1. Site Clock Reset.
2. Department Clock Reset.
3. Human Performance Error Rate.
4. Industrial Safety Accident Rate (ISAR).
5. Procedure Use and Adherence Errors.

Effectiveness Review: Perform effectiveness review and self-assessment of HU fundamentals, ownership of the HU program and Palo Verde’s implementation of the INPO document for Performance Objectives & Criteria for human performance.

Due Date: Complete actions by 07/15/2007.

**Human Performance NRC Cross-cutting Issue
Closure Action Plan**

Metric Description

Site Metric for Human Performance Improvement

1. Site Clock Reset.
2. Department Clock Reset.
3. Human Performance Error Rate.
4. Industrial Safety Accident Rate (ISAR).
5. Procedure Use and Adherence Errors.

REFER TO ACTION 1

Human Performance NRC Cross-cutting Issue Closure Action Plan

Action Item 3: Identifying and Analyzing Human Performance Data

Problem Statement: Station has not effectively utilized data available from significant and low-level events to identify declining trends. Criteria for station and department events were not identified for acceptable threshold of performance. Several investigations did not identify and eliminate latent organizational weaknesses and/or program/process deficiencies, resulting in repeat events. Trending, analysis, and communication to identify trends has not been fully effective or communicated to all levels of the management team.

Action Plan Goal: To ensure that latent organizational weaknesses and failed defenses, which cause events, are considered when conducting root-cause investigations and apparent-cause evaluations. Provide a means to capture these trends for continuous learning.

Actions Previously Taken:

- a) Provided HU/organizational behavior training for Performance Improvement Department personnel, Corrective Action Review Board (CARB) members and Human Performance advocates.
- b) Trained analyst from the Human Performance Department.
 - Developed lesson plan with case studies/exercises using Palo Verde events for continued learning.
 - Included training material for apparent cause evaluations and common cause analysis.
- c) Implemented lower-threshold Department Clock Reset.
- d) Reviewed and analyzed data for lower-threshold criteria to predict declining/improving trends to reduce errors (Re) and manage defenses (Md) through organization (e.g., culture, leadership, vision, etc.) and programs and processes.

Current Status: Palo Verde has implemented activities for data collection, analysis and communication but has yet to realize necessary changes in field behaviors and station performance. Continued identification (criteria) and improving (corrective actions) from department lower-level events has not provided declining performance trends.

Actions to be taken:

- a) Conduct Stream Analysis training and perform a review of significant events in the Corrective Action Program and site clock resets to identify latent organizational weaknesses.
 - Develop lesson plan with case studies/exercises for 2006 significant events in the Corrective Action Program and site clock resets to-date.
 - Conduct training class and incorporate feedback/improvement suggestions into lesson plan.
 - Present results of stream analysis to senior management team at Corrective Action Review Board (CARB).
 - Incorporate corrective actions to address identified root cause into the strategy plan.
- b) Continue implementation of Department Clock Resets with department-specific criteria for the identification of low-level events in 2007.
 - Department Leaders to identify department-specific criteria for reset threshold.
 - Write and issue a policy to govern the implementation of site and department clock resets.
 - Provide training, if appropriate, to leadership on new department clock reset criteria.
 - Develop format for reporting department clock resets at management and department meetings.
 - Implement corrective actions to address identified trends from low-level department clock investigations into the strategy plan.

Human Performance NRC Cross-cutting Issue Closure Action Plan

- Delete station indicator for noteworthy events; replace with department clock reset criteria.
- c) Develop and conduct HU Review Boards to:
- Learn why and how events/errors occurred.
 - Collect real-time information on HU events.
 - Allow a consistent gathering/collection of this information.
 - Provide immediate feedback to the management team about failed defenses, error precursors, and latent organizational weaknesses as well as corrective actions.
 - Incorporate corrective actions to address identified cause(s) into the strategy plan.
- d) Improve trending of low-level indicators to identify common cause(s), failed defenses, or declining trends in performance.
- HU team will mentor investigators and evaluators as necessary.
 - Analyze data quarterly and identify trends.
 - Communicate findings of the analysis to the CARB members and senior leadership team.
 - Review data quarterly with the training advisory committee's for department and site trends.
 - Implement corrective actions to address identified cause(s) into the strategy plan.

Metric Intent: To provide the management team with performance indicators for Station Clock Reset Events, Department Clock Reset Events, Human Error Rate, Industrial Safety Accident Rate, and Procedure Use and Adherence Errors.

Metrics: Site Metric for Human Performance Improvement

1. Site Clock Reset.
2. Department Clock Reset.
3. Human Performance Error Rate.
4. Industrial Safety Accident Rate (ISAR).
5. Procedure Use and Adherence Errors.

Effectiveness Review: Perform effectiveness review and self-assessment on HU investigations and trending.

Due Date: Complete actions by 05/01/2007.

**Human Performance NRC Cross-cutting Issue
Closure Action Plan**

Metric Description

Site Metric for Human Performance Improvement

1. Site Clock Reset.
2. Department Clock Reset.
3. Human Performance Error Rate.
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5. Procedure Use and Adherence Errors.

REFER TO ACTION 1

Human Performance NRC Cross-cutting Issue Closure Action Plan

Action Item 4: Procedure Use and Adherence

Problem Statement: Palo Verde personnel do not consistently use and follow written instructions. Corrective actions implemented by station management have not achieved the desired levels of performance. Station lacks organizational structure and procedure revision process to improve quality of station procedures.

Action Plan Goal: Provide improvement in performance by anchoring procedure use and adherence standards and behavior by providing training, organizational structure, and program/process tools.

Actions Previously Taken:

- a) Conducted site wide classes on Procedure Use and Adherence.
- b) Site procedures were revised to add “level of use” for each procedure.
- c) Senior Management is following up on procedure non-compliance issues by holding review meetings for procedure use events with the affected individual and their leadership team.
- d) The senior leadership team discusses and reviews procedure events during senior leadership team meetings.
- e) The station has gone to a single site procedures and standards organization to improve the quality of station procedures by standardizing the procedure writing, review, and change process.
- f) The procedure feedback process has been changed to provide a single site procedure feedback system. This process provides feedback to the initiator.

Current Status: The station is continuing to experience procedure use and adherence errors. Further actions are continuing to develop training to station personnel and improve the quality of procedures through use of a single site procedures and standards organization.

Actions to be taken:

- a) Changing and reinforcing behaviors will be implemented under Action Items 2 and 3 of this plan.
- b) Provide procedure use and adherence training to selected departments.
 - CBT and classroom instruction will be developed.
- c) Develop Single Plant Writer’s Guide and train procedure writers, as appropriate.
- d) Establish qualifications for procedure writers.
- e) Update implementing procedures to incorporate human performance tools, as appropriate. (Human Factors).

Metric Intent: To provide the management team with performance indicators for Station Clock Reset Events, Department Clock Reset Events, Human Error Rate, Industrial Safety Accident Rate, and Procedure Use and Adherence Errors.

Human Performance NRC Cross-cutting Issue Closure Action Plan

Metrics: Site Metric for Human Performance Improvement

1. Site Clock Reset.
2. Department Clock Reset.
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5. Procedure Use and Adherence Errors.

Effectiveness Review: Perform effectiveness review and self-assessment of HU fundamentals, ownership of the HU program and Palo Verde's implementation of the INPO document for Performance Objectives & Criteria for human performance.

Due Date: Complete actions by 02/29/2008.

**Human Performance NRC Cross-cutting Issue
Closure Action Plan**

Metric Description

Site Metric for Human Performance Improvement

1. Site Clock Reset.
2. Department Clock Reset.
3. Human Performance Error Rate.
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5. Procedure Use and Adherence Errors.

REFER TO ACTION 1

Human Performance NRC Cross-cutting Issue Closure Action Plan

HU Effectiveness Review

Evaluate effectiveness of HU actions. The criteria are:

- (a) Actions above are completed or progressing satisfactorily.
- (b) Metrics and data streams that supply them have been independently verified to accurately portray actual performance.
- (c) Metrics are either satisfactory or improving. Monitor and adjust actions taken for performance that is declining or not improving.

Actions to be taken:

- a) Conduct Effectiveness and Inspection Readiness to determine if measures/goals outlined in actions have been achieved. This effectiveness review will be conducted by a Leadership Review Team to determine if ownership of the HU program has improved and is consistent with top quartile performance.
 - Develop effectiveness and inspection readiness plan, based on review of completed or progressing satisfactorily action outline in this plan.
 - Assemble a team to conduct readiness review, which should include two industry peers.
 - Review completed review and determine if additional actions are required.
- b) Performance of self-assessment for HU investigations and trending by evaluating effectiveness of actions taken to improve human performance investigation and identification of declining/improving trends has been achieved.
 - Conduct self-assessment, identify gaps or areas for improvement, and assign additional corrective actions, if applicable.
 - Present results of self-assessment to senior management team at CARB.
- c) Performance of self-assessment for HU to determine if ownership of the HU program has improved and is consistent with top quartile performance. This will be based on the INPO document for PO&C 95-003 criteria for human performance (OR-3) elements.
 - Conduct self-assessment, identify gaps or areas for improvement, and assign additional corrective actions, if applicable.
 - Present results of self-assessment to senior management team at CARB.

Metrics/Measures: Closure of NRC HU Cross-cutting issue.

Due Date: To be determined based on metric results.