

# Exelon Nuclear Outage Management

Docket Nos.

50-454	50-352
50-455	50-353
50-456	50-219
50-457	50-277
50-461	50-278
50-237	50-254
50-249	50-265
50-373	50-289
50-374	

February 7, 2001  
NRC Headquarters  
Rockville, MD

**Exelon**

Nuclear

A001

# Agenda

- Introduction
  - Outage Planning and Preparation
    - Role of Corporate Organizations
  - Managing Online Work
  - Conduct of Outage
    - Managing risk
  - Results
  - Closing Remarks
- J. L. Skolds
  - C. M. Crane
  - C. M. Crane
  - C. G. Pardee
  - C. M. Crane
  - J. L. Skolds

# Introduction

J. L. Skolds

# Outage Philosophy

- Exelon Nuclear strives to lead industry in outage performance
- Short outages are a reflection of good planning in a well functioning organization
- Safety and short outages are not mutually exclusive. They are complementary when:
  - all required work is done
  - work is performed per the plan
  - shutdown safety risk is maintained at acceptable levels
- Detailed planning and management focus on execution
- Effectively executed short outages do not have a negative impact on reliability

# Overall Management Principles

- Top management priority
- Planning and preparation are essential
- Fundamental work processes and standards must be in place
- Maintain in-depth knowledge of plant material condition
- Identify contingencies in advance
- Exercise appropriate Corporate support and oversight
- Rigorous identification of outage work
- Work execution must be controlled and coordinated
- All work and performance indicators are closely monitored
- Maintain focus on operating unit at dual unit sites - all required work is done
- Meet successful outage criteria
- Celebrate success

# Criteria for a Successful Outage

- Personnel Safety - work executed safely, without injury
- Nuclear Safety - outage schedule appropriately considers risk and no unplanned entries into “orange” or “red” shutdown risk conditions during the outage
  - no planned entries into “red” shutdown risk conditions
- No Events - no human performance or programmatic breakdowns
- Improved material condition - all required work is completed in a high quality manner
- Aggressive ALARA goals are established and met
- Work the Plan - work is completed efficiently and in accordance with the Plan
- Good post-outage operation

# Outage Planning and Preparation and the Role of the Corporate Organization

C. M. Crane

# Outage Planning and Preparation

- Fleet-wide template utilized for outage preparation
- Milestone approach utilized
- Critical path defined
- Systematic identification of required work
  - material condition improvement plans
  - corrective and preventative maintenance
  - engineering programs and required modifications
- Contingency planning and resources loaded
- Partnerships established with vendors
- Utilize High Impact Teams (HIT) for key evolutions
- Dedicated site outage planning organizations
- Large fleet experience base
- Lessons learned promulgated through peer group

# Outage Planning Template Key Milestones

- Identify major work scope E-18 months
- Review revision “A” outage schedule - major work E-12 months
- Engineering system and program review complete E-12 months
- Issue approved design packages to planning E-12 months
- Identify/submit regulatory requests E-12 months
- Perform materiel condition review E-9 months
- Implement outage scope control - “freeze scope” E-9 months
- Work package planning complete E-6 months
- Corporate outage readiness review E-6 months
- Review revision “B” outage schedule - logic tied E-5 months
- Radiation Work Permits complete E-3 months
- Publish revision “0” outage schedule - resource loaded E-3 months
- Final senior management readiness review E-2 months
- Package walkdowns complete E-1 month

# Role of Corporate Organizations

- Provide oversight for accomplishment of pre-outage milestones
- Act as project managers for reactor and refueling, turbine, and steam generator activities
- Manage original equipment manufacturer (OEM) vendor and modification/maintenance contractor alliances
- Manage significant emergent issues
- Participate in post outage reviews
- Perform benchmarking and coordinate use of best practices across fleet

# Online Maintenance

- Comprehensive maintenance process utilized
- Outage principles utilized for critical evolutions
- Process supports proper balance between online and outage work
- The risk impact of on-line maintenance is managed

# Conduct of Outages

C. Pardee

# Conduct of Outages

- Pre-outage activities scheduled and worked
- Utilize centralized Outage Control Center
  - Staffed with senior managers
  - Activated prior to outage and personnel trained
  - Facilitate schedule completion
  - Address emergent issues
  - Monitor shutdown risk
- Utilize project managers for critical evolutions
- Clear communication expectations established
  - 10 minute / 30 minute rules
- Use of detailed performance indicators
- “Work the plan”

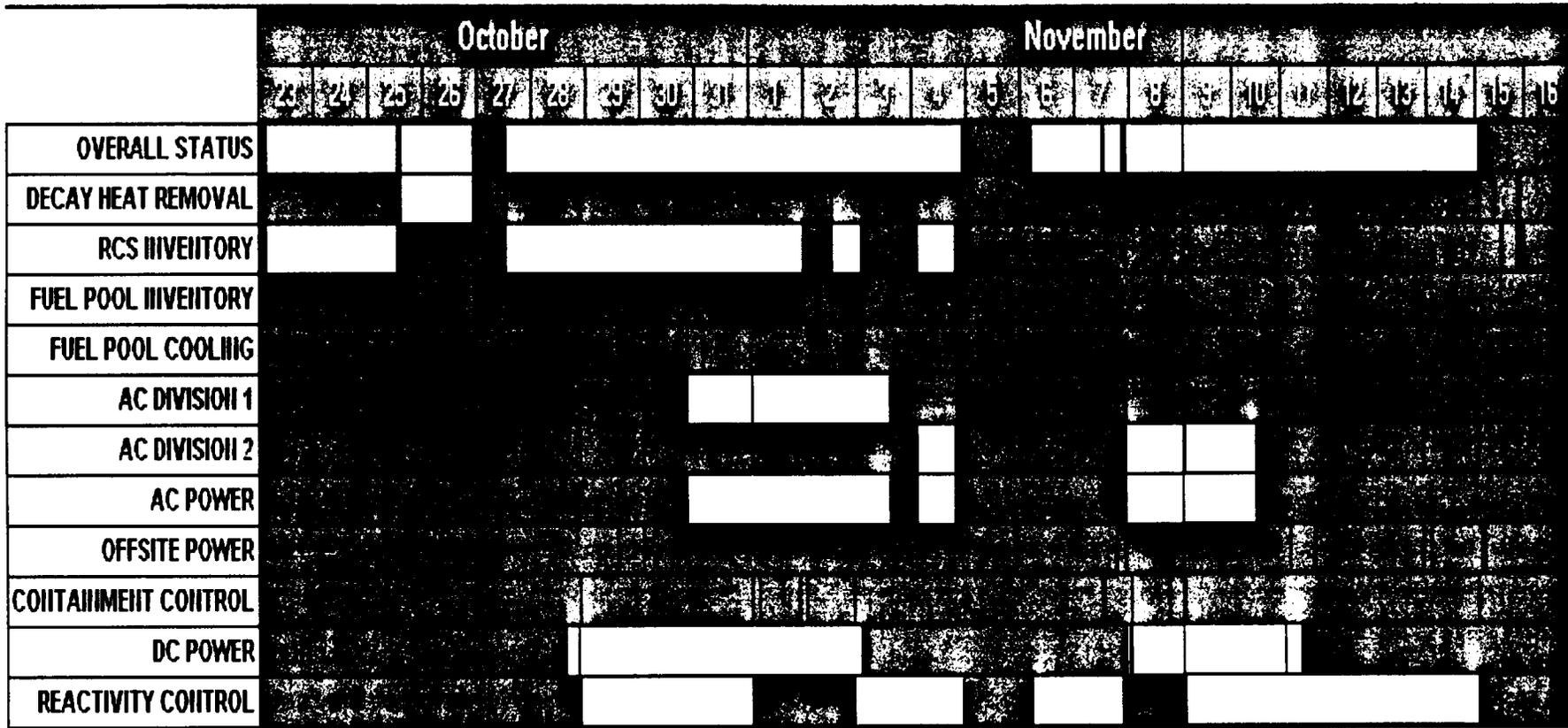
# Monitoring Conduct of Outages

- Site
  - Senior management directly involved
  - Structured shift turnovers
  - Daily scope control reviews with specific criteria for add/removal
  - Daily staffing / cost review
  - Maintain standard performance indicators
  - Post outage report
- Corporate
  - Daily morning status report
  - Daily senior management involvement
  - Resolution of emergent issues
  - Weekly outage indicator review
  - Post outage critique meetings

# Managing Shutdown Risk

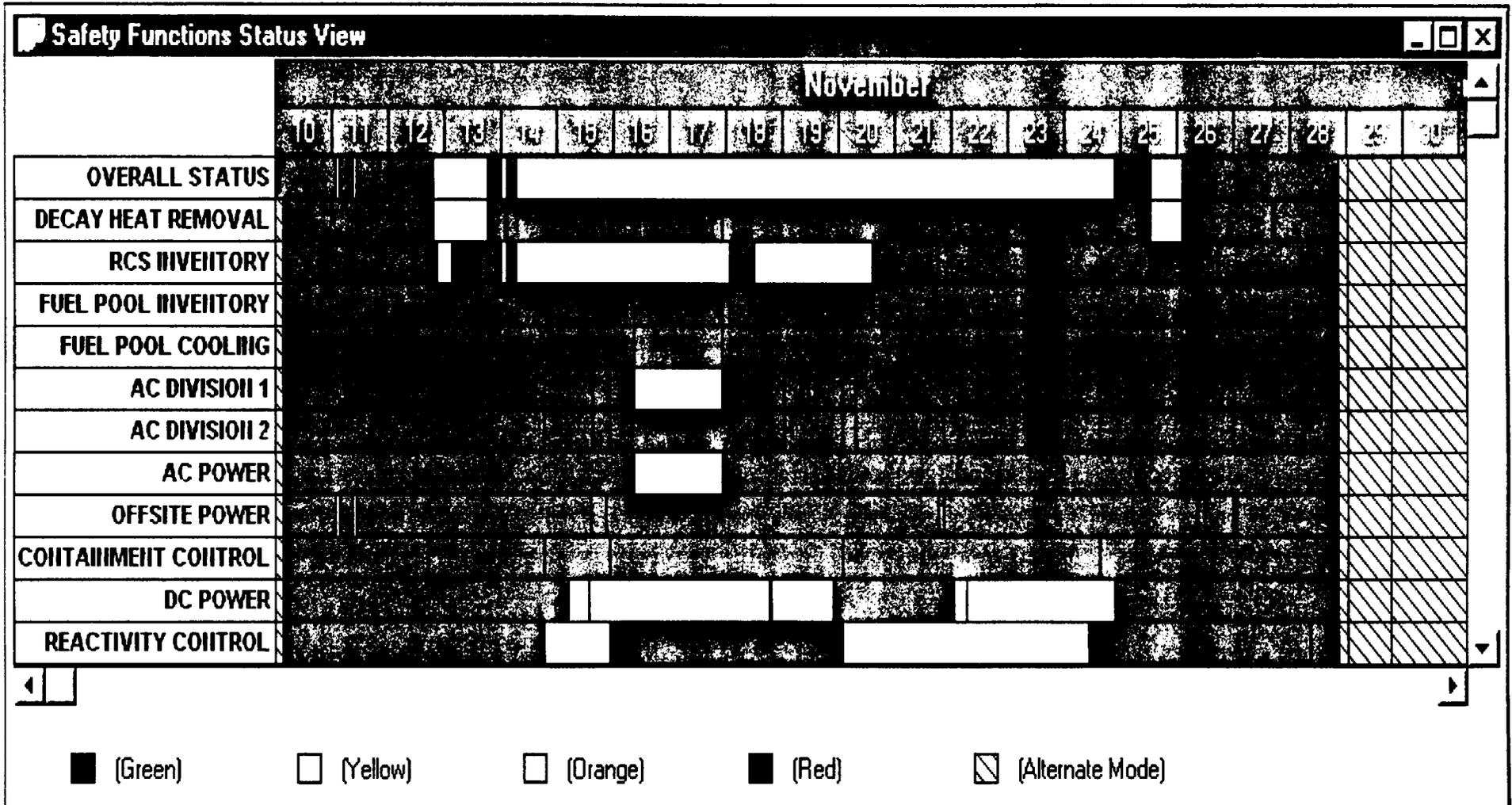
- Actions and responsibilities are proceduralized
- Applies to Hot Shutdown, Cold Shutdown, and Refueling for BWRs and PWRs as well as no mode for PWRs
- Monitors defense-in-depth for all safety functions
- Identifies high risk activities
- Identifies protected pathways (equipment)
- Requires contingency plans
- Requires authorizations and communications
- Continuously monitored by Outage Control Center

# L1R08 Final Shutdown Safety Profile (30 day outage)



(Green)     
  (Yellow)     
  (Orange)     
  (Red)     
  (Alternate Mode)

# L2R08 Final Shutdown Safety Profile (20 day outage)

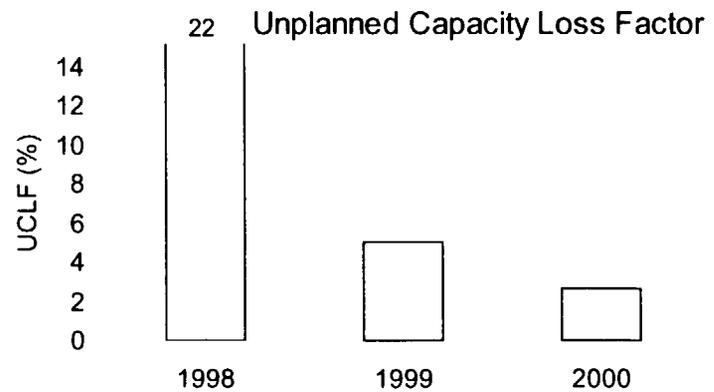
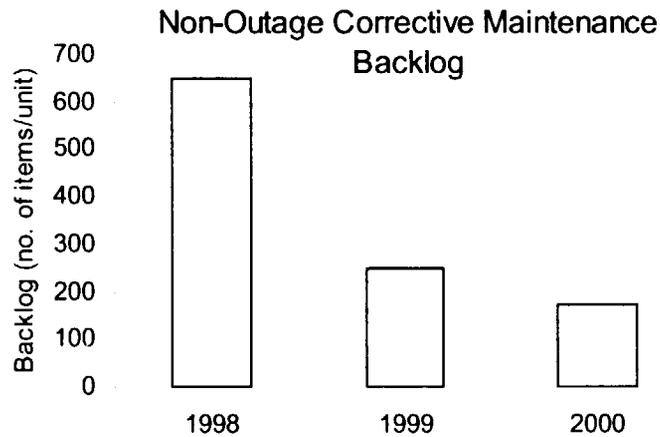
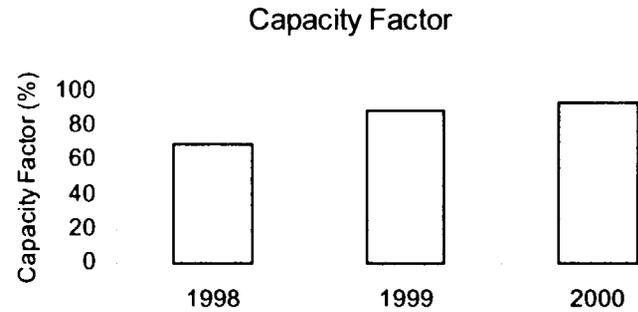
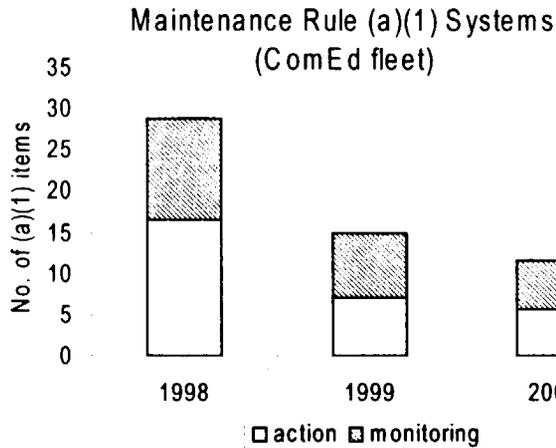


Green - A failure or error can be easily mitigated without significantly challenging the safety function  
 Yellow - A failure or error can be mitigated but would challenge the safety function  
 Orange - A failure or error would potentially reduce mitigation capability in the safety function  
 Red - A failure or error would produce loss of that safety function

# Results

C. M. Crane

# Plant Material Condition Improvements



# Outage Results

- **Material Condition improvements continue to be made**
  - reduced UCLF from 5.0% (1999) to 2.6% (2000), three plants top quartile
  - reduced Maintenance Rule (a)(1) systems from 29/unit (1998) to 12/unit (2000) (ComEd fleet)
  - increased capacity factor from 89.3% (1999) to 93.8% (2000) - eight of ten sites top quartile
- **Required work being completed**
  - greater than 99% of designated outage work completed in 2000
  - majority of work not performed was planned as contingency
- **Post outage operation - 237 days/unit in 1999; 88 days/unit in 2000**
  - 6/11 units refueled in 2000 still running
  - high number of unplanned scrams impacted Year 2000 performance
- **Improvements still needed in managing radiological performance**
  - emphasis on controlling emergent work and changing conditions

# Site Specific Results

	Duration (Days)	% Planned Scope Completed	Mods Performed	Work Orders Completed	PMs Completed	Tests Completed
Peach Bottom 2	20	99+	7	4185	3022	661
Dresden 3	17	98.9	47	1860	1200	387
Byron 1	20	99.1	30	2500	800	1100
QC 1	20	98.1	54	1600	660	243
Clinton	29	97.4	74	450	1130	515
Oyster Creek	34	99.9	25	365	257	292
Braidwood 2	15	99.0	30	1780	615	870
LaSalle 2	20	99.0	30	2060	630	770

Note: counting conventions for work orders not yet standard across sites

# Closing Remarks

J. L. Skolds

# Closing Remarks

- Differentiators for Exelon Nuclear
  - Top priority
  - Detailed planning
  - Management involvement
  - Outage performance focus
- Safety is not compromised by short outages - safety is enhanced
- Short outages are the result of excellent planning and execution