INDEAVOR

4 Tips When Transitioning Your Facility During Nuclear Outages

Guide

Intro

In 2024, U.S. nuclear plant refueling outages <u>averaged 34 days</u>, with some extending up to 59 days. Prolonged outages can strain resources and disrupt operational schedules.

Planned nuclear outages are a critical necessity for maintenance and refueling, providing an opportunity to ensure the long-term safety and efficiency of the plant. However, the key to maximizing their benefits lies in keeping them as streamlined and efficient as possible, minimizing downtime without compromising on compliance or safety.

Smoothly transitioning from online to outage mode is essential to maintaining compliance, minimizing downtime, and ensuring operational efficiency. This transition comes with unique challenges, including shifting employee operating conditions from the 54-hour rule or Minimum Days Off (MDO) requirements to the rules that govern outage mode.

Managing this process with outdated legacy systems or paper often leads to inefficiencies, compliance risks, and increased manual effort. This guide offers actionable tips to help nuclear facilities streamline the transition from online to outage mode.

COMMUNICATE & PLAN EARLY

#01

Outage mode is a critical period for any nuclear facility, requiring an unparalleled level of coordination across labor, equipment, and timelines. The stakes are high: any delays or miscommunication can result in inefficiencies, compliance risks, and even extended downtime, which impacts the facility's overall productivity and operational costs.

Start planning your nuclear outages months in advance. Begin by creating a comprehensive timeline that outlines all major tasks, including:

- **Maintenance activities**: Identify which systems and components require servicing or upgrades.
- **Refueling operations:** Plan for precise scheduling of refueling tasks, including resource allocation for high-demand periods.
- **Inspections and testing**: Coordinate regulatory-required inspections to ensure compliance and avoid delays during startup.

Communicate the schedule early and often with all stakeholders—to align everyone on the same goals and expectations. Key actions include:

- **Stakeholder alignment:** Conduct pre-outage meetings to review key milestones, expectations, and roles for all parties involved.
- **Regular updates:** Provide consistent updates to the schedule to account for any changes or new developments. This ensures transparency and helps stakeholders adjust their own plans accordingly.
- **Contractor coordination:** Engage contractors early to ensure their availability and alignment with the outage schedule. Provide them with clear onboarding processes and integration into your workforce management system to avoid delays.

#02   USE HISTORICAL STAFFING DATA

Nuclear outages are resource-intensive and require a delicate balance: too many workers can lead to inefficiencies and higher costs, while too few can result in delays and safety risks. Leveraging data from past outages ensures that staffing plans are realistic, efficient, and tailored to your facility's unique needs. Reviewing this data helps identify patterns and pain points that can inform current staffing plans (and aid in timeline creation). Key areas to focus on include:

- **Labor demands by task:** Analyze the average needed for specific activities like refueling, maintenance, and inspections. Break this down by shift to identify peak periods of demand.
- **Shift lengths and schedules:** Assess whether shift configurations (e.g., 8-hour vs. 12-hour shifts) were effective in managing fatigue and maintaining productivity.
- **Skill gaps:** Identify tasks or roles experiencing bottlenecks from insufficient skilled labor, and plan to fill these gaps during the upcoming outage.

Predicting potential bottlenecks will help your facility create contingency plans and avoid repeating past mistakes. Historical data can highlight the following delays or inefficiencies:

- **Maintenance delays:** Were there enough skilled workers to handle critical systems or equipment that required repairs?
- **Contractor scheduling conflicts:** Did external contractors arrive on time and align with the internal schedule?
- **Fatigue-related issues:** Were there instances of workers being overstretched or unable to meet regulatory compliance standards?
- **Equipment availability:** Were there delays in accessing critical maintenance and repair equipment? If so, was they due to scheduling conflicts, insufficient inventory, or unexpected breakdowns?

INTEGRATE SKILLS & COMPETENCIES

#03

Matching the right people to the right tasks is critical for a successful outage. A well-coordinated plan ensures that all tasks are completed efficiently, safely, and in compliance with regulatory standards. Integrating skills and certifications into your scheduling system provides a clear, automated way to verify worker qualifications, streamline assignments, and minimize disruptions during nuclear outages:

- **Dynamic staffing plans:** Adjust staffing levels throughout the outage to reflect fluctuating demands, ensuring high-demand periods are adequately staffed without overstaffing during slower periods.
- **Skills-based scheduling:** Match workers to tasks based on their certifications, experience, and availability. Use workforce management tools to automate this process and minimize errors.
- **Cross-training opportunities:** Identify areas where cross-training could help reduce dependency on specialized skills and improve flexibility during outages.

Outage tasks often require highly specialized skills, from radiation safety expertise to turbine maintenance. Properly aligning these skills with task assignments is essential to avoid delays and ensure safety:

- **Automate matching:** Use a scheduling system that matches workers to roles based on their certifications and availability. This minimizes the risk of errors and ensures compliance with regulatory standards.
- **Customize requirements:** For each task, define the specific skills or certifications required, such as radiation safety training, welding certifications, or mechanical engineering expertise.
- **Prevent skill shortages:** Identify gaps in the workforce early and proactively bring in contractors or cross-train internal staff to cover critical roles.

#04

AUTOMATE COMPLIANCE

The Nuclear Regulatory Commission (NRC) can impose civil penalties of up to **$362,814** per violation per day, depending on its severity and duration. These violations can include fatigue-related errors, failure to meet certification requirements, or exceeding allowable work-hour limits. For nuclear facilities, even a single oversight can quickly compound into substantial fines and operational delays.

Online mode prioritizes long-term workforce sustainability, whereas outage mode prioritizes completing critical, time-sensitive tasks. This means the constraints that schedulers have during online mode are slightly alleviated.

During outages, workforce regulations adjust to meet the increased labor demands and tighter schedules. Rules may allow for longer shifts (e.g., 12-hour shifts) and extended weekly working hours while still attempting to manage fatigue and safety. Employees may work 60+ hours per week, compared to the 54-hour limit in online mode. MDO rules are more flexible, with fewer days off or rest periods between shifts.

To ensure all shift schedules comply with NRC requirements in both online and outage mode, automate compliance with a scheduling tool that:

- Monitors and enforces rules in real-time
- Adjusts automatically to mode-specific regulations
- Cross-references fatigue thresholds
- Provides up-to-date skills and certification statuses across all employees and contractors

Paper and spreadsheets are static tools that can't perform these capabilities without manual intervention.

XCEL ENERGY REDUCED DOWNTIME DURING NUCLEAR OUTAGES

With Indeavor, Xcel Energy transformed its workforce management during critical nuclear outages. Indeavor's automated fatigue management system streamlined compliance with NRC fatigue rules eliminated scheduling errors, and significantly reduced the time spent on manual reporting. Customizable features, such as grouping workers by specialty, simplified workforce coordination, and improved operational efficiency during extended outages.

"The custom views and customizations in Indeavor have been invaluable. The fatigue rules are designed for a 60-day outage, but when it extends beyond that, the software makes managing people coming and going easier. The ability to section everyone into specific groups—like custom pipe fitter groups—simplifies management during large outages. This customization, which was very difficult to do previously, allows us to meet specific needs and improve customer satisfaction."

— Shayne Curtis, Work Hour Database Administrator, Xcel Energy | Monticello Plant

The results: reduced operational costs, enhanced workforce safety and compliance, and increased overall efficiency during outage mode.

Conclusion

#01 — *Communicate and plan* early to ensure alignment across stakeholders, prevent delays, and streamline outage execution

#02 — *Use historical staffing data* to accurately predict labor demands, prevent inefficiencies, and avoid costly bottlenecks

#03 — *Integrate skills and competencies* to match the right workers to the right tasks, ensuring safety and compliance

#04 — *Automate compliance* to reduce errors, save time, and avoid costly fines while maintaining operational efficiency

Efficiently managing nuclear outages is key to maintaining safety, compliance, and operational success. By planning ahead, leveraging historical data, integrating skills into scheduling, and automating compliance, your facility can minimize downtime and avoid costly setbacks. Implement these strategies to streamline transitions and ensure a productive outage season.

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