



## Project Summary

### Organization

Constellation Energy Nuclear Group

### Solution

Power Generation/Nuclear

### Location

Ontario, N.Y.

### Project Objectives

- Implement a centralized electronic Performance Improvement Center (ePIC) to replace existing paper-based Corrective Action program
- Pilot ePIC in advance of rollout to Constellation Energy nuclear fleet

### Products Used

eB Nuclear Application Suite

## Fast Facts

- Constellation Energy's ePIC program would ultimately replace disparate and antiquated systems at five nuclear units and headquarters
- eB was selected as a component of ePIC because it would integrate with a variety of legacy systems and would scale fleet-wide
- eB Performance Improvement applications were developed according to Constellation Energy's detailed requirements as launch customer, and validated against other eB nuclear customers as well as applicable industry standards

## ROI

- ePIC is a proactive, fully integrated, self-contained, and self-supporting system that provides a wealth of critical information governance for change management across the enterprise
- eB has contributed to improved regulatory compliance
- With eB, information is readily accessible in a predetermined object modeling system so personnel turnover does not affect process efficiency and safety

# Constellation Energy Upgrades to Electronic Performance Improvement Center Using Bentley's eB

## R.E. Ginna Nuclear Plant's Best Practices Support Compliance With Industry Guidelines

### The Need for a Fully Integrated Process

The R.E. Ginna Nuclear Power Plant in Ontario, N.Y., is one of five nuclear plants within the Constellation Energy Nuclear Energy Group. Commissioned in 1970, it is one of the oldest U.S. nuclear plants still in operation. As Constellation Energy began aligning business processes and integrating information systems across its fleet, Ginna became the first plant to implement a centralized electronic Performance Improvement Center (ePIC) to replace its existing paper-based corrective action program.

Constellation Energy's ePIC program was developed in response to numerous industry guidelines issued since the late 1990s, all aimed at performance improvement. Industry-wide benchmarking projects were conducted and led to guidelines that improved the safety and efficiency of nuclear power plants. These included:

- Self-Assessment, 1999
- Trending Activities, 2000
- Corrective Action, 2000
- Human Performance, 2001

Each project systematically defined a process and identified best practices based on full industry participation. In addition, the projects confirmed the perception that a more fully integrated process was necessary.

In 2005, the Institute of Nuclear Power Operations (INPO) published INPO 05-005, "Guidelines for Performance Improvement at Nuclear Power Stations." It was designed to present performance improvement as an integrated process, making a strong case for the benefits of overall integration driven by leadership and culture, and incorporating industry best practices into a closed-loop system to promote process efficiency and safety while minimizing business risk.

In addition, performance improvement best practices have been driven through the knowledge base created by the Operating Experience network, an INPO organization that shares events data on a daily basis from all U.S. nuclear sites. In total, these guidelines became the foundation for steady performance improvement, and in 2007, the U.S. nuclear

industry achieved record-low production costs and record-high electricity production.

### Challenges in Performance Improvement

Constellation Energy operates a nuclear fleet that encompasses plants it built and plants it acquired. The fleet produced 60.9 percent of the total power generated by Constellation Energy in 2007 and currently includes:

- Two units at Calvert Cliffs in Lusby, M.D., from affiliate Baltimore Gas & Electric Company,
- Two units at Nine Mile Point in Oswego, N.Y., acquired in 2001 from Niagara Mohawk,
- One unit at Robert E. Ginna in Ontario, N.Y., acquired in 2004 from Rochester Gas & Electric.

Constellation Energy is planning to build additional nuclear units at Calvert Cliffs, Nine Mile Point, and other locations nationwide. It is coordinating its license submission as a member of the UniStar alliance.

Nuclear fleets share both human and material resources across the enterprise. Being able to promptly and accurately recognize conditions adverse to quality is a key goal of performance improvement that reduces risk and increases safety. Streamlining the performance improvement process across the fleet optimizes operating experience, allows the organization to address human performance elements, and instills a safety conscious culture. Until recently, no integrated software tool has been available to the industry that allowed the automation of the entire performance improvement process, seamlessly integrated with other critical plant information systems.

With five units across three sites, plus a separate headquarters site – all using disparate and antiquated systems – Constellation Energy realized the new performance improvement system had to drive process excellence, rather than merely being compliant with regulations. With no knowledge-sharing across facilities, a paper-based system, and no automation, there was little visibility into the information needed to make critical business decisions across the fleet. To meet industry guidelines and prepare the company for future growth, it



*“Constellation Energy selected Bentley’s eB Nuclear applications for our fleet-wide e-PIC because they offer unparalleled knowledge and commitment to the nuclear market and a fully integrated suite of nuclear specific applications that implement industry best practices.”*

*—Gerry Doyle, director, Fleet Performance Improvement, Constellation Energy*

would be critical to develop an integrated approach to establish standardized fleet operating practices that would provide the process efficiencies and information governance required to comply with nuclear regulatory requirements.

### The Integrated Approach

With representatives from all plants, Constellation Energy selected a single integrated system for performance improvement using eB nuclear applications from Bentley. Though this case study will focus on performance improvement, eB applications are also currently used by Constellation Energy for master equipment lists, configuration management, records management, and information management.

Constellation Energy previously implemented eB as a configuration management system, and was familiar with its ease of integration. Knowing that eB would integrate with a variety of legacy systems and would scale fleet-wide provided additional evidence to support the selection. Along with Bentley’s unparalleled knowledge of, and commitment to, the nuclear industry, additional overall factors included:

- eB offers a modern multi tier service-oriented architecture based on Microsoft technology. The platform offers scalability, flexibility, rapid application development, and simplified integration with other systems.
- eB offers the unique ability to manage information in context by linking (associating) events, documents, records, and actions with assets, people, knowledge, skills, processes, projects, functions, surveys, and behaviors. This capability creates multidimensional contextual bridgework that delivers complete and accurate information on demand.
- eB includes industry best practices in the implementation of performance improvement, as well as configuration management and nuclear records/information management. Yet it provides the ability for each organization to tailor business rules, workflow processes, and terminology to suit its unique requirements.

Through a centralized web-based interface available to all personnel, ePIC manages condition (problem) reports, corrective actions, operating experience, and various surveys for Human Performance Measurements, providing an integrated solution that fully complies with the established industry guidelines. Integrated with Insert Key Solutions for Equipment Reliability and IBM Maximo for Work Management, eB enforces compliance and increases visibility to business and industry governance rules.

The capability to link interdependent information allows eB to provide information integrity through the design and engineering environment, ensuring that the plant configuration remains consistent with its design basis, and, as such, compliant with its operating license. A robust trending module ensures consistent trending of all events according to a fleet standard set of trend codes, allowing valuable key performance indicator and statistical reports for management oversight.

### Single Process Definition Implemented Across Fleet

Bentley and a peer team consisting of process implementation specialists and performance improvement representatives from headquarters, Ginna, Calvert Cliffs, and Nine Mile Point began an in-depth analysis to develop a single process definition that would eventually be implemented across the fleet. Through this process, fleet standards were coordinated and developed and site-to-site implementation milestones were set. In addition, Ginna was selected as the first site to implement the fleet solution, which has been in production since May 2006.



eB identifies, classifies, and manages enterprise information, including documents, records, assets, people, processes, events, and projects through predefined information objects. These objects have defined data and behavior based on industry best practices. With this foundation eB defines the context of objects within its system, thereby defining the interactions and interdependencies between different objects. In addition, the objects encompass structured (database) and unstructured data (documents, email, etc.), allowing visibility and interpretation of a broader base of enterprise information.

The basis for ePIC was the eB Performance Improvement application, developed according to Constellation Energy’s detailed requirements

*“eB has proven itself as the core of our ePIC system. Not only do we have increased visibility to the information we need, we can trust the data integrity due to its unique ability to manage the links between relevant information objects.”*

— Adriene Allen, Director,  
Performance Improvement, R.E.  
Ginna Nuclear Plant

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as launch customer, and validated against other eB Nuclear customers as well as applicable industry standards.

### **Web-Based Architecture Contributes to Ease of Deployment**

The peer team migrated legacy data into the new system, trained Ginna staff, and over a period of six months configured and implemented the ePIC system as legacy systems were phased out. Software deployment was greatly simplified by taking advantage of the eB web-based architecture, which also contributed to usability and rapid adoption by end users. With the exception of independent oversight, all performance monitoring process steps recommended by oversight organizations are handled by ePIC and/or key performance indicators that come from the ePIC database. Of these, the eB Performance Improvement application handles the majority of performance monitoring procedures.

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*“The ePIC Performance Monitoring functions are closely linked to Constellation’s commitment to knowledge transfer and retention. Integrated with the corrective action program and other business processes, KT&R addresses the risk of losing experienced individuals and identifies gaps in process and program health. With eB, information is readily accessible in a predetermined object modeling system, so personnel turnover does not affect process efficiency and safety.”*

— Jeffrey Germain, R.E. Ginna Nuclear Plant

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The development of a standard Constellation Energy fleet performance improvement program has been culturally challenging because consensus had to be reached at each plant to create standardized best practices. Peer teams now meet by conference call once a month and in person twice a year to establish new milestones for further improvement.

Constellation Energy has positioned itself as an industry leader, guiding its fleet to one cohesive process that is fully compliant with industry guidelines. Since implementing eB for ePIC, Ginna has undergone a full NRC 95002 inspection, and, facilitated by the ease and visibility with which eB accesses accurate information, received a successful result of “No Significant Findings.”

With the adoption of the ePIC system, Ginna has successfully achieved its goal of performance excellence. The results of the NRC inspection are significant, as they indicate the strength of the safety culture that has been instilled throughout the Constellation Energy fleet, following the 13 components of NRC Safety Culture:

1. Decision Making
2. Resources
3. Work Control
4. Work Practices
5. Corrective Action Program
6. Operating Experience
7. Self- and Independent Assessments
8. Environment for Raising Nuclear Safety Concerns
9. Preventing, Detecting, and Mitigating Perceptions of Retaliation
10. Accountability
11. Continuous Learning Environment
12. Organizational Change Management
13. Safety Policies

Benefits have extended beyond meeting compliance and safety requirements. With staff across all sites trained on a single system, relocation can occur as needed without requiring additional training, resulting in significant administrative savings.

Constellation Energy and Bentley have architected and implemented ePIC to be a proactive, fully integrated, self-contained, and self-supporting system that provides robust feedback to management processes. This data-rich feedback function provides management with a wealth of critical information governance for change management across the enterprise. ePIC has been fully deployed across the fleet and future expansion includes further consolidation to enable enhanced fleet oversight. This will enable management to be more proactive with needed improvements at any site at all times.