



Training Design Considerations for New Reactor Technologies

By Rob Brixey, NWI Project Manager



A number of US designs under consideration are not based on approved Nuclear Regulatory Commission

designs. This lack of approved designs requires delaying the development of a significant portion of training program materials until more detailed information is available from the vendor. In addition, proprietary commercial policies may impede the availability of detailed information. These conditions combine to produce a level of risk and uncertainty associated with the selection of particular designs. These conditions may be partially mitigated by optimizing the development of training processes, programs, and materials. The advanced reactor plant designs will incorporate computer interfaces to an extent unseen in

domestic plants. Highly Integrated Control Rooms, with advanced Digital Instrumentation and Controls require greater emphasis on the Man-Machine Interface. The current generation of operators has very little experience with these types of controls. Training techniques need to be developed to accommodate the new operator interface.

Currently, one advanced reactor plant design has an operating prototype simulator, which has been operated by operators licensed at an existing facility. This provides the opportunity to add a dynamic aspect to task analysis, by documenting the knowledge, skills, and abilities required to operate an advanced reactor plant in all modes (e.g., startup, power ascension, full power operations, and shutdown). When starting on a prepared site, it is estimated that the construction interval, for a new plant will be between 42 and 52 months. Adding 18 months to 24 months of site

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NWI

NWI Supports Victoria, Texas Community Outreach Night for ESBWR Site

On the evening of October 28th, 2008, NWI's Rob Brixey and Frank Tsakeres participated with a cast of senior Exelon professionals in the Community Outreach Night at Victoria, Texas. The community center, near the site of the proposed ESBWR, hosted an exhibition consisting of booths and exhibits that contained information about various aspects of the pro-



posed plant. Information exhibits from plant design/safety systems to environmental concerns such as water consumption and tritium were displayed in the center of the exhibit hall. These booths were staffed by Exelon and other nuclear specialists fielding questions on a one-on-one interactive basis with members of the public, city/county officials, the media, and local business owners. Questions were answered in a number of popular areas including jobs & training, environmental impacts, company commitments, the new technology, land usage and community economic benefit. Mr. Joe White, Lasalle Training Manager,

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preparation, a new build can be estimated to require between 60 and 76 months. Specifics can vary for new build projects based upon reactor type (e.g., AP 1000, EPR, ESBWR, ABWR, etc.), design-ready construction documentation, and regulatory approval.

One of the most significant requirements anticipated on new build project is requiring a substantial portion of the plant staff to have completed training and qualification to support pre-operational testing. Therefore a substantial amount of training program materials must be developed and implemented prior to and during plant construction. Developing Part Task Simulators capable of simulating individual systems can assist in accommodating early training for operators even prior to approval of the detailed Control Room design. Full Scope or Plant Referenced Simulators are based on the actual Control Room design. These simulators are certified for use prior to performing integrated crew training and licensing examinations. Therefore, training materials and simulation of facilities must be built early, and physically located out of the way of construction processes.

The Nuclear Energy Institute (NEI) Licensed Operator Task Force (NEI LOTF) has addressed many issues required for the NRC to grant Cold Licenses. The NEI LOTF has requested regulatory considerations required to grant NRC licenses to candidates without current operating experience on the design for which a license is sought. The NRC is currently in the review and approval phase and has identified no issue thus far with the proposed changes. Some new

Exelon Nuclear Victoria, Texas Community Outreach Night

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assisted the entire fair by discussing aspects of nuclear training programs from mechanical technician apprenticeships to licensed operator opportunities with interested Texans.

NWI has been supporting the new reactor design project since early 2008, representing Exelon's training interests in dealing with the prime Nuclear Steam Supply System vendor and the owner's engineer, Sargent & Lundy. Milestone planning with respect to training program development for all disciplines and accredited training programs as well as simulation evaluations (e.g., part task and full scope) have been under development since early this year. NWI hopes to continue to provide value added support through construction, component and pre-operational testing for this ESBWR.



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plant designs are considered passively safe (e.g., ESBWR). This adds a consideration for the operator licensing process for defining *critical tasks*. Currently, operator license examinations require the candidates to perform critical tasks, or manipulations with safety significance. If operator manipulation has no safety significance, then the traditional and regulatory usage of critical tasks for the basis of granting or denying applicants an Operator License may become technically obsolete. The Nuclear Regulatory Commission will doubtlessly resolve this issue in an acceptable manner in forthcoming NUREG revisions. The NRC has advised licensees to expect a NUREG-1220 style training program inspection, which will evaluate the output of training programs prior to fuel load date. A streamlined licensing process for Licensed Operators transferring from one advanced reactor plant to another of the same standard design is under consideration by the NRC. This allows Licensed Operators a substantial amount of mobility in their career paths. The process makes operators easier to obtain from, as well as lose to, another utility. Aligning with the process of standardization, the NRC has indicated that standardized NRC Exams, modified to account for site specific differences, may be used to license operators at multiple utilities. New Knowledge and Abilities (K&A) Catalogs, or revisions to existing catalogs will include the new items identified for the advanced reactor designs. This process is ongoing, NEI has assigned industry representatives specific actions for completing the K&A Catalog tasks.

INPO ACAD 08-001 defines the requirements for completing initial accreditation of training programs. INPO is expected to inspect processes and documentation early in the development of training programs to ensure that the Systematic Approach to Training methodologies are in place. In addition, INPO accreditation for operations training programs is intended to be completed prior the commencement of the first licensed operator training class. The NRC requires that license applicants complete accredited training prior to examination for an NRC Operator License. From a planning standpoint, it is prudent to allow a margin of several months to address accreditation issues, in the event any should arise. INPO Accreditation renewal will be required prior to Fuel Load, as well as the initial accreditation of Maintenance and Technical training programs specified in 10 CFR 50.120. In addition, the NRC will schedule a formal inspection of training programs to verify the effectiveness of training, the use of feedback and evaluations and other qual-

South Carolina: Getting Into the New Reactor Development Future...

The South Carolina Electric & Gas Co. (SCE&G), a South Carolina water and electricity provider, has entered into agreements with Westinghouse and the Shaw Group to build and maintain two new nuclear power plants. Westinghouse and the Shaw Group have submitted applications to the Nuclear Regulatory Commission (NRC) to receive licenses to operate. Approval of the proposed plants would mark only the second time in the past 30 years that new nuclear power plants have been approved to operate in the U.S., though early-stage plans for new plants are becoming relatively common.

"We gave consideration to the various types of base-load generation, including natural gas-fired, coal-fired, and nuclear generation," said SCE&G President Kevin Marsh in an interview for this article. "We evaluated our options based on a number of factors, including cost to build and operate, the importance of maintaining a balanced generation portfolio in terms of fuel diversity, and environmental impact, particularly as it relates to lowering emissions.

"We determined that the best option for providing our customers with clean, non-emitting reliable energy to meet the growing demand for electricity was to pursue a license to build and operate two new nuclear units at the same location as V.C. Summer Nuclear Station, near Jenkinsville, South Carolina," Marsh added. Environmentalists and energy experts are currently touting nuclear energy as a clean alternative to the use of fossil fuels for energy. This comes in the wake of concerns over carbon dioxide emissions and fears about global warming. While fossil fuels are commonly considered the main sources of manmade carbon dioxide emissions, nuclear power produces no carbon dioxide.

"The building of two new power plants in South Carolina may signify a trend in public opinion on nuclear power," said Ronald Bailey, science correspondent for the Reason Foundation. "But the truth of the matter is that I have concerns about the economic viability of nuclear power."

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ity indicators of effective training programs. New build projects around the world in recent years have required the utilization of a multinational workforce. Multilingual construction craft workers require training programs to bridge language barriers. In the US, this is a new consideration. In addition to training programs, plant signage, and procedures will require technical translation to be effective.

The aging workforce issues in current generation plants will be antagonized by experienced workers transferring from operating plants to the new build projects. Experience will be a valuable commodity in both new build and existing plant organizations. In many situations, consideration to over hire for existing plants should be considered to produce a staffing margin which allows for the transfer of experienced personnel to the new build project. Intentional organizational separation between new build and existing plants makes this role a crucial Corporate Human Resources priority.

To compensate for all of the previously noted differences, training process enhancements will be required, particularly in the areas of Operations, Instrumentation and Controls, Engineering Support Personnel, and Chemistry Technician training programs. Technical innovations allow digital laboratory training, virtual reality modeling of the plant, and distance learning methods to improve the knowledge and skills of the workforce to the levels required to support the demands of new reactor designs.

Considerations made early in the new build process will be useful to ensure the safe operation of new build nuclear power plants. The challenges encountered are best addressed by the collaborative participation between utilities, vendors, regulators and industry organizations. Improvements obtained from deploying new plant design, abbreviated construction duration, regulatory changes, as well as the changing demographics of the nuclear industry contribute to the probability of resounding success in the nuclear renaissance.

NWI's Nuclear Oversight Support for Bruce Power



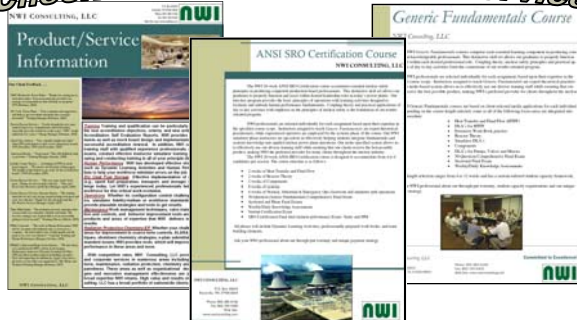
In early November of 2008, NWI embarked upon a support venture with Bruce Power in Ontario, Canada, to develop and assist in the implementation of a Nuclear Oversight Pro-

gram similar to those in the US nuclear power industry. Mr. Ernie Harkness is leading the project and is supported by a number of experienced NWI professionals including Ray Waldo, Dave Hoffman, Rob Brixey, Bill McNeill, Bill Lindsey, Roger Armitage and Frank Tsakeres. Other NWI professionals will assist in the program development and field implementation in coming months. Bruce Power, an independent commercial power provider has committed to modeling their new performance-based program after US organizations

with the intent to complement their existing compliance-based programs with a performance-based improvement focus. Initially, selected disciplines, namely, Operations, Maintenance and Corrective Actions will be targeted using a comprehensive communication roll-out and change management plan with policy established by the Chief Nuclear Officer (CNO). Bruce Power CNO Robert Fisher stated that “performance focus in our Nuclear Oversight program is essential and will help us improve not only our processes but assist our workers in performing effectively, efficiently and error-free.” Over the next few months, it is NWI’s goal that the site senior managers embrace this process as an improvement tool. In addition, NWI will assist each of the major disciplines in identifying and resolving worker and equipment performance issues through field observations by utilizing the iterative process of continual improvement through performance-based observations and monitoring.

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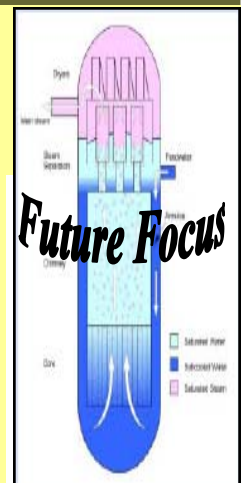
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NWI News Update

The following key activities are being conducted by NWI professionals...

- Bruce Power Training Support & Nuclear Oversight Development Project
- Robinson accreditation support.
- SONGS Operations Training Program support.
- Palo Verde 95-003 Recovery and Procedure Development Projects.
- DC Cook Simulator Development Technical Support



Thank You

We wish to express special thanks to the following clients for making NWI a preferred consulting company.

- AEP's D.C. Cook Nuclear Power Plant
- APS's Palo Verde Nuclear Station
- Bruce Power
- Exelon's New Reactor Development Project
- Entergy's River Bend Station
- DTE Fermi Station
- SCE's San Onofre Nuclear Generating Station
- Xcel Energy's Monticello Nuclear Generating Plant

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