

Edward Shyloski, Vice President, Shaw Nuclear Construction International Preconditioning the new nuclear build project organization for success

Each Advanced Light Water Reactor (ALWR) technology being offered today is different but the preparation for construction execution requirements are exactly the same. In all cases, the key prerequisites, techniques, and methods are the same. To understand what the attributes are in each phase of construction, the comprehensive preparation for each stage must be understood as going slow to go fast according to a respected organizational development advisor to nuclear utilities and A-E/Constructors, Dr Ann McGee Cooper. In other words, the advice is to make sure we have taken the time to prepare and know we are prepared to execute each phase.

Dr Barry Naft, President and CEO of Environment International LLC, said: old build institutional memory is fading. Discipline is required to plan for realism. Willingness to learn from others is essential.

One most important reason is to illustrate the keen understanding, commitment to training, much hard practice, assessment, and follow-through of turning nuclear lessons learned into best practices. We firmly believe Lessons learned are lessons forgotten **unless** they are totally interwoven into the owner/nuclear steam supply system supplier/architect/engineer engineering, procurement, and construction (owner/NSSS supplier/A/E EPC) processes, procedures and training to form and focus a fully integrated new nuclear build project organizational approach for safe and quality installations. Otherwise, the organization, its people, and the work environment will predictably and unwittingly repeat the failures of the past.

After a consensus investment decision to build new nuclear is made, it is obvious nuclear construction work is riskier than most any other work. The Shaw Group will select and train the best people for staff and craft leadership and constantly work to build high performance organizations to the norms of a safety culture that is essential to the success of nuclear power plant construction.

Three major themes

1. Take the time to select and train the key leadership positions of the project team.
2. Take the time to do it right the first time by learning from the lessons of the past.
3. Structure the UK project team leadership at the beginning of the project into one integrated and co-located organization of RWE, WEC, Shaw, UK Contractor personnel focused on common success.

THEME 1: TAKE THE TIME TO SELECT AND TRAIN THE KEY LEADERSHIP POSITIONS OF THE PROJECT TEAM

Organization: key team selection is the first step.

The Shaw Group Nuclear Division knows that the key individuals of the integrated owner/NSSS supplier/A/E EPC team must be selected based on their combined managements' consensus ratings of each individual and by a team assessment specifically in regard to three areas, i.e. their business, technical, and interpersonal skills.

They need not ever just be appointed by the management of each company involved. The use of available commercial interactive software to rate potential individuals aiming to build a high performance team pays dividends even though it is very uncomfortable to openly rate each and every key individual candidate.

This is also essential during the project to determine, through surveys and assessments, the existing norms of the safety culture, i.e. a key component in developing and improving leadership team dynamics. When it is done this way, we are less likely to experience any or some of the 43 Non-Traditional Leading Indicators to poor project outcomes as published by the Construction Industry Institute in their 2006 Proceedings.

HOW AND WHY THE SHAW GROUP CAN SUCCESSFULLY STAFF THE WYLFA, NORTH WALES API 1000 STANDARD PLANTS

How can WEC/Shaw provide and maintain the most qualified staff for key project leadership positions for new nuclear construction?

Including key positions, The Shaw Group Nuclear Division proposes to provide and maintain the most qualified staff to RWE/WEC to deliver the UK API 1000 Standard Plants using the following methods with key team selections being the first step:

- a. Development of Shaw deployment job descriptions.
- b. Survey, investigate, and create for approval by the UK RWE owner the most attractive, reasonable, and uniform prime contractor individual employment terms and conditions that will attract the most qualified professional nuclear new build work force as well as establishment of uniform craft labour employment conditions in accordance with UK labour laws and UK block visa requirements.
- c. Selection of the best, seasoned nuclear veterans from within the Shaw Group Nuclear Department International API 1000 China projects. Other prior nuclear experienced personnel will be staffed from the following areas of available experience: the Shaw Nuclear Maintenance Department at 39 US reactors, the Shaw E&I Department's MOX Project, the URENCO LES Enrichment Project, and mostly from the prior UK and European nuclear plant modification and construction experience ranks of our international partner contractors. Our current Shaw staff in the UK has over 80 personnel with prior UK nuclear experience. Albeit Shaw key UK contractor partners remain unnamed at this time, our due diligence selection criteria for participation by international partners is key to providing one integrated organization with prior nuclear experience that can be utilized on the UK RWE project.
- d. Conduct applicant interviews by Shaw Group Nuclear functional departments and human resources for eligibility to meet UK employment considerations. This is exemplified by Shaw Group's Nuclear Maintenance Supervisor Challenge (Oral Board) Interview process, a copy of which Symposium delegates can obtain on request from the speaker. A similar interview process for competency qualifications as well as personality testing for nuclear

construction environment compatibility will be conducted. The temperament required and scrutiny encountered in a nuclear construction safety culture is not for everyone and selections must be deliberately discerning to obtain the best talent.

- e. Conduct Shaw consensus scorecard interviews and selections of Shaw individual/team members for their technical, business, and interpersonal skills using Shaw Individual/Team Member interactive program.
- f. Perform an additional full five-year background check, a medical check, drug testing, and credit check that establish and validate nuclear construction fitness-for-duty requirements are met before assignment even though selected individuals may currently be employed with Shaw.
- g. Before and during deployment, train, train and test the project key leadership personnel in the Shaw API 1000 processes and procedures.
- h. Before and during deployment train, train, train, and test, the UK project contractor staff and craft leadership in the API 1000 Civil/Structural and Mechanical, Piping, Electrical, and Instrumentation (MPEI) commodity installation criteria, e.g. specifications by each discipline.
- i. Perform all safety-related work and important-to-safety work through the use of deliberate practice on non-Q installations of the infrastructure or balance of plant, and use of prototypes, trial mockups, and templates to gain an implicit trust in competency of the entire construction work force, especially craft supervision, field engineers, quality control, and foreman leadership.

THEME 2: TAKE THE TIME TO DO IT RIGHT THE FIRST TIME BY LEARNING FROM THE LESSONS OF THE PAST

We really can do it right the first time ... but only with deliberate practice!

Championships have been won in every sport by teams who are on the top of their game. Real winning teams have been conditioned by practice of proven techniques and processes and seasoned by constant practicing for all anticipated game conditions. Each coach knows he has individuals in each critical position with latent talents that must be base-lined in their fundamentals with real game experience. Therefore, in

their training and practice sessions, coaches assess individuals who make up the team with rigorous assessments. Coaches do this to predict the team's real game capabilities and expected performance. It is obvious and highly probable then that Cinderella teams do not become champions. Putting people to work without setting the expectations for nuclear construction standard outcomes and without practice to test the outcome must not ever be done again or the failures of the distant past are certain to reoccur.

In the nuclear industry, The Shaw Group is fully aware of Toshiba's 37 month success at K-6, an ABWR construction from first nuclear concrete to fuel loading. Therefore, the importance of emulating such construction schedule certainty is obvious. But it is extraordinarily difficult to assure schedule and cost certainty for the world's nuclear steam supply system (NSSS) suppliers and their associated architect/engineer construction contractors now competing and offering their FOAKE (first-of-a-kind engineering) Generation III+ nuclear plant technology. Further, nuclear utility owner safety and quality expectations remain the same, i.e. that reliability of systems, structures, and components (SSCs) installed be assured whether they are safety-related, important-to-safety, or non-safety related. Less attributes of the same quality program may be used but Balance of Plant (BOP) and the Conventional Island (CI) are as critical to reliability as well.

The Shaw Group recognizes the majority of people who are selected for construction staffs and craft for new nuclear plant builds will **never before** have experienced the rigor and past generation's lessons learned involved in past nuclear construction. However, we can do it right the first time when we construct the Generation III+ API000 plant if we take more time in the team preparation than we ever have done before.

HISTORICAL NUCLEAR PROJECT CONSTRUCTION EXPERIENCE

Everyone has their own view of previous nuclear construction. However, let us gain some documented perspectives!

The Construction Industry Institute (CII) research study team found that the more things change, the

more they stay the same. CII illustrated in their 2006 Proceedings some 43 anecdotal Non-Traditional Leading Indicators to Project Outcome on projects in jeopardy, for example:

The project team is lacking in the necessary expertise, experience, breadth, and depth to successfully execute the project.

The project team is losing confidence in the accuracy and validity of the schedule.

Construction is started before adequate completion of design....

The project is experiencing a high level of engineering design, specification error, and scope changes.

The project fails to follow the quality plan.

The project lacks sufficient skilled craft and is experiencing high craft turnover.

The project is using technology or construction practices that are unproven.

The project is experiencing a high level of safety incidents.

The project quality control results are reflecting high rejection rates for equipment and materials...

The Institute of Nuclear Power Operations (INPO) also illustrated in INPO 08-005, August 2008 (Reference 3), issues and problems recorded in INPO 83-01 dated February 1983 and recommendations to help prevent recurrence. INPO lays out the historic nuclear build issues with a matrix of problems in policies, procedures, and processes for Organization and Administration, Design Control, Construction Control, Project Support, Training, QA/QC, and Test Control. Some issues and/or recommendations include:

Organization and administration:

- No. 1 Clearly define limits of engineering responsibilities and authorities....
- No. 4 Ensure...support of...established quality programs....
- No. 7 Hold construction supervisors and craft personnel accountable...and for ownership of quality in workmanship....
- No. 9 Resolve problems in a timely manner - ...provide a means for holding personnel accountable.
- No. 31 ...include supervision and field engineering involvement and oversight for the use of current procedures.

Construction control:

- No. 25 ...Include requirements for communicating design requirements to site contractors...
- No. 31 ...include supervision and field engineering involvement and oversight for the use of current procedures.
- No. 39 Establish a QC program that applies to important non-safety related construction.
- No. 47 The quality of construction instruction needs improvement. In procedures...ensure consistency.

Project support:

- No. 54 ...ensure...personnel are trained on proper rigging and lifting practices...
- No. 61 Feedback...inadequate for field deficiencies; ...provide a process... to improve...qualification.

Training

- No. 73 programs did not fulfill site needs; ...to fulfill site needs...include:
 - o Qualified and prepared instructors
 - o Continuous and updated training
 - o Thorough training records...

The Shaw Group provides a paradigm shift to new nuclear build, i.e. walking the talk.

The Shaw Group knows what must be done differently to be able to Do it right the first time! New nuclear build construction can be accomplished **if** its execution is studied, planned, and managed by **a team of the right people** who have been properly selected and have honed their skills practicing as a team, measuring progress against basic fundamentals of the nuclear EPC industry standards, and embracing sound quality and performance principles.

The solution to effective new nuclear build lies more in the preparation than in the doing! Because more important than any plan are the construction team's understanding, commitment, and follow-through of the plan said John O Stull, my mentor. Let us discuss the important construction focus areas for an Advanced Light Water Reactor (ALWR), specifically our

Westinghouse API000, to begin to understand the why and how of team selection and its preparation are primary.

THEME 3: STRUCTURE THE PROJECT TEAM LEADERSHIP INTO ONE INTEGRATED AND CO-LOCATED ORGANIZATION OF RWE, WEC, SHAW, AND UK CONTRACTOR PERSONNEL FOCUSED ON COMMON SUCCESS.

Organization for construction execution

Ken Aupperle and Charles Hess write, in a paper entitled Industry lessons learned for 21st century nuclear projects (November 2007):

...as outlined in the 1985 Forbes magazine article 'Nuclear Follies', all of the projects were failures because they exceeded their schedule and budgetary costs by incredible amounts...Examining the completed projects leads to the following 'Keys to Success'...conclusions:

1. Effective utility owner project leadership
 - a. Organization, responsibilities, and accountability
 - b. Open communication at all levels
 - c. Integrated project schedule ownership
 - d. Clear and common priorities
2. Project planning and schedule focus
3. Pro-active risk management/mitigation program
4. Attention to details and documentation

The Shaw Group can rebuild the new nuclear build owner/NSSS supplier/A/E EPC organization infrastructure to make critical decisions and take advantage of plant standardization and repeatability. **One** EPC integrated organization must focus and co-locate early the entire owner/NSSS supplier/A/E EPC mega-project key team member decision-making participants in **one** office upon project inception and well before full notice to proceed (FNTP). This important decision normally establishes clear lines of communication because the principles of organization are normally addressed.

One team reduces the amount of organizational interfaces and, in new nuclear build, this is extremely

important! It is interesting to note the recoveries to complete some older plants, e.g. Comanche Peak 1 and 2 and TVA's BFN 3 and 1, as a few examples, were finally done with **one** owner/NSSS supplier/A/E EPC team co-located on **one** site. The fastest-to-the-finish line replication was Bill Derrickson's 60-month Florida Power & Light St. Lucie Unit 2. Derrickson broke down traditional organization barriers. He knew promised coordination from afar does not materialize in time amongst the dislocated, non-standard practices of various unaligned companies. Even a **one** co-located array of owner and NSSS supplier/A/E EPC teams needs to practice hard to overcome institutional inertias and become aligned as one. Otherwise, underestimation of the complexities and difficulties will persist along with prolonged problem identification and resolution.

There must be **one** single integrated owner/NSSS supplier/A/E EPC management team to collect the disparate companies' concerns and priorities normally taking precedence over the project's priorities. Only **one co-located** team can 'be busy about the right things' to make daily progress. In order to force integration, **one** single, co-located mega-project key management team is ultimately required.

There is little or no waste in time or resources to set up one co-located team early. Setting up one team late has cost and schedule consequences. This has been proven in the recent Airbus 380 and Boeing Dreamliner FOAKE productions. To save big jet, Airbus managers learned to speak same language. As top brass fought, subordinates worked together (*Wall Street Journal*, 15 October 2007). The *Wall Street Journal* article showed by historic example that only one committed, co-located German-French organization really worked together after communication failures and chauvinistic conflicts...exploded into a full-blown crisis.

Conclusion

We can and must do all the above by creating a safety-conscious work environment and high performance team norms in **one** fully-integrated, co-located EPC organization. A high performance, total-integrated management team creates an open, inclusive atmosphere where most all individuals want to continue to work together because they become team members for all the right reasons. Such members feel an obligation to **team** first.

The Shaw Group with Westinghouse and UK RWE will select an international, seasoned professional staff with prior proven nuclear experience. The Shaw Group can provide training and testing of staff and craft leadership in the lessons learned woven into API000 processes and procedures, conduct deliberate practice in discipline installation commodities, and perform work under **one** co-located, fully-integrated EPC team organization model which will attract, maintain, and keep the best and the brightest and correctly place staff and craft in the rightful and meaningful positions to contribute to delivery of the API000.