

Spring 2007
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NUCLEAR RENNAISANCE

New Reactor Design Training Accreditation Update

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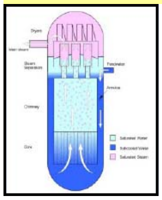

Since our last issue, some key shifts in philosophy have been taken regarding Initial Accreditation (IA) and Accreditation Renewal (AR) of the new reactor designs and COL (Combined Operating License) submittals. According to sources at the recent 2007 American Nuclear Society Conference on Nuclear Training and Education (CONTE) (Jacksonville, FL, February, 2007) , a modified accreditation process for new reactor training programs will be required. It appears that some companies are intending to obtain a COL (currently good for 10 years), but are delaying actual construction opting for the most politically favorable environment. It is important to note that IA and AR were birthed via an NRC requirement based upon the training rule (10CFR50.120) and has not changed, even in light of the anticipated new reactor construction. For the proposed new reactor COL, IA commencement timeframes will be based on agreements between INPO and the COL licensee. In many respects, the rules of engagement and IA process are intended to parallel the COL application process. However, adjustments to the IA and AR process may occur as the COL process matures.

Initial Accreditation and Accreditation Renewal Process. The IA process commences with a submittal of an IA package that includes standardized reactor design and site-specific training material as well as a training implementation plan. For Initial Accreditation, no ASER (Accreditation Self Evaluation Report) is required. Following INPO review and comment, an IA board report will be generated by the INPO review team and submitted for an IA decision from the National Accreditation Board. After IA and prior to fuel load, AR for operations and technical training programs will be reviewed through the current INPO Accreditation Team Visit (ATV) process. Just like the current AR process, a licensee-generated ASER (e.g., Accreditation Self Evaluation Report) will be required. The Board will review the training programs via the board report generated from the ATV and then decide upon AR. IA is needed prior to training and qualifying plant personnel. Some licensee's expressed the desire to qualify workers prior to fuel load (e.g., during system turnover). Using this proposed strategy and considering the front end development time (e.g., training material development duration of ~ 1-2 years with simulator ordering, delivery, installation and certification taking approximately 1-2 years prior to training operators), the IR/AR process should already be in process to correspond to COL requests in 2008.

A short discussion of this topic was presented at the recent ANS topical training conference (CONTE 2007) and can be

TAS: ILT Throughput Assessment Screening Tool (excerpt from the 2007 ANS CONTE Conference)

Failures in initial operator license examinations and high license candidate drop out rates are negatively impacting utility staffing needs and challenging the utility's confidence in the ability to prepare license candidates. Utilities have had difficulty in achieving high initial license training (ILT) candidate throughput (e.g., successful licensed candidates divided by the initial number of candidates entering ILT class multiplied by 100%) due to numerous factors. The Institute of Nuclear Power Operations (INPO) indicated that a large number of ILT examination failures were due to a variety of factors including informal candidate selection processes. In some cases, experience requirements for initial Senior Reactor Operator (ISRO) candidates were being waived and/or

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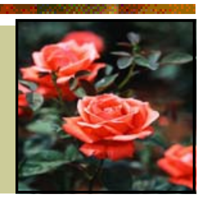
reviewed from the American Nuclear Society website (www/ans.org).

Other New Reactor Design News. In the January 2007 issue of the Nuclear News, company officials are not seeking to build new reactors unless a federal government plan to handle spent fuel is in place. Funding from congress may not be sufficient to support disbursing matching funds for first-of-a–kind engineering in support of COL applications. NRC lower priority work may be limited as it expands its personnel to support COL application reviews. Designs that have been certified are expected to be the projects which will get the highest priority including the Westinghouse AP1000 PWR and GE's ABWR. Following design certification, it can be included by reference only in a COL application since resolution of relevant safety issues have been dealt with in advance. Currently the designs that are being considered include ESBWR, ABWR, AP1000, U.S. EPR for an additional about 29 reactors at an expected different 23 sites. From a recent update, it is anticipated that the ESPs (early site permit) for Exelon's Clinton (Illinois) and Entergy's Grand Gulf (Mississippi) is expected to be issued this spring. Of the 14 applicants of existing/expected ESP and COLs, 5 companies have submitted ESPs with COLs submittals anticipated starting late 2007 through 2008.

So far no US organization has declared that is will actually buy and build new reactors as of this writing. The concern for stock price impact on such a decision has had executives cautious to make this strategic investment. However, following several companies public announcements of the intent to construct the new reactor designs (ESPs and COLs), stock prices have actually increased. For all but one of the companies (e.g., 10 of 11 companies stock increased from $0.18 to $19.70 per share from February 2005 through October 2006).

TAS: ILT Throughput Assessment Screening Tool (Continued from Page 1)



lacked the minimum standards required to ensure that ISROs received an adequate practical knowledge of plant operating systems and processes. INPO also found that Reactor Operator (RO) candidate selection was often based solely on seniority as a non-licensed operator (NLO).

NWI has developed a Throughput Assessment Screening (TAS) evaluation process designed to address the selection problem. TAS objectives are as follows:

- *Reduce NRC license failures by increasing throughput from selection to successful licensure for RO and SRO candidates.*
- *Secure a more technically-based decision making process for license candidate selection.*
- *Reduce stranded investment costs from license candidate failures.*

TAS is a prediction tool comprised of three components (e.g., Basic mathematics and science evaluation, Comprehension evaluation, and Situational awareness assessment).

Candidate performance in each of the three evaluation phases is combined and processed using a complex empirically-derived algorithm. The overall score is used to determine the probability of an ILT or initial NLO (INLO) candidate to successfully complete the ILT or INLO training program. While most existing screening tools assess a candidate's basic math and science abilities, testing comprehension and performing situational awareness evaluations separate TAS from other screening instruments.

The BMSE (Basic Mathematics and Science Evaluation) phase of TAS is used as a benchmark to evaluate entry-level knowledge and understanding of basic arithmetic operations and problem solving. BMSE includes integer functions, averaging, content area determinations, as well as operations with decimals, fractions, percentages, ratios, proportions, addition, multiplication, division, simple polynomials and word problems. The BMSE is also used to evaluate basic earth science

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knowledge for entry-level understanding.

CE (Comprehension Evaluation) is the second phase of TAS. CE contains a series of exercises comprised of reading short stories and answering corresponding questions. These short stories are general in nature, requiring no prior knowledge of the subject material. Thus a knowledge-level bias is removed from the overall evaluation. Comprehension tests help quantify candidates' ability and aptitude for problem solving and deductive reasoning.

The third phase of TAS is the Situational Awareness Assessment (SAA). SAA has been applied in a number of industries including aviation (e.g., airline pilots, air traffic controllers, etc.). It has been used on five different continents and applied to various cultures, genders and classes without yielding any notable bias. The study of situational awareness behaviors in technical fields has long been effective in analyzing operator errors. It also serves as a tool to screen for behaviors associated with successful operations of facilities and equipment.

In the TAS application, SAA is used to determine candidates' abilities to multi-task and predict situational outcomes while monitoring and making decisions using significant amounts of data. This evaluation is performed over a relatively short period of time (approximately 90 minutes). By using unique computer controls, the evaluation is not bias to keyboard proficiency or prior computer skills. The object is for the student to predict target interactions based upon speed, color and path direction. The student is required to monitor variables along a computer-generated matrix. Like in the main control room, large amounts of data and critical parameters are required to be monitored and evaluated by operators. In some situations, an operator's problem-solving and monitoring effectiveness is challenged by normal distractions such as periodic surveillances. An unreliable auto-track feature can be initiated by the candidate but must be monitored while performing other "bonus" tasks. Bonus tasks are used to simulate the distractions encountered in a nuclear power plant main control room. Each bonus task has certain worth based upon candidate resolution time and decision-making logic. Ultimately, SAA is used to evaluate the ability of a candidate to ascertain the correct information and make correct and timely decisions based upon a large amount of variable data streams and unreliable automatic monitoring systems.

Candidate performance in each of the three evaluation phases is combined and processed using a complex empirically-derived algorithm. The overall performance evaluation is documented in a confidential report and encompasses the following focal areas: Attention to Detail; Data Retention; Problem Solving; Tracking and Monitoring; Prioritization.

Baseline data was used to validate the TAS selection algorithm. Data was collected from a group of ILT candi-

NWI Presents at 2007 CONTE Conference in Jacksonville...

At the recent Conference on Nuclear Training and Education, NWI supported the conference as a gold sponsor and presented 2 technical papers (see TAS article in this issue and Summer Newsletter featured article on Dry Cask Storage CBT). The meeting was a complete success as it was an international event with over 10 countries represented. Topics including anticipated instructor supply and demand, the new reactor design training needs, and unique training technologies were just a few of the many topics featured. See CONTE conference at www.ans.org for more details.

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dates at a US nuclear power plant site. A pool of licensed, previously licensed and unsuccessful candidates were then added to finalize the baseline data base.

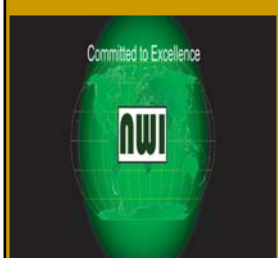
To obtain a measure of TAS accuracy, data sets have been collected from two ILT classes (a total of 11 candidates) in the Northeast and Southern regions of the US in order to compare TAS results to the following: 1) Utility Generated Generic Fundamentals (GFES) exam, 2) NRC GFES results, and 3) experienced instructor class rankings. Initial candidate results are presented below.

#	BMSE	CE	SAA	TAS Overall	GFES (Utility)	GFES (NRC)	Inst. Rank
5	93	96	205.8	173.425	93	90	1
4	99	86	159	155.925	95	80	2
2	98	98	157	150.65	96	92	3
1	96	98	121.2	128.075	97	N/A[1]	4
6	88	86	111.4	113.1	N/A[2]	N/A[2]	7
3	97	86	42.6	70.525	91	N/A[1]	5
7	92	92	20	58.75	91	88	6

[1]Previously licensed and not required to take GFES

[2]Audited class only

The data suggests that while performance in BMSE and CE vary little between candidates (For BMSE, $x=92\pm6$ at 3.52 (95% CL) and CE, $x=89.8+1.9$ at 4.2 (95% CL)). The SAA and overall TAS results have a much wider numerical spread with results yielding mean and standard deviations of 103 ± 15 and 117 ± 11 for SAA and TAS respectively. TAS result patterns are similar to those of the utility-generated GFES exam and instructor ranking making TAS a better discriminator for selection that BMSE or CE alone. From the Table above, only three out of the seven candidates took the NRC GFES exam. Three out of the four candidates' scores correlated well with the TAS predictor scores with one outlier. Further investigation revealed personal issues impacted the candidate's NRC GFES exam performance. In addition, remediation recommendations is a beneficial outcome of TAS allowing the instructional staff to target solutions for candidate weaknesses prior to final licensing testing. The instructional staff can then focus on key candidate attributes that require attention (i.e., system integration in the simulator). 16 test subjects have taken TAS. The results presented in Table I are limited as the final NRC exam results will not be known for another ten months. More TAS data will expand the sample size allowing a greater confidence in selection prediction. If TAS remediation plans assist in successful ILT licensure, then significant savings (e.g., est. $300K-400K per candidate) can be realized for turning just one candidate's failure into success!



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

- AEP's D.C. Cook Nuclear Power Plant
- Exelon's Quad Cities Nuclear Station, Oyster Creek Generating Station & Outage and Reactor Services
- FPL's St. Lucie, and Turkey Point Stations
- TVA's Watts Bar Nuclear Plant
- PSE&G's Salem Station

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