

April 3, 2008

MEMORANDUM TO: Michael A. Junge, Chief  
Operator Licensing and Human Performance Branch  
Division of Construction and Operational Programs  
Office of New Reactors

FROM: Richard M. Pelton, Training & Assessment Specialist **/RA/**  
Operator Licensing and Human Performance Branch  
Division of Construction and Operational Programs  
Office of New Reactors

SUBJECT: SUMMARY OF MARCH 5, 2008, CATEGORY 2 PUBLIC MEETING  
WITH THE NUCLEAR ENERGY INSTITUTE TO DISCUSS NEW  
REACTOR OPERATOR LICENSING INITIATIVES

On March 5, 2008, the U.S. Nuclear Regulatory Commission (NRC) staff held a public meeting with Nuclear Energy Institute (NEI), industry representatives, and vendors to discuss the operator licensing white papers (Agency Document Access Management System (ADAMS) Accession No. ML080710327) submitted by NEI on February 29, 2008. Enclosure 1 lists the attendees at the meeting and individuals who participated via teleconference; no members of the general public were present. Enclosure 2 is the meeting agenda. Information presented by NEI and industry representatives at the meeting is available in ADAMS at Accession No. ML080150006.

The New Reactor operator licensing white paper discusses cold licensing of the projected 450 licensed operators necessary to operate the new nuclear power plants. Cold licensing is a process used prior to fuel load that provides a method for operations personnel to acquire the knowledge and experience required for licensed operator duties following construction.

Meeting participants agreed that time spent obtaining experience prior to licensing must be meaningful and consistently calculated. The final determination of meeting the experience requirements rests with the NRC. Consensus between the NRC and NEI was reached in the areas of training program accreditation and implementation, in-plant job performance measures and on-shift on-the-job training during construction, simulator training using a part task/limited scope simulator, continuing training prior to and following NRC licensing exams, scheduling of licensing examinations, documentation of individual experience, and, overall operating crew experience.

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NEI stated that the operator licensing white paper would be incorporated into NEI 06-13, Technical Report on Template for an Industry Training Program Description (NEI 06-13). The revised NEI 06-13 will be submitted for review in March. NRC agreed to review the revision and develop interim staff guidance.

In closing, it was decided that additional meetings related to the licensing and examination of reactor operators will be held. No final positions were taken during the meeting.

Enclosures:

1. List of Attendees
2. Meeting Agenda
3. NEI Operator Licensing Task  
Force Cold Licensing Plan, 2/29/2008
4. Meeting Notice (ML080510418)

cc: See next page

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NRO-002

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Public Meeting with the Nuclear Energy Institute  
Discussion of New Reactor Operator Licensing Initiatives  
March 5, 2008  
Meeting Attendees

<b>Name</b>	<b>Organization</b>
Mike Junge	NRC
Nancy Salgado	NRC
Rick Pelton	NRC
John Munro	NRC
Fred Guenther	NRC
Hironori Peterson (per telcom)	NRC
Eddie Grant (per telcom)	NuStart
Todd Newkirk	IBEW
Charles Sawyer	Duke Energy
Russell Smith	NEI
Hamer Carter	Progress Energy
Michael Simpson	SCE&G
Al Koon	SCE&G
Ki-Hwan Kim	Korea Hydro & Nuclear Power Co.
Joseph Debor	
Phil Polefrone	UNISTAR
Timothy Dennis	ANS Standards Committee
Ted Amundson	Southern Nuclear
Charlie Nesbitt	Southern Nuclear
Richard Hill	Southern Nuclear

## **PUBLIC MEETING WITH THE NUCLEAR ENERGY INSTITUTE ON NEW REACTOR OPERATOR LICENSING**

**DATE/TIME:** March 5, 2008  
10:00am - 2:00pm

**LOCATION:** Nuclear Regulatory Commission  
Two White Flint North  
11545 Rockville Pike -- Room T 9 A1  
Rockville, MD 20852

**PURPOSE:** Discuss comments on NEI White Papers

<b>AGENDA</b>		
<b>TOPIC (content)</b>	<b>WHO (leader)</b>	<b>Time (minutes)</b>
Meeting Introductions:	Junge	15
Opening comments		
Experience Requirements for License Candidates  (Desired Outcome) Understanding of level of experience required	NEI	30
Crew Experience Requirements During First Year of Operation  (Desired Outcome) Understanding of level of experience required	NEI	30
Review of agenda and action items  (Desired Outcome) Understanding of action, responsibility and due date	NRC	30
Next Steps	Junge	10

NEI Operator Licensing Task Force Cold Licensing Plan  
2/29/2008

**PROBLEM STATEMENT:**

Current regulatory guidance and industry guidelines that describe licensed operator experience, training, and qualification requirements cannot be met by individuals that will be needed to staff new nuclear plants. For example, Regulatory Guide (RG) 1.8, Revision 3, states that a nonlicensed applicant (an instant candidate) for a senior operator license should have at least six months of responsible nuclear power plant experience at the plant for which the instant candidate seeks a license. Responsible nuclear power plant (NPP) experience is defined as having actively performed as a designated nuclear control room operator or as a power plant staff engineer involved in day-to-day activities of the facility. In another example, senior reactor operator candidates must have at least six months of plant operating experience above 20 percent power. These requirements are not achievable during the construction phase of a new NPP.

**INDUSTRY POSITION:**

The Nuclear Energy Institute (NEI) Operator Licensing Task Force proposes implementation of the “cold” license process and the methods described in this document to address licensed operator and crew experience, on-the-job training, simulator training, and licensed operator continuing training.

Exemption from experience requirements contained in current operator initial licensing regulations and use of the additional methods described in this document will continue until the cold licensing process is terminated as explained in the cold licensing process termination section of this paper.

As plant systems, components, and structures are completed, and as integrated plant operations begin, the systematic approach to training process will be used to adjust cold license class training methods and settings to optimize student learning using actual in-plant training and experience opportunities as they become available.

As always, the U.S. Nuclear Regulatory Commission (NRC) makes the final determination of acceptability of meeting experience and plant evolution requirements prior to operator license (OL) issuance.

**BACKGROUND:**

1. Prior to obtaining a NPP OL from the Nuclear Regulatory Commission (NRC), the candidate must satisfy nuclear power plant experience requirements and perform specified operating plant evolutions as described in the following documents:
  - 1.1. 10 CFR Part 55; OL Eligibility and Use of Simulation Facilities in Operator Licensing
  - 1.2. 10 CFR Part 50.120; Training and Qualification of NPP Personnel
  - 1.3. RG 1.8, Revision 3; Qualification and Training of Personnel for NPPs
  - 1.4. ANSI/ANS-3.1-1993; American Nuclear Society - Selection, Qualification, and Training of Personnel for NPPs
  - 1.5. NUREG-1021, Revision 9; Operator Licensing Examination Standards for Power Reactors
2. Currently, licensed operator candidates must meet the experience requirements prior to entering a licensed operator training program, and as part of the training program, perform the specified evolutions at the operating NPP for which the license is sought. For example, senior reactor operator candidates must work in the control room for at least six weeks with the plant above 20 percent power. This cannot be performed at a plant under construction.
3. The NEI Operator Licensing Task Force, comprised of nuclear industry licensing and training professionals, reviewed the cold license process described in RG 1.8, Revision 2 and ANSI/ANS -3.1-1981, and Generic Letter number 84-16, to identify methods that will ensure licensed operators possess the experience necessary to safely startup and operate new NPPs.
4. The task force also addressed issues such as minimum shift crew experience, the conduct of on-the-job training, use of simulators, license examination schedules, and initiation of licensed operator continuing training.

**ELIGIBILITY AND EXPERIENCE REQUIREMENTS:**

5. Persons eligible for the cold license process shall meet the following requirements:
  - 5.1. Candidates for a reactor OL shall have a high school diploma or equivalent as required by RG 1.8, Revision 3.
  - 5.2. Candidates for a senior reactor OL shall have at least one of the following qualifications:
    - 5.2.1. Previously held a senior reactor OL for an operating commercial NPP

- 5.2.2. Previously held a reactor OL for an operating commercial NPP
  - 5.2.3. Have a bachelor's degree in engineering or science as defined by RG 1.8, Revision 3
  - 5.2.4. Experience as a licensed operator training instructor with a senior reactor operator certification. This experience will be evaluated and approved on a case by case basis by the NRC
  - 5.2.5. Two years military experience in a position equivalent to a reactor operator
- 6. Eligibility for each individual utilizing the cold licensing eligibility guidance shall be documented.
  - 7. Licensed operator candidates need not satisfy the experience requirements prior to entering a licensed operator training program. Experience and plant evolution requirements that have not been met at the time the licensed operator examination is administered shall be met prior to issuing the individual's NRC operator license. In such a case, the Licensee will notify the NRC when the candidate meets the experience and plant evolution requirements.

#### **EXPERIENCE AND PLANT EVOLUTION METHODS:**

- 8. The methods listed below provide the licensed operator candidate with meaningful experience on the reactor for which the license is sought. Methods for gaining meaningful experience include completing systematically designed training courses, and participating in practical work assignments such as preoperational testing, procedure development and validation, human factors engineering activities, task analysis verification, or conducting licensed operator classroom or simulator training. Additionally, for these activities to be considered meaningful, they must be associated with safety significant, defense-in-depth, or other major plant components or systems. All cold licensed operator candidates will:
  - 8.1. Complete a systematically designed site layout course.
  - 8.2. Complete a site-specific non-licensed operator on-the-job training program on selected non-licensed operator tasks. The selected non-licensed operator tasks are those tasks that are important to plant operation with regard to nuclear safety, defense-in-depth, or that are risk significant.
  - 8.3. Participate in practical work assignments for a minimum of six months that includes preoperational testing, and one or more of the following:

- 8.3.1. Procedure development and validation
  - 8.3.2. Human factors engineering activities
  - 8.3.3. Task analysis verification
  - 8.3.4. Licensed operator classroom presentations or simulator training implementation
9. Senior reactor operator cold license candidates will complete a site-specific reactor operator and senior reactor operator training course.
10. Senior reactor operator cold license candidates without “hot” plant experience will complete a plant operational excellence course that is conducted in a plant simulator or they will observe control room activities at an operating nuclear plant for at least six weeks. The course and the observation activity are designed to familiarize the candidate with the operational interfaces encountered by decision makers in a nuclear plant control room. Hot plant experience is defined as performance of senior reactor operator duties for at least six months with at least 6 weeks of operation above 20 percent power, startup from subcritical to 20 percent power, shutdown from above 20 percent power to cold (less than 212°F) and subcritical, and startup preparations following a fueling or refueling outage. The startup and shutdown may have been performed at an operating plant or a plant simulator.
11. Table 1, Comparison of Hot and Cold License Guidance, shows the current experience requirement and the associated cold license experience method. Table 2: Illustration of Cold Licensing Plan by Candidate Type, shows education and experience methods for each licensed operator candidate type.

#### **CUMULATIVE OPERATING CREW EXPERIENCE:**

12. The following shows the minimum cumulative operating crew experience requirements implemented in 1984 that were acceptable to NRC as described in Generic Letter number 84-16, and explains how the crew’s cumulative experience will be determined:
- 12.1. Each operating crew’s cumulative NPP experience shall be  $\geq 6$  years; and the crew’s cumulative power plant experience shall be  $\geq 13$  years. When determining the crew’s cumulative NPP experience, all 6 years shall not be attributed from one crew member. Experience gained by working at nuclear power plants and military nuclear propulsion plants, conducting licensed operator training, participating in new plant construction and testing, and completing academic degree requirements have been

established so that the crew's cumulative NPP experience can be determined. The cumulative crew nuclear power plant experience is the sum of each individual's experience after applying weighting factors and maximum credit limits. Cumulative power plant experience is the sum of each individual's power plant experience without applying weighting factors and maximum credit limits.

- 12.2. In addition to the experience requirement mentioned above, each operating crew shall be staffed with a senior reactor operator with hot plant experience (previously defined in 10). If a senior reactor operator with hot plant experience is not available, then a shift advisor with at least one year of on-shift licensed senior reactor operator experience at a similar type (PWR/BWR) operating plant, and who has completed a training program on the design for which they are advising may be substituted. While observing crew performance, the shift advisor will make recommendations to the shift manager only, and will not interfere with the licensed responsibilities of the operating crew. The shift advisor will have direct access to plant senior management to resolve issues. Shift advisor duties include, but are not limited to the following:

12.2.1. Monitor procedure adherence

12.2.2. Observe the conduct of prejob briefs, shift turnover, plant evolutions, nonlicensed operator rounds, plant tours, and post job debriefs

12.2.3. Monitor overall station risk

13. Weighting factors and maximum credit limits for determining cumulative operating crew experience are shown in Table 3: Cumulative Operating Crew Experience Equivalencies.

#### **CONDUCT OF ON-THE-JOB TRAINING:**

14. Until plant construction is completed, acceptable methods for the conduct of on-the-job training include discussion, simulation, and use of mockup equipment and virtual reality technology.

#### **USE OF PART-TASK/LIMITED SCOPE SIMULATORS:**

15. Part-task or limited scope simulators can be used during licensed operator training.

**LICENSED OPERATOR CONTINUING TRAINING:**

16. Licensed operator continuing training begins within 90 days following the issuance of the first OL. Continuing training content is systematically determined to maintain operator knowledge of plant operation.

**COLD LICENSING PROCESS APPLICABILITY AND TERMINATION:**

17. The cold licensing process described in this document may be applied to each unit of a multi-unit site.
18. Cold license guidance items 1 through 9 on Table 1 will apply to any licensed operator training class started prior to initial fuel load.
19. Cold license guidance items 3 through 9 on Table 1 will apply to any licensed operator training class started after initial fuel load and before completion of the first refueling outage.
20. The cold licensing process will terminate after completion of the first refueling outage.
21. For items 18, 19, and 20; as plant systems, components, and structures are completed, and as integrated plant operations begin, the systematic approach to training process will be used to adjust cold license class training methods and settings to optimize student learning using actual in-plant training and experience opportunities as they become available.

**INITIAL LICENSED OPERATOR EXAMINATION SCHEDULE:**

21. Administration of licensed operator examinations begins approximately 18 months prior to fuel load.

Table 1: Comparison of Hot and Cold License Guidance			
Current License Guidance	Applicable Position	References	Cold License Guidance
1. Six months on-site at reactor for which license is sought.	All	ANSI 3.1-1993; 4.4.1 4.4.2 4.5.1. RG 1.8 Rev 3: 2.8 2.10. NUREG 1021 Rev 9 ES-202	Six months practical work assignments and Complete a site layout course
2. One year on-site at the reactor for which the license is sought with six months as a nonlicensed operator.	Reactor operator	ANSI 3.1-1993: 4.5.1. RG 1.8 Rev 3: 2.10. NUREG 1021 Rev 9 ES-202	Six months practical work assignments and Complete a site layout course and Complete a site-specific non-licensed operator training program for selected nonlicensed operator tasks

Table 1: Comparison of Hot and Cold License Guidance			
Current License Guidance	Applicable Position	References	Cold License Guidance
<b>3.</b> Pre-requisite experience requirements must be met to enter training program.	All	NUREG 1021 Rev 9 ES-202 Section D.	Applicable experience requirements shall be met prior to NRC license issuance.
<b>4.</b> Three years power plant experience at least one of which should have been at the plant for which the license is sought.	Reactor operator	ANSI 3.1-1993: 4.5.1 RG 1.8 Rev 3: 2.10 NUREG 1021 Rev 9 ES-202	Six months practical work assignments and Cumulative operating crew experience requirements apply
<b>5.</b> Reactor OL actively involved in the performance of licensed duties for at least one year.	Senior reactor operator (Non-degreed)	RG 1.8 Rev 3: 2.8 NUREG 1021 Rev 9 ES-202	Complete a site layout course and Complete a site-specific non-licensed operator training program for selected nonlicensed operator tasks and Complete a reactor operator and senior reactor operator training course

Table 1: Comparison of Hot and Cold License Guidance			
Current License Guidance	Applicable Position	References	Cold License Guidance
6. At least three years of responsible nuclear power plant experience.	Senior reactor operator (Degreed)	RG 1.8 Rev 3: 1.3 2.8	Complete a site layout course and Complete a site-specific non-licensed operator training program for selected nonlicensed operator tasks and Complete a reactor operator and senior reactor operator training course
7. At least six weeks of operation above 20% power, and startup from subcritical to 20% power, and shutdown from above 20% power to cold (less than 212°F) and subcritical, and startup preparations following a fueling or refueling outage.	Shift Supervisor (Shift Manager)	ANSI 3.1-1993: 4.4.1	Cumulative Operating Crew Experience requirements apply and Complete a Plant Operational Excellence Course or plant observation activity

Table 1: Comparison of Hot and Cold License Guidance			
Current License Guidance	Applicable Position	References	Cold License Guidance
8. At least six weeks of operation above 20% power.	Senior reactor operator (Non-degreed)	ANSI 3.1-1993: 4.4.2	Cumulative Operating Crew Experience requirements apply  and  Complete a Plant Operational Excellence Course or plant observation activity
9. Three years power plant experience and three years nuclear power plant experience	Senior reactor operator (Degreed and Non-degreed)	ANSI 3.1-1993 4.4.1 4.4.2 RG 1.8 Rev 3: 2.8 NUREG 1021 Rev 9 ES-202	Six months practical work assignments  and  Cumulative Operating Crew Experience requirements apply

Table 2: Illustration of Cold Licensing Plan by Candidate Type							
License Candidate	Education	Site Layout Course	NLO Task Training	RO Training	RO and SRO Training	Plant Operational Excellence Course or Observation Activity	Six Months Practical Work Assignments (1)
Reactor operator	High school diploma	Yes	Yes	Yes	N/A	N/A	Yes
Senior reactor operator – degreed manager or degreed nonlicensed operator or technical staff	Bachelor of Science or equivalent in engineering, engineering technology, or physical science	Yes	Yes	N/A	Yes	Yes	Yes
Senior reactor operator – previous license or military equivalent	High school diploma	Yes	Yes	N/A	Yes	Yes (2)	Yes
Senior reactor operator – certified instructor	High school diploma	Yes	Yes	N/A	Yes	Yes	Yes

(1): practical work assignments includes activities such as participating in preoperational testing, procedure development and validation, human factors engineering activities, and task analysis verification, or conducting licensed operator classroom or simulator training; (2): No, if candidate has hot license experience

<b>Table 3: Cumulative Operating Crew Experience Equivalencies (1)</b>			
<b>Type of Experience</b>	<b>Weighting Factor</b>	<b>Max Credit</b>	<b>Justification</b>
1. Commercial Nuclear Plant RO/SRO on same type plant (PWR/BWR)	1.00	No Limit	Task Analysis for same type plant are essentially the same
2. Commercial Nuclear Plant RO/SRO from different type plant (PWR/BWR)	0.75	No Limit	Task Analysis demonstrates that 75% of PWR/BWR tasks are similar
3. Military Nuclear Propulsion Plant Experience (Propulsion Plant Watch Officer, Engineering Watch Supervisor, Reactor Operator, Engineering Officer of the Watch, Propulsion Plant Watch Supervisor)	0.5	36 months	For these military nuclear propulsion plant watch qualifications, approximately 50% of the job tasks are similar
4. Military Nuclear Propulsion Plant Experience (Other than watch qualifications in 3 above such as Machinist Mate, Electricians Mate, Engineering Laboratory Technician, or Electronics Technician)	0.25	36 months	For these (other) watch qualifications, a range of similarities between job tasks (25-75%) exists, so a conservative value of 25% is credited

Table 3: Cumulative Operating Crew Experience Equivalencies (1)			
Type of Experience	Weighting Factor	Max Credit	Justification
5. Reference Plant Simulator	5.00	12 months	Industry analysis demonstrated that activities completed in a simulator, compare to an operating Control Room, occur in a ratio of approx. 400/1
6. Limited Scope Simulator	3.00	9 months	Similar to Reference Plant
7. Actual nuclear plant experience during construction	0.25	12 months	Approximately 25% of the tasks during construction testing in preparation for system turnover to operations is similar to an operating facility
8. Actual nuclear plant experience during pre-operational testing	0.75	12 months	75% of tasks during pre-operational testing are similar to an operating facility
9. Actual nuclear plant experience during fuel load and startup testing	1.00	12 months	Tasks during initial startup are similar to operating facility

Table 3: Cumulative Operating Crew Experience Equivalencies (1)			
Type of Experience	Weighting Factor	Max Credit	Justification
10. License Classroom training	0.25	9 months	Theory of ops and specific plant design knowledge is critical to an operator's success
11. Participation in operator duties at another commercial nuclear facility. This includes nonlicensed operator duties	0.75	12 months	Task similarities
12. Other Nuclear Plant experience	0.25	12 months	Procedure writing, facility operation (water plant and other support facilities, etc)
13. Licensed operator instructor	0.50	12 months	Instructors will have participated in a train-the-trainer program that includes simulator, classroom (systems, theory).
14. Bachelors Degree in an Engineering, Science or Technical field	n/a	24 months	College work (in these fields) gives student an understanding of the fundamentals of plant

Table 3: Cumulative Operating Crew Experience Equivalencies (1)			
Type of Experience	Weighting Factor	Max Credit	Justification
			operations
15. Associates Degree (technical)	n/a	6 months	Student gains knowledge of fundamentals
(1): Weighting factors and max credit values based on those in “Industry Evaluation of Operating Shift Experience Requirements” By: J.H. Miller Jr. 2/24/1984, and endorsed by Generic Letter number 84-16, Adequacy of On-Shift Operating Experience For Near Term Operating License Applicants, except for shaded rows which are added experience types based on new technology or additional analysis.			

References:

- 10 CFR Part 50.120; Training and Qualification of NPP Personnel
- RG 1.8; Revision 2; Qualification and Training of Personnel for NPPs
- RG 1.8; Revision 3; Qualification and Training of Personnel for NPPs
- ANSI/ANS-3.1-1981; American Nuclear Standard for Selection, Qualification, and Training of Personnel for NPPs
- ANSI/ANS-3.1-1993; American Nuclear Society - Selection, Qualification, and Training of Personnel for NPPs
- Generic Letter number 84-16, Adequacy of On-Shift Operating Experience For Near Term Operating License Applicants
- 10 CFR Part 55; OL Eligibility and Use of Simulation Facilities in Operator Licensing
- RG 1.149, Revision 3; NPP Simulation Facilities for Use in Operator Training and License Examinations
- ANSI/ANS-3.5-1998; American Nuclear Society – NPP Simulators for Use in Operator Training and Examination
- NUREG-1021 Revision 9, Operator Licensing Examination Standards for Power Reactors
- NUREG-1262, Answers to Questions at Public Meeting Regarding Implementation of Title 10, Code Of Federal Regulations, Part 55 On Operators' Licenses