



NUCLEAR MANAGEMENT AND RESOURCES COUNCIL

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December 29, 1992

Mr. Bruce A. Boger, Director
Division of Reactor Controls and Human Factors
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Dear Mr. Boger:

Earlier this year we discussed with Human Factors Assessment Branch Chief Jerry Wermiel the industry's use of the shift technical advisor (STA) and provisions for back-shift staffing. To a great extent, Jerry's interest was piqued by the then recent publications: Information Notice 91-77 (Shift Staffing in Nuclear Power Plants) and SECY-92-026 (Implementation of the Shift Technical Advisor at Nuclear Power Plants).

We judged that these two issues were important to the industry and were appropriate for an industry survey. We subsequently developed and distributed questionnaires to NUMARC members. We have discussed the responses to both questionnaires with Jerry Wermiel and his staff in recent months. Enclosed are summaries of these responses. An overview of these responses and our conclusions are provided below:

Shift Technical Advisors

- There are presently over 400 STAs in the industry.
- Ninety-two percent of them hold degrees.
- Thirty-three percent maintain an active SRO license.
- Eighty-five percent perform crew-related assignments.
- Over seventy percent of the respondents indicated value added by STAs.
- Only fifteen percent of the respondents would eliminate the position if STA were no longer required by regulation.

ADD

Shift Staffing

- Most of the respondents cited NUREG-0737 and NUREG-0654, along with Appendix R and EOP/EPIP coverage, as the additional guidance (beyond the FSAR) for developing minimum shift complements.
- Ninety-three percent of the respondents conducted a staffing review after receiving Information Notice 91-77. The seven percent who did not had recently conducted a shift complement staffing study.
- The review of Information Notice 91-77 resulted in few actual personnel additions. The respondents were able to affirm the adequacy of their existing staffing practices against the two actual occurrences cited in the Information Notice.
- Many of the respondents use simulator exercises to ensure their staffing is adequate. They conduct scenarios with multiple failures to validate staff sufficiency.

Conclusions

Fundamentally, the industry does not rely on a single source of engineering expertise on shift in the person of the STA. Rather, most plants recognize that engineering expertise is now the result of the accredited training programs for RO/SRO/Shift Supervisor/STA. Reactor engineering and plant systems expertise then is possessed by each member of the licensed control room crew. The value added by the STA accrues from the presence of an extra systems-trained person available to the operating crew. From the utility comments, the industry believes that the STA can provide a valuable service in the control room. The majority of respondents indicated they would maintain the position even if it were no longer mandated.

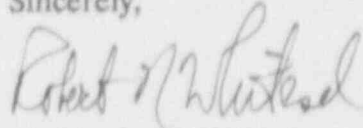
On the topic of shift staffing, a large majority of respondents indicated that they had either conducted a shift staffing survey in advance of Information Notice 91-77 or that they believed their shift staffing adequate after reviewing the information notice. Shift staffing adequacy is routinely assessed from a review of control room crews' responses to dynamic simulator scenarios during operator requalification training and examinations, as well as plant staff performance during emergency preparedness exercises. Training and requalification scenarios often require participation from shift personnel outside the control room to support the fire brigade, medical teams, in-plant valve positioning and other emergency activities. Each plant manager has ample

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incentive to ensure that his shift complements are prepared to handle reasonable combinations of off-normal events.

If you have any questions, please call Bob Evans or me.

Sincerely,

A handwritten signature in dark ink, appearing to read "Robert N. Whitesel". The signature is fluid and cursive, with the first name "Robert" and last name "Whitesel" clearly distinguishable.

Robert N. Whitesel
Manager
Operations, Management and
Support Services Division

RNW♦RCE:ldl
Enclosure

STA QUESTIONNAIRE RESPONSES

Total STAs: over 400
STAs with degrees: 92%

STAs with SRO: 33%
STAs who perform SRO functions: 26%

2a.

Are your STAs part of the operating crew in the control room? Yes or No. If "no", please explain.

Yes 63% No 37%

STAs are assigned various control room duties, but are not part of the operating crew.

The STAs office is located in the Technical Support Center. The STA will spend approximately 50% of the time in the control room.

STA is a collateral function for engineers.

24-hour resident-on-call program with 4 hour/day in the control room.

2b.

Do STAs rotate on the same schedule as the control room crews? Yes or No. If "no", briefly described how assigned.

Yes 70% No 30%

The STA and control room supervisor functions have been combined and titled shift control room engineer (SCRE). (Note: ten units subscribe to this concept and one unit plans to adopt in the near future).

STAs work 12 hrs./day, 7 days on and 7 days off with one support and one training week (6 week rotation).

One STA covers both units, which have separate Control Rooms.

STAs work 12 hour shifts, vice 8 hour shifts that the control room crews use. This helps maintain continuity between crews and permits each STA to work with every control room crew.

STAs are on the same shift with the control room crews through a 5 week shift cycle, but may rotate to a different set of control room crews during the next 5 week shift cycle.

STAs work 24 hour duty days. Operations works rotating 12 hour shifts.

2c.

Do your STAs report to the same department/organization as the control room personnel with whom they work? Yes or No. If "no", please explain.

Yes 50% No 50%

STAs report to the Technical Department.

STAs report to the Assistant Station Manager-Nuclear Safety and Licensing (Operations reports to the Assistant Station Manager-Operations and Maintenance).

STAs are in the Nuclear Engineering Department, which reports to a different Vice President from Plant Operations.

STAs report to the Technical Engineering organization while the shift crew reports to the Operations organization.

Report to Engineering, outside of plant organization.

STAs report to the engineering organization.

2d.

If your STAs stand the same duty schedule and stand the routine watch in the control room, do you feel that having the STA as an integral part of the Control Room team has helped and/or will help mitigate events? Yes or No. Please explain.

Yes 100% No 0%

The STA function is performed by the shift supervisor in a dual role capacity.

Being closely involved with plant operating activities enhances their plant knowledge and therefore their usefulness during emergencies.

Our Shift Supervisor or Supervising Operator is also the STA.

Due to the rotation, any STA works well with any crew, and acts as an integral part of the control room crews during events.

STAs are part of the shift complement, they train with their shift, and perform as an integral part of the team. Their absence would have a negative impact on the team's ability to successfully mitigate an event.

Provides independent engineering perspective. Assists in maintaining plant status during transients. Assists in reporting requirements and E-Plan event classifications.

The STA maintains an awareness of plant conditions and is treated as part of the shift team. The STA is able to stand back while the control room supervisor (CRS) is deep in off-normal procedures and the shift supervisor (SS) is in the E-Plan and make helpful recommendations to the shift.

The STA (non licensed position) is being phased out and replaced by shift control room engineer (SCRE - Licensed and STA Qualified); the STA and SCRE position are extremely helpful in both normal operation and classification and mitigation of events.

3.

Do your STAs perform crew-related assignments during normal and off-normal evolutions that would have to be covered by other crew members if STAs were no longer required? Yes or No. (If "yes", briefly specify or provide examples of the assignments)

Yes 85% No 15%

When the STA is not required for an emergency, this same individual performs as a shift foreman, which is the case more than 99% of the time.

Monitors critical parameters, confirms safety system actuations, advises on procedure action prioritization.

1. Safety function status checks for emergency procedures
2. Post trip reviews
3. 10 CFR 50.72 phone calls to the NRC
4. 10 CFR 50.59 reviews for temporary plant or procedure changes

Equipment out-of-service tracking, operations surveillance coordination, plant equipment retest, and fire watch coordination.

Reportability reviews, root cause of failure, NRC communicator, shutdown margin calculations, mid-loop coordinator, material nonconformance screening, and other misc. paperwork.

Perform SRO functions, when not required to perform STA functions such as Plant Watch Supervisor or Shift Supervisor Assistant; performs as a dedicated supervisor for specific evolutions.

During emergency conditions, the STAs are responsible for monitoring of critical safety functions. During normal evolutions, our STAs perform as Shift Engineers coordinating maintenance, testing, and modification activities with the operating shift. They provide an important service in plant problem resolution.

Work control, tagging functions, in-plant supervisor for evaluations, performs plant tours, supervises special evolutions, and audits.

1. Assists in Notifications and E-Plan Classification.
2. Fire Brigade Commander.
3. Assists in Maintaining Plant Overview During Transients.

4.

Provide any examples where an STA on your site has stepped back, correctly diagnosed plant conditions and offered guidance that was acted upon during an actual plant event.

(Approximately 70% of the respondents provided examples)

1. Identified a failed open feed-pump recirc valve, which kept the plant from tripping.
2. Identified an improper fuse being pulled for an equipment tagout.
3. Diagnosed increase in drywell unidentified leakage caused by reverse flow to pump.

Following a reactor trip, while monitoring critical safety functions, the STA noticed a reactor coolant system (RCS) pressure increase during a subsequent RCS heat-up, [he/she] identified that 2 groups of pressurizer backup heaters were on, and recommended to the Unit Supervisor that they be turned off to reduce the pressure increase.

Power was lost to the feedwater control system. The STA's knowledge of the system enabled him to suggest a breaker trip. Actions were performed successfully within a few minutes allowing time for I&C to troubleshoot problem shortly thereafter. The plant remained on-line as a result.

Very few occasions during actual events, however, numerous occasions during simulator training.

A control rod overheating problem required a manual power reduction and de-energizing of the control rod. The STA notified the crew of the anticipated reactivity addition and recommended the appropriate manual reduction of feedwater flow. This briefing prevented an additional plant upset/possible trip.

The STA diagnosed increasing temperatures on a condensate booster pump and recommended increasing cooling to the pump preventing a possible pump trip.

5.

What value have you found added by having the STA, aside from meeting the regulatory requirement?

(Approximately 70% of the respondents provided examples)

The additional specialized training on shift initially was valuable; however, with the implementation of symptom - based emergency procedures, the value of the position has diminished.

They provide on-shift support for technical problems, safety-evaluation expertise, and provide constant, available reactor engineering support.

Provides intensive training and operational experience for plant engineers who are assigned STA training and watchstanding as part of the plant engineer professional development program.

The STA provides independent assessment of safety functions during events. The STA is able to maintain a broad perspective of plant conditions without the pressure associated with the SS position. The STA provides an engineering perspective, liaison, and support during day to day activities.

The STA provides added experience to the operating shift. Some STAs have up to 20 years of experience and can provide the operating shift with an "extra" set of eyes.

6.

If the STA was no longer required by the NRC, would you eliminate the position? Yes or No. Please explain.

Yes 15% No 85%

Since it's a dual role here we would.

We would need to reassess the operating and accident assessment functional assignments, as well as normal work duties, and reassign them to appropriate personnel.

If the requirement to maintain a degreed individual were retained by the NRC, then the STAs would continue manning the units. If not, the decision would have to be made based on cost benefit to utilities.

Long term benefits have not justified the initial commitment (i.e., several months of training to qualify STAs) and the ongoing commitment (i.e., requalification training, overtime pay, etc.).

Would consider replacing with an additional licensed operator.

The expertise offered by the STA in an abnormal situation could be highly beneficial.

Although the STA position itself may be eliminated, the expertise supplied by the STA would be maintained within the operating crew.

We would need to reassess the operating and accident assessment functional assignments, as well as normal work duties, and reassign them to appropriate personnel.

Considering the variety of functions performed by the STA, the continuing importance placed by the NRC on on-shift engineering expertise, and the expressed concern of the NRC staff regarding a dual SRO-shift engineer type position ("Inside NRC, Feb. 24, 1992), the STA position would be maintained.

The STAs have proved to be vital to the success of operating crews in EOP scenarios. Additionally, during normal operation, the STA coordinates resolution of technical issues especially in backshifts. The STA position has also proved to be good training ground for future supervisors and managers.

That would eliminate an independent resource that is currently available to the operators. Furthermore, responsibilities would have to be assumed by someone else. Elimination of the position would also close off an avenue of professional development for plant engineers.

The STA provides a valuable function in day-to-day operations which allows the Shift Supervisor to concentrate on the safe, efficient operation of the plant without undue diversion.

STA provides a service that is valued in the operation of the plant. Position allows engineers to gain significant operating experience and offers an opportunity to gain and demonstrate leadership and human relations skills. We are transitioning to a combined SRO/STA position.

SHIFT STAFFING AT NUCLEAR POWER PLANTS

(100% Utility Companies Responding)

General Findings:

Most of the respondents cited NUREG-0737 and NUREG-0654 along with Appendix R and EOP/EPIP coverage as the additional guidance (beyond the FSAR) for developing their minimum shift complements.

Ninety three percent of the respondents conducted a staffing review after receiving Information Notice 91-77. The seven percent who did not had recently conducted a staffing study.

The review of Information Notice 91-77 resulted in few actual personnel additions. The respondents were able to affirm the adequacy of their existing staffing practices against the two actual occurrences cited in the Information Notice.

Many of the respondents use simulator exercises to ensure their staffing is adequate. They conduct scenarios with multiple failures to validate staff adequacy.

Below is a representative list of responses to the questions.

2a.

How was the shift complement derived? (What process was used to determine the shift complement? Did you consider high probability combinations of off-normal events, e.g., fire with loss of all off-site power?)

The shift complement was derived using EOPs and the minimum staffing required for the Emergency Plan. A fire with loss of all off-site power and a control room fire with remote shutdown were considered.

Fire requiring shutdown from outside of the Control Room (Appendix R) with consideration of Emergency Plan implementation.

The minimum shift complement was derived from Technical Specification requirements, procedural requirements, and NRC commitments. High probability combinations of off-normal events were considered. For example, the 10 CFR 50 Appendix R requirement to address Control Room inaccessibility resulted in the development of a procedure which assumes a fire inside the plant concurrent with a loss of off-site power. Fire

brigade staffing and other responsibilities such as event notification have been considered in the development of the current staffing levels.

Regulatory requirements and judgment. Our shift complement provides a fire brigade and a medical emergency response team.

Three persons for safe shutdown considerations with a concurrent requirement for five persons to act as fire brigade. The following items were considered in developing our shift complements:

- Numbers
- Number of Watchstations
- Safe Shutdown Requirements
- Fire Brigade
- Emergency Plan Communications. Previous experience, dependent on Plant Emergency Team staffing, Radwaste Operator and Appendix "R" - Safe Shutdown Criteria (Shutdown from outside the control room).

Combination of Technical Specification requirements, shift activities, and desired maintenance personnel staffing on back shift. Complex casualties requiring maximum personnel were considered.

Evolutionary - As the plant operated over time, optimum staffing developed (Operations). Security staffing took into account high probability events. The numbers for current security staffing include level of routine plant activity that requires support. Chemistry staffing was determined by taking into consideration high probability combinations of off-normal events.

Response to accidents or off-normal operations as described in the UFSAR.

Shift complement was determined based on Tech Spec minimums supplemented by additional personnel as required to provide for periodic relief of control room operators, handling of administrative paperwork, and implementation of off-normal procedural requirements including the Emergency Plan. The shift crew is expected to be able to implement procedure ~~xxx~~, should emergency remote shutdown be required. Shift staffing reviews are being performed to determine if it would be advisable to enhance current manning requirements to better address the more severe potential off-normal events.

3.

Based on Information Notice 91-77 (November 26, 1991), have you conducted a minimum shift complement review to determine whether you have adequate staffing to respond to off-normal conditions and events (e.g. fire brigade, event notifications, etc.)?

Yes 93%

No 7% (If Yes, how was it done and what were the results?)

Reviewed past events, developed scenarios where a fire and E-Plan event occur simultaneously and determined staffing. Review showed 3 people would be required above the Tech Spec minimum.

Operations reviewed abnormal and emergency conditions that require extensive operator involvement. Results indicate that the minimum shift complement reflected by current operations practice is adequate.

No changes were made as a result of the Information Notice. However, fire brigade composition was recently revised to include only two operators, not three.

By successfully validating EOP/AOP in simulator sessions using minimum shift complements. Derived from E-plan notification/response requirements. Reaffirmed shift composition is adequate to respond to off-normal conditions.

Based on 1989 Control Room Evacuation and Appendix R Review (LER 89-09), staffing is adequate to meet our needs and regulations.

Adding 1 reactor operator for off-normal events in the Control Room or to act as fire brigade leader. This was based on needs identified during simulator training.

Review of referenced events (IN-91-77). A determination was made that adequate shift staffing exists due to supplementing fire brigade with essential shift maintenance personnel and utilization of Fire Protection Officer for Emergency Plan Communications.

A review was performed for two areas: (1) Events similar to those in Information Notice 91-77 and (2) other events which could cause similar problem. The results showed our manning to be adequate based on several factors including on-site fire department, STAs performing notifications, and the ability to request assistance from another unit.

An evaluation conducted as part of the plant's Operating Experience Feedback Program concluded that current staffing is adequate.

4.

What changes to your staff complement are you considering after reviewing Information Notice 91-77?

None as a result of IN-91-77.

The addition of one SRO and one AO to each crew was already in progress prior to Information Notice 91-77.

At this time, Operations has no plans to change.

No changes are contemplated.