PROFESSIONAL REACTOR OPERATOR SOCIETY

Professional Reactor Operator Society (PROS) official position concerning two issues with Part 26, Subpart 1 – Managing Fatigue, and Regulatory Guide 5.73, Fatigue Management for Nuclear Power Plant Personnel, as presented to Advisory Committee on Reactor Safety (ACRS) on March 3rd 2009. Presented by Mitch Taggart licensed Senior Reactor Operator at Callaway and Vice President of PROS.

First of all, PROS is concerned about safe operation of our Nuclear Plant first and foremost. We also feel, as an industry, we have done just that with respect to our outage performance over the last several years. The rule and accompanying regulatory guide will make utilities change the way they schedule their man power on the front end and back end of an outage. The new rule will force many utilities to change a successful past practice and could impact our ability to safely execute an outage.

The first concern is with the definition of 'Unit Outage'. This may require a rule change along with the regulatory guide:

> Unit Outage – currently defined as reactor unit disconnected from the grid. PROS recommended change: up to one week prior to disconnecting the reactor unit from the grid and up to 75% turbine power following reconnection to the grid.
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> Discussion – Although for some groups the outage work falls between breaker open to breaker close. This is not true for operations. In the period just before shutting down the plant, many activities occur that require additional personnel. Among these is the switch from the non-outage shift schedule to the outage schedule, the Just-In-Time (JIT) Training for the control room crew that will actually perform the plant shutdown, and final work schedule walkdowns/pre-staging. Many stations start their "supercrew" outage schedule one week prior to the shutdown to accommodate this workload. Operations, unlike other groups, cannot suspend or reduce normal activities to prepare for an outage. Maintenance for example, can reduce the online workload if necessary to prepare for an outage, but Operations cannot significantly reduce the pre-outage work to free time for outage preparations.

<u>Advantages of the proposal for prior to outage:</u>

- Crew acclimation to outage shift prior to unit shut down (straight days or straight nights)
- Crew familiarization with each other for combined outage crews
- Allow transition period from normal shift rotation to the outage shift rotation (accommodate transitioning people from days to nights and vice versa)

- Adequate staffing for outage crew Preparation/Familiarization in the simulator prior to commencing the shutdown (real time simulator shutdown vice just snap shots at key stages)
- Sufficient personnel available to pre-stage equipment for first few days of the outage and walkdown Worker Protection/clearances to install drain hoses and vent caps for timely turnover to maintenance teams
- Better preparation time, including pre-job briefs, to safely execute the large number of infrequently-performed tasks associated with plant shutdown and cooldown (getting all involved parties together after outage work starts is almost impossible).
- Outage preparations will be done by outage crews and not by personnel on their regular shift whose main responsibility should be monitoring the operating reactor.
- Being prepared helps keep the stress level as low as possible in the Control Room (stress will never be eliminated, but being prepared keeps in it in check)
- The additional preparation time reduces the chance of errors and subsequently events, improving overall safety.

Advantages of the proposal for after the outage:

- Allow major equipment to be tested/placed in service prior to releasing support personnel
- Ensure sufficient personnel available to handle the given emergent issues that can occur following an outage (large number of activities for Operations in the last 24 hours centered around unit output breaker closure)
- Allow for transition from outage shift schedule to normal shift schedule in a controlled fashion. This has a significant positive impact on the cumulative fatigue that may develop at the end of the outage and just after the outage is completed. The same crews that were performing outage activities are the same ones that are now operating the unit.
- The better a plant deals with outage recovery (resolve emergent issues) the fewer challenges experienced during the cycle

Disadvantages of the proposal:

- Outage schedule time frame would be longer, such that personnel operating the plant just prior to shutting it down or just after starting it up may have worked beyond the hour limitations normally allowed for an operating reactor.

PROS is not proposing any change in the work hour allowance of 60 days provided in part 26.205 (d)(4) of the ruling for outages.

Industry Example:
One plant did not implement their outage supercrew schedule until the day the breaker opened. The negative impact from this late start to their outage workhour schedule was significant. Inadequate preparation delayed the plant shutdown/cooldown, as well as the system tagouts required to support the outage work. The schedule delays were easily measured, and may seem to be of little safety significance, yet the same lack of preparation that resulted in schedule delays, also increased the risk of error, a risk made greater as the operators began to feel pressure from being behind schedule. If starting the outage workhour schedule at the last minute becomes the requirement due to the fatigue rule, the overall impact on safety could well be negative.

Analogy:
You can equate getting ready for an outage much like preparing for a Broadway production. Months go into preparing for opening night, but the dress rehearsal is just days before. The same idea applies to an outage; months of planning proceed, but the 'dress rehearsal' is done the week before.
Likewise, if there are issues with the production on opening night (outage recovery), the production team does not wait long, normally the same day, before they are resolved otherwise all the work up to that point would have been wasted. The same idea applies to the end of a unit outage; any issues encountered must be addressed promptly for a long successful run.

The second concern is with the term 'outage unit' which should only impact the regulatory guide:

Outage unit – currently limited to the unit in an outage condition.
PROS recommended change: outage unit would be changed to outage site so multiple unit facilities with combined control rooms would be able to modify all the site personnel schedules to accommodate the outage.

Discussion – While distinguishing between personnel working on the outage and non-outage unit for work hour limitations may seem reasonable, in many circumstances it would be impractical if not impossible, particularly in shared control rooms. The unintended consequences of this requirement are significant, and in fact could have a negative impact on overall safety.

Advantages:

- The site can manage work hours using a single set of rules
- Will not create tension among the Operations Department. With the present guidance, Operators will be working different hours, some making more money than others, causing strife among the whole department. The junior personnel will be regulated to what ever the more senior operators do not want to do. Many will be forced to work the operating unit since most Operators look forward to the monetary benefit of working outage overtime. Of course all licensed personnel are qualified and capable, but qualified does not mean proficient, and qualifications are no real substitute for experience so many of the junior operators will have to wait their turn to work the outage unit.
- More personnel supporting the outage. If the present guidance does not change, more licenses will be required to man the operating unit. To comply with the fatigue rule working hour limitations, the number of operating unit personnel will have to double from the present supercrew levels. This will mean more outage work for fewer people left supporting the outage rendering less preparation time and potentially a decrease in safety.
- Critical outage activities will have adequate oversight and maintain present outage proficiency. Outage activities are not less critical than a unit running at 100%. Matter of fact, the outage activities are actually more critical (e.g. mid loop, Safeguards equipment testing, movement of irradiated fuel, etc.). To have fewer people, more fatigued by rise in work load, performing these key activities so the individuals performing monitoring of the operating unit will be less fatigued is not the safe way to operate during a site outage.

- Fatigue levels may lower for the Operating Unit. To say that the fatigue levels for a crews on a rotating shift is less compared to the fatigue level of a crew on a straight shift (night or day) is not necessarily accurate. Since the crew that is rotating on shift has frequent Circadian cycle interruptions, their fatigue level may be greater than someone that is on the same sleep cycle on a straight shift. If the operating unit crews do not change from nights to days, then the individuals working nights will naturally change there sleeping habits while not at work for the extended time off required by the fatigue rule again interrupting their Circadian cycle. The short durations of the current outages do not present an undue level of fatigue for someone to properly monitor and operate a running unit while working the allowed working hours for a site outage.
- Communications between work groups will be better if working the same schedule. Face-to-face communications is always the best way to communicate. Face-to-face with the same individuals is even a better way to communicate. With crews rotating on different schedules, the communications will not be as effective both among operators and the many other groups supporting the outage or operating unit. The reduction in effective communications will result in more errors. The errors will result in more anxiety for all personnel involved. Anxiety and stress is a major contributor to fatigue, additional fatigue could potentially challenge safe operation.

Disadvantages of our proposal:

- Some personnel on the operating unit may work beyond the Part 26 limitations normally allowed for an operating reactor.

Analogy:

Again, you can look at the Broadway production as an example. If problems are encountered with the production crew, the other groups will step in and help and vice versa. To have your production team, actors and writers all working different schedules (no one seeing all aspects of the production) would result in a poor production from a lack of effective communications or, possibly, no production at all. Similarly, having site personnel working different schedules would result in less unity and effectiveness. The ‘production’ would not be as successful and, in the Nuclear Industry, this could lead to a reduction in safety.