

NRCExecSec Resource

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To: NRCExecSec Resource
Subject: Smith System for Safe Nuclear Power Plant Operation

SMITH SYSTEM FOR SAFE REACTOR OPERATION

The Smith System for safe vehicle operation has been around for a long time. Getting the Big Picture was one of five elements they preached for good defensive driving. I have attempted to use a similar approach for good nuclear power plant "driving". Here goes...

- Get the Big Picture-whether you are operating a vehicle or a nuclear power plant, getting the big picture is critical to safe operation. Do not allow yourself to be distracted. No tunnel vision allowed. Use all available information before taking action. As Davy Crockett said, "Be always sure you're right-then go ahead!"
- Believe Your Instruments-unless you can prove that an instrument is faulty. Not trusting your instruments is probably the #1 factor in aircraft pilot error.
- Keep Your Hands in Your Pockets Until You Have Gotten the Big Picture-not good when you are driving a car, but the best reactor operators keep their hands in their pockets until they get the big picture. This is especially important when a number of alarms are sounding at once in the control room. Operators are trained to focus on key parameters first and foremost to ensure reactor safety. Keeping the reactor core covered and cooled is paramount.
- Backup Safety Systems-reactor operators backup automatic systems. For example, if the reactor automatically shuts down (i.e. scrams) the operators manually trip the reactor to backup the automatic action. The focus is on ensuring the plant responds just as it should by design.
- Do No Harm-the #1 rule for physicians and reactor operators. Reactor operators do not override, defeat, or block automatic safety system operation or safety interlocks. An operator's primary responsibility is to ensure safety systems operate as designed. Only when the dust has settled are safety systems shutdown or reset. And then only in accordance with strict administrative-control procedures. At TMI and at Chernobyl operator action caused harm.
- Keep Your Edge-Always Ask Yourself What If and Why Questions-a questioning attitude is fundamental to safe reactor operation. Don't assume, know! "Assume" can make an "ass" out of "u" and "me"!
- Know Your Teammates and Your Reactor Plant-I know seniority is a factor in job promotions and advancement. But when seniority governs who is on the graveyard shift that is going too far in my opinion. It would be preferred if the most experienced operators were around when almost no one else was. As a minimum, shift crews should be properly balanced with regard to experience. In addition, I see an overwhelming trend toward 12-hour reactor operator shifts. Operators love it because you get more time off between shifts. I have worked 8, 10, and 12-hour shifts and I know it is hard to be at the top of your game the last couple of hours of a twelve. Airline pilots and reactor operators should have the same work-hour restrictions.
- Stay Clear of Unsafe-At-Any-Speed Reactors or Reactor Owners

Stay away from any nuclear power plant stuff made by the Russians. You can be sure if it's Russian-made that public safety is secondary. Russians, though, are top drawer when making anything that kills people. (I would love to own an AK-47). Just think, how wise is it to play Russian roulette?!

Before signing on with a power company, familiarize yourself with its operating safety and regulatory

track-record.

Stay Clear of Unforgiving Reactor Plant Designs

} Stay away from reactors not surrounded by robust containment structures.

} Avoid, like the plague, any reactors designed with positive moderator, fuel, or power coefficients. Negative coefficients inherently act to help shutdown a reactor if the moderator or fuel temperature increases. Positive coefficients do the opposite making the situation much worse. The positive fuel temperature coefficient at Chernobyl accelerated the disaster. In fact the rapid power excursion was so severe that if your car was designed like Chernobyl this is what would happen. You are driving down the road at 60 mph. All of a sudden your accelerator pedal sticks to the floorboard. Before you can get your foot off the accelerator and on to the brake you are traveling 10,000 mph!

} No PWR reactors with B&W once-through steam generators-this design simply does not contain enough of an inventory of water to buy precious time for corrective action if a failure occurs.

} Stay Clear of Reactors that do not have a FSS (Full-scale Simulator)-all nuclear power plants, just like commercial jet airliners, should have Full Scope Simulators (FSS). This is the case in the US. There is not a more important training tool than a simulator. The world record for continuous nuclear power plant operation is 2.5 years. It is therefore quite impossible to practice startups and shutdowns on the actual power plant itself. Besides you can only practice abnormal and even accident scenarios on a simulator. A utility's real commitment to safety has to be questioned if a FSS is not available for training.

Attention all folks considering a nuclear power plant profession as an operator. Now you know, as the song goes, whether to walk away or run!