Millstone 2.206 Petition Request

The NRC was provided an article written by Mr. David Collins on April 21, 2010. Mr. David Collins provided a revised copy of his article at a public meeting held on April 22, 2010. On May 3, 2010, Ed Miller and Carleen Sanders, of the NRC staff, contacted Mr. David Collins with regards to one of the statements in his article. Mr. David Collins confirmed that he did want the statement of interest processed as a 2.206 petition and that he did not have a problem with the process being public.

Mr. David Collins request, which he would like handled as a 2.206 petition, is as follows:

"CT Governor to prevent restart of the Millstone 3 unit for a period of one year [until April 15, 2011] pending the investigation and resolution of any issues [identified in this article or elsewhere] that the judgment of those parties indentified by INPO as being responsible for managing operating risk [workers, managers, internal oversight, external oversight] present an unacceptable public health risk to the citizens of the state of CT."

"What should happen next is the CT Governor should not allow Millstone 3 to restart from the current outage [began mid April] until all significant safety issues are identified, analyzed and addressed to the satisfaction of:

- The NRC resident inspectors
- A panel of INPO representatives
- The Millstone Oversight department
- A panel of responsible Millstone managers
- A panel of responsible Millstone workers

By "Responsible Millstone Managers" I am referring to people like first line supervisors I mentioned and may others like them who have been fighting for a very long time to be allowed to implement needed safety improvements at Millstone. By a "panel" I mean a handful of representatives from these groups that for years have raised safety or quality issues to Millstone management [issues that have been effectively dismissed (not resourced)]."

Mr. David Collins provided a revision to his article on April 29, 2010. The specific wording of the request relative to the 2.206 petition was altered to the following:

"I would recommend that NEAC advise the Governor to disallow the restart of Millstone 3 [planned for mid-May] until the staffing safety issue [and other safety issues identified in this paper are investigated and addressed to the satisfaction of:

- The NRC resident inspectors
- A panel of INPO representatives
- The Millstone Oversight department
- A panel of responsible Millstone managers
- A panel of responsible Millstone workers

- The CT Attorney General's office"

NEAC (Nuclear Energy Advisory Group) is an advisory group that reports to the CT Governor.

Mr. David Collins provided a revision to his article on May 6, 2010. The specific wording of the request relative to the 2.206 petition was altered to the following:

"I would recommend that NEAC [through the office of the CT attorney general] pursue implementation of the "rehire law", and advise the Governor to disallow the restart of Millstone 3 [planned for mid-May] until the staffing safety issue [and other safety issues identified in this paper] are fully investigated and addressed to the satisfaction of:

- NRC resident inspectors
- INPO representatives
- Millstone Oversight department
- Millstone managers
- Millstone workers
- The CT Attorney General's office"

BACKGROUND

The 2.206 requested action can be found in context on page 31-32 of Revision 0 of Mr. David Collins article.

The 2.206 requested action can be found in context on page 34-35 of Revision 1 of Mr. David Collins article.

The 2.206 requested action can be found in context on page 37 of Revision 2 of Mr. David Collins article.

The 2.206 requested action can be found in context on page 53 of Revision 3 of Mr. David Collins article.

Revision 0, 1, 2, and 3 are attached.

REVISION 0

Millstone Needs Another Safety Scrub, CT Governor Should Review

To help Dominion executives meet Wall Street numbers, In March Millstone reduced staff too quickly, and is currently operating without important safety functions in place that are designed to minimize the chance of an accident. How this could happen with two NRC resident inspectors stationed right on site at Millstone?

I am a recently retired Millstone [engineer, safety system quality assessor, and INPO coordinator]. I also wrote a master's thesis on safety culture management, and I am an industry safety culture [safety management] expert.

In March Millstone reduced staff through early retirements [I was one of the "early retirees"] and also through terminating over 50 workers [the entire management team was exempt]. There are many older workers at Millstone, and the desired staff reductions could have been accomplished over the next 2-4 years through early retirements [I verified this with HR].

In April, I implored the plant manager not to involuntarily terminate any workers, as this [very clearly was not economically necessary. I sent emails to top Dominion management arguing that this action was only to improve short-term profits [beef up Wall Street numbers] and was as unnecessary as it was unethical. "Don't do this" I said.

In January the Millstone plant manager had justified the [100 or so] staff reductions pointing out that some sites have higher INPO ratings than Millstone with [about 10%] lower staffing numbers. [INPO is the Institute of Nuclear Power Operations, the industry "excellence" organization formed after Three Mile Island to recommend operational improvements that minimize the chance of an accident].

While some sites do have higher ratings than Millstone with lower staffing, this is due to the presence of a highly effective leadership teams combined with a strong site-wide safety focus, not because they have 10% fewer people.

A Toyota Prius gets high gas mileage because it has been engineered to operate efficiently with lower quantities of fuel. Putting less gas into your "old clunker" is not going to magically turn it into a Prius. Reducing workers at Millstone is not going to magically make the leadership team more effective, or improve the site-wide safety focus. However, like not putting enough gas in your old clunker, it will result in your not getting where you need to go.

When I found out in late March the staff reductions had been made in the department I had just left [the Organizational Effectiveness department] I said "you can't do this", and for the first two weeks in April have been sending copious documents to top Dominion managers explaining exactly how safety has been [significantly] under-resourced, and why they now need to reverse the [50+] worker terminations and bring these workers back.

If I felt that the staff reductions had no [significant] adverse impact on nuclear safety [while I would have still believed the worker terminations unethical and unnecessary] I would have said "oh well, that's business I guess" and would not be writing this article. No, this is not "just business" this is a company that is putting short-term profits ahead of the long-term public safety interests of the people of Connecticut.

Revision 0, Received April 21, 2010 (Note Added by NRC Staff for Reference Purposes)

To understand why I am saying this, the reader needs to understand a little about safety management in the nuclear industry, the historical nuclear safety management that has occurred in the past in Connecticut, and the safety management that is ongoing right now at Millstone.

Putting Profits Ahead of People And Ahead of Safety

According to a New Haven Register article published last month:

> *Dominion's net pre-tax profit from the Millstone 3 generating unit was $440 million in 2009, which translates into ... a return on equity of 115 percent, according to the report. [CT] HB 5505 defines windfall profits as "in excess of 20 percent return on equity."*

Add the production of Millstone 2 and this equates to annual windfall profits of about 770M.

The Iraq war [and other factors] have kept energy prices artificially high for many years, and over the past decade companies like Exxon Mobile have raked in record windfall profits. For much of this time there has not been a "real" shortage of oil, just the "risk" of a shortage of oil. Which means these companies have used the fear of shortages to charge more for their product, not because they "need to", but because they "can" and the government [heavily influenced by the energy lobby] lets them get away with this.

When energy prices go up, companies that rely on oil [or gas or coal] to produce power need raise electricity prices because fuel is a major cost factor. This is not the case with nuclear. The price of uranium oxide is not significantly affected by oil prices, and even if it were, most of the cost of operating a nuclear plant is not the fuel cost, but the cost of the large numbers of staff required to operate a plant safely.

So when energy prices go up, nukes charge more for electricity not because they "need to", but because they "can" and while energy prices have been high [really ever since Dominion purchased Millstone in 2001] Millstone has proven an amazing "cash cow" for Dominion.

How much money has Dominion made on Millstone since 2001? Profits for nukes trend up and down with oil prices, so here is a rough estimate [*2010 oil price projected as of 3/11/2010]:

Year	Price per barrel	Est. Millstone Profit
2001	23.00	331
2002	22.81	328
2003	27.69	399
2004	37.66	542
2005	50.04	721
2006	58.30	840
2007	64.20	924
2008	91.48	1317
2009	53.48	770
*2010	69.85	1006
		Total 7179

So Millstone has made about 6B since purchased by Dominion, and may make up to another billion this year.

Considering how much Dominion makes on Millstone, I wondered why on earth Millstone had felt the need to terminated 50 CT workers in March [all good people with whom I worked and who I know were loyal, dedicated employees]. This was clearly not because Dominion "had to" but because they "could." But why would Dominion do something like this?

Overstaffed or Undermanaged?

In January the plant manager at Millstone rolled out a [Goodnight consulting] chart showing that since 1996 [essentially since deregulation] production performance has improved as staffing levels have dropped, and implied that statistics show that safety and reliability correlate positively with low staffing numbers, and that plants with low staffing generally also have high INPO ratings.

I contacted the owner of Goodnight consulting [Charles Goodnight] he said he does not have access to INPO ratings and never claimed any correlation with low staffing and safety. I think the majority of people in the industry would tell you that high INPO scores correlate more closely to site management team efficacy [management was exempted from the layoffs, no surprise here] than staffing levels that are marginally higher than similar two unit sites.

Goodnight did support some staff reductions, but only if done in a careful, controlled manner, and only after completing something called a "change management plan" to verify that staffing remains sufficient to support critical safety functions. A member of Millstone management told me [this is a month *after* the layoffs] that these "change management plans" were never completed.

Several people have since told me that the "real" cause of the layoffs is that the Dominion did not get the rate increase it wanted from it's [regulated] Virginia plants, and is now taking "a pound of flesh" from it's [deregulated] CT plants.

I wondered, is this dynamic causing money to be given precedence over safety in CT? Could an over-focus on "maximizing profits" [right now, today] be increasing the probability of a nuclear accident in CT?

Short Term Profits Over Long Term Safety

Is Dominion putting [short term] money interests above [long term] safety interests at Millstone to meet [arbitrary] 'Wall Street' goals set by top executives?

INPO does not use the term "accident" it calls serious accidents like TMI a "significant event." INPO says nearly every significant event since 1993 [since deregulation] had "pressure to continue operating" as a causal factor [this was not observed even once prior to deregulation].

> *It is important to note that [pressure to continue operating] was a factor in all but one of the most recent (since 1993) significant events. Therefore, given today's competitive environment,* ***pressure to continue operating*** *may be a notable contributor to future significant events.*

Are competitive pressures due to deregulation causing an increasing focus on money and a decreasing focus on safety?

Do Everything NRC Says And Your Plant Will Operate Safely, Correct?

Well, not exactly.

The mission of NRC is to assure "adequate" public safety, the mission of INPO is to promote "operational excellence". "Operational excellence" is what avoids accidents like TMI.

INPO was established after TMI to encourage the industry to more than the minimum, to do everything reasonably possible to prevent events like TMI [and many others] from recurring. To keep the probability of nuclear accidents ALARA [as low as reasonably achievable].

INPO identifies [not engineering problems but] a weak safety culture [organizational-managerial problems] as the most frequent causal factor of nuclear "events" like TMI and the majority of the others.

As competition increases, more and more operating companies have been adopting a philosophy of "minimal regulatory compliance". This means that management controls costs by doing the bare minimum required to satisfy NRC. The more responsible ones also do the minimum that keeps INPO happy, and the CEO's of these operating companies are rewarded by receiving an "INPO 1" rating for their nuclear plant sites. Average plants get "INPO 2"

The Millstone site has historically been "INPO 2" [average]. However, for a long time now INPO safety metrics have had Millstone on the bottom of the industry. In January, the overall INPO rating for one of the plants was dead last, equivalent to an academic score of "F minus declining." The next INPO review is likely to categorize Millstone as an "INPO 3" a rating given to a handful of the worst performing sites in the industry.

How Likely Are Future Major Accidents?

UCS [Union of Concerned Scientists] Dave Lochbaum is the leading nuclear industry watchdog critic. After the 2002 Davis Besse event he was interviewed by CBS "Sixty Minutes." Below is a precient article Lochbaum wrote several years before the Davis Besse event occurred, warning that a major accident can still occur [as Davis Besse demonsrated]:

http://www.ucsusa.org/nuclear_power/nuclear_power_risk/safety/nuclear-plant-safety-will.html

> *With 103 reactors currently operating in the United States, these data suggest that a major reactor accident may be fairly likely to occur in the near future. It seems only a matter of time before the initiating event wheel, the equipment wheel, and the human performance wheel stop in a combination that produces another accident.*
>
> *Why should anyone be concerned about preventing another reactor accident? After all, the Three Mile Island accident produced some dramatic headlines and prompted a Saturday Night Live skit, but it did not leave portions of the Pennsylvania countryside uninhabitable. If TMI represented the worst-case reactor accident, then it might be acceptable to suffer one such disaster every generation. Unfortunately, things can be much worse than TMI.*

A few years ago Lochbaum left UCS and took a job at NRC. UCS offered me Lochbaum's job, but I was employed at Millstone and said I would consider it after retirement [Lochbaum has since returned to UCS].

What About Safety At Millstone Today?

TMI [and Chernobyl] demonstrated that organizational-managerial problems lead to most of the serious nuclear accidents. If NRC had not figure out how to effectively regulate organizational-managerial issues after TMI and Chernobyl, certainly after the Millstone event the NRC [finally] figured it out and corrected the problem. Right?

Well, not exactly.

In 2003, a lot of Ohio reporters were doing stories on the safety culture problems that led to Davis Besse event, and many of them attended a 2003 NRC workshop on the subject where I did a presentation on "safety culture management". After the workshop, I was interviewed for a half dozen Ohio newspaper articles as an "industry safety culture expert."

If you google "david collins safety culture" you can access a couple of the [many different] papers I have written and presentations I have given. After the 2002 Davis Besse event, this article appeared in a Cleveland newspaper:

2002 Cleveland Plain Dealer *Employees must fix plant's damaged attitude on safety*

> *The Millstone debacle was supposed to have heightened the nuclear industry's awareness of the safety culture issue. The NRC believed Reactor Oversight Program, its new approach to monitoring the nuclear fleet would be a more sensitive, less subjective indicator of how well reactors were operating. Which is why Davis Besse came as such a shock to regulators and the industry: Until the day the hole in the reactor lid was found in March, the plant got uniformly high marks from the NRC's inspections*
>
> *"There clearly were some issues with safety culture at that plant that had not been recognized by us, and not recognized by the top- most management of FirstEnergy," said NRC Chairman Richard Meserve. As he told an industry group in November, "the Davis-Besse episode presents the fundamental question as to whether the NRC's approach to assuring an adequate safety culture is sufficient." "I think if you were to talk with five different people about what safety culture is, you'd probably get five different answers." Meserve said "If we were to find tools to measure a plant's culture objectively, I think a lot of concerns of regulation in that area would diminish."*
>
> *MIT Nuclear Engineering professor George Apostolakis chairs the 12 member NRC safety advisory "think tank" ACRS [Advisory Committee Reactor Safeguards]*
>
> *"For the last 20 to 25 years," Apostolakis said, "this agency has started research projects on organizational-managerial issues that were abruptly and rudely stopped because, if you do that, the argument goes, regulations follow. So we don't understand these issues because we never really studied them. It's a major failure of the system, in my view."*
>
> *David Collins, an engineering analyst at Connecticut's Millstone nuclear power station who studies safety culture, likens it to the moral and ethical code that guides doctors: "An attitude that ensures the [nuclear] technology first does no harm."*
>
> *"We need some mechanism for NRC to remove toxic leadership," suggested David Collins, an engineering analyst at the Millstone Nuclear Power Station in Connecticut, noting that overbearing executives could diminish plant safety. Like several other speakers and committee members, Mr. Collins, expressed reservations about extensive safety culture regulations.*

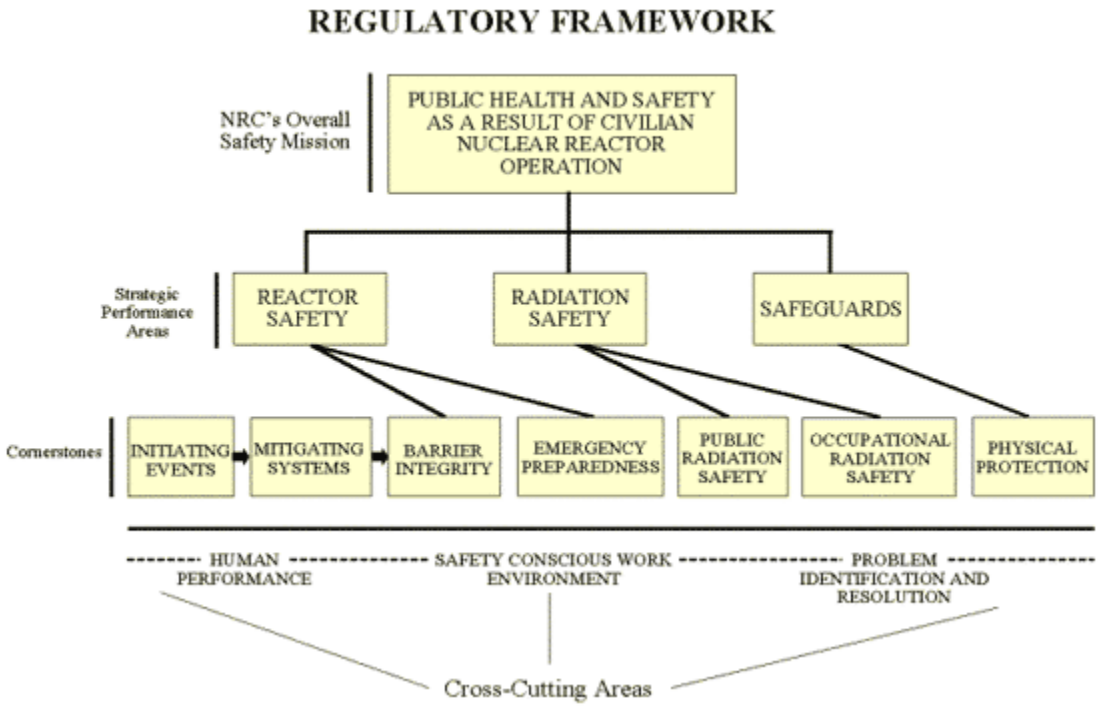
Collins, a safety culture authority and engineering analyst at Millstone, wants the NRC to require operators of all nuclear plants to educate their staffs about good safety culture, then regularly measure employees' attitudes and report the results.

What Is Wrong With NRC Regulations?

NRC has a safety advisory committee of "top engineering experts" [the ACRS – advisory committee reactor safeguards] which is very good at monitoring [regulating] the "engineering" part of safety management using a process called the ROP [regulatory oversight process]. The ROP cornerstones check on things like [does your car have brakes, do you test them, do they seem to be working].

NRC has no committee of "top organizational management experts" and so is not good at regulating the "managerial-organizational" part of safety management, which INPO calls "leadership professionalism", and which can also be called the "organization safety culture".

Here is a nutshell of the ROP, this is what the NRC monitors for safety performance:



The bottom three elements, called "the cross-cutting areas" are the "safety culture" areas that NRC is not good at monitoring [regulating] things like:

- *Has management been cutting corners on safety [below the NRC "radar"] to save money?*
- *Has management been covering up safety issues [from NRC, INPO, other members of management]?*
- *Has management been creating an environment so strongly focused on making money that employees are afraid to bring safety issues to managers [and has the ECP – employee concerns program - been so weak that employees don't bother using it]?*
- *Does management encourage employees to bring forward safety concerns [and thank the employees for communicating them] then proceed to classify them as "low priority" and ignore them?*

Here is the NRC policy statement definition for *safety conscious work environment*. To locate this definition yourself, you can google NRC, open the NRC website, search the word "safety", then scroll down to this definition:

> *The Commission's policy statement describes SCWE as "a work environment where employees are encouraged to raise safety concerns and where concerns are:*
>
> - *Promptly reviewed,*
> - *Given the proper priority based on their potential safety significance, and*
> - *Appropriately resolved with timely feedback to the originator of the concerns*

So how is Millstone doing these days on reviews, safety issue prioritization and providing feedback to employee?

Not so good I am afraid.

In spite of what NRC may tell you, there is a growing pile of evidence that Millstone [for many years now] to save money has not been adequately addressing these areas. How much money are we talking?

Dominion operates seven nuclear plants, the four Virginia plants historically have operated cheaper than any others plants in the country. Millstone is still a "work in progress" but since Millstone was purchased in 2001, I estimate the extra profits from operating "Dominion lean" at just the Virginia plants has made Dominion a minimum of an extra 1.6B.

The Root Of The Problem

NRC does not study safety culture. Here again is the Apostolakis quote from the previous page [Apostolakis was recently promoted to an NRC commissioner]:

> "*… we don't understand [organizational-managerial] issues because we never really studied them"*

The major reason for this is that the ACRS is made up of engineers who view safety management as primarily ensuring that these radiation [safeguard] barriers do not fail:

- *fuel cladding*
- *reactor coolant piping*
- *the reactor containment [the big reinforced concrete dome building]*

None of the ACRS have the necessary expertise to advise NRC on what INPO indicates is the real cause of accidents [significant events] like TMI, Chernobyl and most others, which is organizational-managerial failures.

The (Kemeny) investigation of the accident at TMI reported this:

> *"The one theme that runs through the conclusions we have reached is that the principal deficiencies in commercial reactor safety today are not hardware problems, they are management problems"*

INPO has identified these organizational-managerial [safeguard] barriers, INPO calls them "defense-in-depth" leadership accident prevention barriers:

> *"A robust safety culture requires aggressive leadership emphasizing healthy relationships that promote open communication, trust, teamwork, and continuous improvement. Continuous improvement needs ongoing leadership attention to improve the plant's resistance to events triggered by human error (defense-in-depth). Those in positions of responsibility must see themselves as leaders as well as managers to create an atmosphere of open communication. Therefore, leadership is a defense."*

INPO has identifies these "defense-in-depth" barriers as:

- *Workers*
- *Managers*
- *Internal Oversight [the site Oversight department]*
- *External Oversight - NRC*
- *External Oversight - INPO*

For many years people have been recommending that NRC get safety advice from managerial-organizational experts. NRC needs a panel of *organizational process* safeguard experts equivalent to their *engineering process* safeguard experts [the ACRS].

Then NRC needs to develop regulatory constructs capable of maintaining organizational-managerial failures ALARA [as low as reasonably achievable] as accident causal factors.

After the NRC allowed the Millstone site to restart the units in 1998, and Lee Oliver moved on, Millstone immediately started sliding back into the same pre-1996 "bad management" practices.

No effective safety culture regulations had been institutionalized by NRC. I asked the senior NRC resident at the time "what has been put in place to keep an event like Millstone from happening again here or elsewhere in the industry." He paused and thought for a moment and replied: "nothing I guess."

John Beck is a consultant who is considered a leading safety culture assessor in the nuclear industry. Working for the NRC, he monitored the culture at Millstone [and later at Davis Besse] for a couple of years after recovery [restart]. On departure from Millstone he sent the following cautionary letter to Millstone management [and shared a copy with me]:

> *"This trust in management can be ephemeral...there were a number of areas volunteered by some with whom I spoke where trust was slipping. During the latter stages of restart and early recovery there was a palpable and contagious feeling of hope and genuine enthusiasm at Millstone. It seems to have dimmed since then for some reason. I wonder why?*
>
> *Never forget that previous management failed so miserably, not because they were not intelligent, and not because they did not clearly understand what successful economics looked like in a competitive environment. They failed because they were arrogant, dismissive and refused to listen to the issues and concerns of the people who make this place run."*

If you google "millstone safety culture" the first result you see should be a book on nuclear safety culture discussing the Millstone event and many others.

Pg. 100 of this book says:

> *"The fear is that a poor manager who recklessly and ambitiously tries to make a marginal plant show a profit will break down the safety culture, resulting in an accident prone environment."*

Below is a comment in an email that Edgar Schein sent me last year. Schein is an MIT Organizational Management Professor Emeritus, many years ago he coined the term "organizational culture" and many people consider Schein to be the top organizational culture expert in the world:

> *"At some point the safety assessors have to be prepared to call the problem what it is--senior executives who care more about finances than safety, middle managers who care more about productivity because that is what senior managers reward them for, and supervisors who suppress employee complaints and efforts to identify safety problems because it takes too much time to look into things and to convince their bosses about critical maintenance issues that may be surfacing. What makes safety culture so complicated is that we are trying to build safety into badly managed companies!!! What do you think about that observation?"*
> *- Ed Schein*

Schein is the leading consultant to INPO on safety culture, and is frustrated [as I am] that the NRC only focuses on safety culture for a short time after there is a major "event" and then completely forgets about it. In safety culture this is known as the "ViCE" cycle. After an event you become **Vi**gilant. Then after a while you become **C**omplacent. Then you experience another Event.

Is Millstone management [as Beck says] *"arrogant and dismissive"* do they *"refuse to listen to the issues and concerns of the people who make the place run?"* Is Millstone management [as the book indicates] "recklessly and ambitiously trying to make a marginal plant show a profit?" is management "breaking down the safety culture, resulting in an accident prone environment?" Are NRC and INPO [as Schein says] "trying to built safety into a badly managed company?"

I think so, and I think there is a lot of evidence to support this. Has the "backsliding" since 1998 brought the Millstone leadership team right back to where it was in the early 1990's?

Millstone Leadership During the "Dark Days"

From the NRC report:

[NRC SECY-98-090 - Selected Issues Related to Recovery of Millstone Nuclear Power Station Unit 3]

> In late 1995, the NRC determined that since the late 1980's Millstone Nuclear Power Station had been the source of a large number of employee concerns and allegations related to safety of plant operations and harassment, intimidation, retaliation, and discrimination (HIRD) of employees. The NRC had conducted numerous inspections and investigations that had substantiated many of the concerns and allegations and had cited the licensee for violations.
>
> The NRC also had taken escalated enforcement action. Notwithstanding those actions, the licensee was not effective in handling many employee concerns or in implementing effective corrective action for problems that had been identified by concerned employees.
>
> In December 1995, the NRC established a Millstone Independent Review Group (MIRG) to conduct an evaluation of the history of the handling of employee concerns and allegations.

The charter for the MIRG directed it to evaluate the licensee's effectiveness in addressing Millstone-related employee concerns and allegations. The MIRG was requested to identify root causes, common patterns between cases, and lessons learned and to recommend plant-specific and programmatic corrective actions.

The MIRG conducted a review of licensee allegation files, related inspection reports, NRC's Office of Investigation, and the Office of the Inspector General investigations, enforcement actions, U.S. Department of Labor actions, and previous NRC management reviews from 1985. The review included in depth case studies of selected employees' concerns and allegations to identify root causes, common patterns between cases, and lessons learned.

The MIRG concluded, in its September 1996, report, that in general, an unhealthy work environment, which did not tolerate dissenting views and did not welcome or promote a questioning attitude, had existed at Millstone for several years. This poor environment had resulted in repeated instances of discrimination and ineffective handling of employee concerns.

The MIRG identified seven, principal root causes for of the employee concern problems:

- Effective problem resolution and performance measures;
- Insensitivity to employee needs;
- Reluctance to admit mistakes;
- Inappropriate management style and support for concerned employees;
- Poor communications and teamwork;
- Lack of accountability;
- Ineffective Nuclear Safety Concerns Program (NSCP) implementation.

The MIRG also concluded that these root causes underscored a common theme of **management failure** to provide the dynamic and visible leadership needed **to bring about required, basic attitude changes.** None of the findings of the team were new. **The problems had been identified previously to NNECO management by its own self-assessments, yet the problems continued.**

If we were to ask the question: "Is the Millstone leadership team as bad now as it was in the early 1990's?" Who would be capable of answering this question?

The Five Groups That Oversee Safety

INPO identifies the "defense-in-depth" barriers as:

- *Workers*
- *Managers*
- *Internal Oversight [the site Oversight department]*
- *External Oversight - NRC*
- *External Oversight - INPO*

These are the groups responsible for overseeing safety at Millstone, and these are the groups that can answer the question "is safety being managed adequately at Millstone today?"

In March the New London Day published an article titled: “NRC says 2009 was a safe year at Millstone” so we pretty much know what is the [official] NRC position on this subject, so lets explore how some of the other groups might answer this question.

For a very long time now, INPO safety metrics have had Millstone on the very bottom of the industry. In January, the [overall] INPO rating for Millstone 2 was dead last in the industry, equivalent to an academic score of “F minus declining.”

Every year, INPO gives each site in the country a [safety] rating of 1-5. INPO keeps the scores secret [even from it’s own staff] and once a years rolls the ratings out to the CEOs of the operating companies [and to senior INPO staff] at what is called the “INPO CEO conference”.

The NRC regulatory authority comes from federal laws [NRC can put people who do not comply in jail]. INPO is a “communitarian regulator” and relies completely on CEOs wanting to “do a good job” and [as there are public safety implications] wanting to “do the right thing”. INPO wants CEO’s who get an INPO 1 rating to be pround, and CEO’s who get an INPO 3 rating to say “what the heck is going on here, why am I not a number 1?”

Consultants who [for a living] assess safety culture in the industry have noticed a disturbing trend since deregulation toward “minimal regulatory compliance”. Many sites have been doing the bare minimum that the NRC ROP requires, not doing enough to keep INPO happy, and completely dismissing the concerns of staff.

What led to the Millstone shutdowns in 1996 was that Millstone leadership had implemented “minimal regulatory compliance” in the mid 1980’s. From the [narrow] perspective of responding to the competitive pressures of deregulation, Millstone leadership was at that time [in a manner of speaking] “way ahead of it’s time”.

Sites that do an adequate job of minimizing the chance of an accident receive an INPO score of 2. Sites that do an above average job receive a 1, sites that do a below average job receive a 3. The INPO scores of 4, 5 are really only there to make a score of 3 appear to be average. If INPO denies this, ask them to tell you how many sites currently have a score greater than 3, and how many sites currently have a score less than 3.

Millstone is currently a 2 [declining] and the NRC senior resident told me that he feels the staff reductions will push Millstone to an INPO 3 rating. If Millstone does not receive an INPO 3 rating this year, I would not be confident about safety management at Millstone, I would be concerned about the efficacy of the INPO assessment team.

In February the Millstone Oversight department wrote a condition report with a simple four word title: “Millstone Leadership Is Ineffective” listing multiple examples of inconsistent compliance with procedures and repeated loss of configuration control. These are the same issues that NRC identified in 1996 that precipitated the shutdowns.

A number of employees [workers and managers] have complained to me that it feels like Millstone is headed back to becoming one of the worst leadership teams in the industry, or is already there.

Is safety being adequately managed at Millstone right now?

One Department Where Safety Is Not Being Managed Adequately Right Now

I was a long time electrical project engineer [I led one of two engineering teams that replaced the Millstone reactor head in 2005, a very large 60M project] I also worked for a time as an Oversight assessor, a human performance supervisor, and for the last two years before retirement in March I worked in the Organizational Effectiveness department.

In the Organizational Effectiveness department I worked as the INPO SEE-IN coordinator [making certain the site properly evaluates and learns the lessons of TMI, Chernobyl, Davis Besse and many other minor events].

With regard to the impact of the March worker terminations, the only department that I can speak to is the one that I worked in [the Organizational Effectiveness department] but I would think it is likely that the March terminations created unsafe [understaffed] conditions in some other departments, possibly many other departments.

Safety is not being managed adequately right now in the Organizational Effectiveness department.

Evidence of Under-staffing Safety in the Organizational Effectiveness Department

When I heard that Millstone had laid off 50 workers in March , I was surprised. When I heard how many staff had been reduced from the department I had just left [Organizational Effectiveness] I was concerned, because the department oversees some very important safety functions such as:

- Organizational safety culture and human performance
- Leadership effectiveness [what INPO calls "professionalism"]
- The CAP - Corrective Actions Process [what NRC calls "the window to the safety culture"]
- Evaluation of the INPO "SEE-IN significant event" documents that teach the organization how to avoid accidents
- Reports of Millstone events published to help other sites avoid similar problems [called Operating Experience] and processing of similar reports that come in to help Millstone

In 2009 the NRC senior resident inspector told me he would like to see the ORE function "beefed up" . The NRC inspector wanted the ORE manager elevated to the director level, so management would finally "listen" to leadership improvement recommendations that ORE had for years been trying to implement. Many others [including myself] felt the efficacy of the ORE department needed to be "beefed up" [I felt significant improvements were needed in the areas of safety culture management and leadership efficacy].

Instead of being "beefed up" in March the ORE staff was cut in half. But this is just the opinion of an industry safety culture expert, an NRC senior resident inspector, and a smattering of various Millstone employees [workers, managers, Oversight assessors etc.] right?

Well, not exactly.

One of the Virginia Dominion ORE managers was visiting the Millstone ORE department a couple months ago. Concerned about planned cuts in ORE department staffing, in 2009 he took advantage of a trip to INPO and asked a room full of his industry counterpart ORE managers "what did they believe was the absolute minimum staffing level for an ORE department to do it's job adequately". He gave me the staffing number, and Millstone is now at about 50% of that number.

When a roomful of industry experts say that staffing is [far] too low to do the job, and the job is what INPO says needed to be done to avoid nuclear accidents, I don't care what kind of ROP regulatory views NRC may have on the subject, safety is being under-resourced.

I told the Virginia ORE manager to take his concerns to the top of the company, to sit in CEO Tom Farrell's chair if needed to make them listen. He said "I can't do that" but it probably didn't matter, because Farrell probably would not have listened anyway.

Why do I say this?

Dominion is one of the largest energy companies in the US. In 2009 CEO Tom Farrell was named six-sigma manager of the year for his cost control abilities. This was not "Dominion six sigma manager of the year" this was global. 43 companies around the world. The CEO of the company that operates Millstone is the top cost-cutting executive on the planet.

So [after failing about nine times to get the concept through to my Dominion nuclear food chain] I sent an email to CEO Farrell [and I copied the COO] explaining that I have studied six-sigma extensively in the masters program I took, and [did you know] six-sigma actually began as a quality management process, and [did you know] some industries like the medical industry [who by necessity are a little more evolved in safety management than is nuclear] actually use six-sigma for safety culture quality management.

Mr. Farrell did not reply, but I did received a call from Dominion's top nuclear manager [CEO of generation] who growled "Mr. Farrell does not require any spurious email messages from you."

I thought it was sort of an interesting reply, so I wrote it down and dated it. That was pretty much the end of the conversation and my safety enhancement employee suggestion.

Other than growling, when the CEO of generation called me another interesting thing occurred. I had saved my email to Farrell in a folder titled "culture issues" when the CEO of generation called, I went to retrieve it but it was gone, like someone in IT had expunged it from my files. I noticed that COO has replied "thanks" [possibly without reading the message] and his reply contained the full body of my message.

So I saved it by forwarding it to my home email, and placed the COO reply message in my culture folder and watched what happened. The next day it was gone too. I had previously emailed Farrell about pollution controls at Dominion's coal plants [an area where Dominion and Farrell appear to be doing a fine job] those messages were still there. What was going on I wondered?

Oh well, no big deal [I guess].

[It's not like I was complaining about safety at some coal mine in West Virginia].

Workers Who Stood Up For Safety Were Terminated, Supervisors Who Stood Up For Safety Were Reassigned

In March three people in ORE were involuntarily terminated, and the two department supervisors were reassigned.

One had been working very hard at getting more managers to go out and do more field observation to help reduce procedure compliance problems [most sites do much more of this than Millstone].

One of the workers [ironically] had been complaining vocally about the [double standard of] managers being exempted from the layoffs.

The remaining terminated workers had been working very hard to get the site [especially the training department which for some reason is particularly bad at this] to properly review and implement the recommendations of INPO most safety significant documents [called the periodic SOERs - significant operating event reports]. She would flag the deficiencies, and I would follow up on them with the departments.

For example, one of the SOERs is on the lessons of Chernobyl. The training department is supposed to make sure that managers are trained on Chernobyl [what caused the event, what will ensure something like this does not happen in the US].

Here is an email message I received from a Millstone trainer in February, about a month before this worker was terminated:

> *Dave,*
> *We have not done [Chernobyl training] in the last 3 years as part of the continuing training. The real question is where, who and how do we make these commitments, and put them into a system that makes people aware of them? To the best of my knowledge there appears to be no method, other than tribal knowledge, of these commitments and their recurrence.*
> *Any help in this area would be greatly appreciated.*
> *[Senior Millstone Trainer]*

I have no idea if this particular issue was ever adequately addressed, but this is an example of the kind of things that Organizational Effectiveness does.

Two [what I would call] "safety conscious supervisors" were reassigned.

These supervisors had both "pushed back" on some significant safety issues and in March were reassigned out of the Org Effectiveness department [no supervisors were laid off, so they could not be terminated but could be reassigned].

The issues they had "pushed back" on were configuration management problems [the kind of problems that caused the Millstone shutdown event] and corrective action problems [the kind of problems that led to the Davis Besse event].

Recall the safety Conscious Work Environment definition:

> *The Commission's policy statement describes SCWE as "a work environment where employees are encouraged to raise safety concerns and where concerns are:*
>
> - *Promptly reviewed,*
> - *Given the proper priority based on their potential safety significance, and*
> - *Appropriately resolved with timely feedback to the originator of the concerns*

When a fire door is found broken, most nuclear plants fix the door immediately, and while waiting for maintenance to come, someone stays at the door [called a "fire watch"] to make certain it closes properly. It costs money to have people standing at the doors, and it forces maintenance to fix the doors a little quicker than they might otherwise prefer [it interferes with other scheduled work].

The CNO gave Millstone management a "directive" to "get rid of these [expensive] fire watches" and fire protection engineering "got right on it". To accomplish this, FPE had to eliminate the requirement for fire doors to "automatically close and latch".

The site fire marshal [the fire marshals at the Virginia plants, a local town fire marshal who worked at Millstone, and a state of CT fire marshal] didn't like it. They all felt that a fundamental rule was being violated, and that fire doors needed to "automatically close and latch".

I had identified three NRC guidelines that appeared to me [an engineer, but not a "fire protection" engineer] were being violated. I copied the specific paragraphs and highlighted the specific words in three NRC fire protection guidance documents and emailed the text with my concerns to the fire protection supervisor [and the responsible manager, director, and Dominion Chief Nuclear Officer].

No one ever responded [definition of responsible: response-able] and explained to me specifically how Millstone was in compliance with these three NRC guidance documents.

He emailed me back saying that he "didn't intend that Millstone should violate NRC guidelines to accomplish this" but he never instructed the leadership team to respond to my compliance questions, and no one ever did.

After observing these numerous repeated employee objections for a while, one of the Organizational Effectiveness supervisors wrote an email to management [I was copied] saying that fire protection engineering was moving too fast, pushing the change through without carefully considering the concerns of employees or the fire code requirements.

In spite of this, the change was pushed through over the continuing objections of some employees. The change saves Millstone about 50K a year, an amount equivalent to about a half hour of on-line production. What this change cost in terms of lost [employee and stakeholder] trust is much more difficult to calculate.

Later the same supervisor wrote a letter complaining that CRT [condition report team] managers were "not showing up" to analyze equipment and configuration issues, something INPO had complained about in 2006 [I was copied].

Loss of configuration control was the primary reason NRC shut down Millstone in 1996. The letter implied it was not the first time that he had complained to management about this. After sending out the letter this supervisor told me: "I am not going back to 1996 without at least complaining about it."

The other ORE supervisor had discovered [this same group of CRT managers] had been downgrading the safety significance of condition reports without telling [or discussing this with] the employees who had initiated the reports. He coached the CRT group that they must to stop this (highly unethical) practice, and eventually had to threaten to resign [as chairman of the group] unless they stopped this practice.

Downgrading safety issues raised by workers was likely what led to the 2002 Davis Besse event. The system engineer had made multiple requests for management to approve the installation of access holes to clean and inspect the top of the reactor. The holes were not approved, the top of head could not be inspected, and over the years an undetected acid leak ate through six inches of carbon steel causing a "football sized hole" in the reactor head, leaving only the thin [thickness of a quarter] stainless steel liner bulging from the [around 2000 psi] reactor coolant pressure, ready to burst at any moment.

Some experts at NRC feel Davis Besse may have been just a few months away from a TMI type accident [some say worse]. UCS Lochbaum feels if the liner burst, it may have stopped the control rods from falling resulted in a Chernobyl-type release. I agree some rods may not have dropped, but I have not seem anything that indicates a large release would have occurred [assuming no additional failures and that the other safety systems functioned as designed].

Both of these supervisors were reassigned in March, so the CRT managers are now free to resume their practices without being nagged by what I would call "safety conscious supervisors." What should happen at Millstone is that these sort of "safety conscious supervisors" willing to "stand up for safety" should be moved up, and the [many] Millstone managers who are not "safety conscious" should be moved out.

Metrics in 1996 indicated that Millstone did not just have a poor leadership team, but one of the worst in the history of the industry. The top managers were replaced, but most of these middle managers were allowed to remain [and gradually fill the more senior positions].

I would estimate about 20% of the managers at an average nuclear plant exhibit some of the behaviors that [INPO says] are toxic to a healthy safety culture. At an "INPO 1" plant I would estimate this number probably drops to about 10%.

At Millstone today, I would estimate this number is closer to 33% – 50%.

How Well Has Nuclear Historically Been Managed In Connecticut?

INPO is a secretive organization, so people in CT might be surprised to learn that three of the 24 US nuclear "events that shaped the industry" occurred here in CT. Some of these 24 were very close to becoming a TMI type accident themselves [one was the 1993 event at Millstone].

Actually, there were four of these events in CT, but NRC covered up what was probably the most significant one. As far as I know, the groundwater event at Haddam was the most significant uncontrolled undocumented releases of radiation to the environment that has occurred at any US nuclear plant.

You can read about it here.

> http://www.nytimes.com/1997/09/17/nyregion/hartford-says-utility-hid-nuclear-contamination.html?pagewanted=1

As the Haddam plant was being decommissioned, and the unreported contamination was discovered, NRC did not pursue criminal charges [did not prosecute any NU management] I think for a very pragmatic reason: the NRC resident had also "looked the other way" for many years.

The political cover up was a good deal for NU managers, who were able to move on to managing at Millstone, instead of being banned from the industry and facing criminal prosecution.

Here is what the NRC task force investigation reported:

> The violations associated with the November 1996 contamination event, which are described in the Notice, created a substantial potential for exposures in excess of regulatory limits. Therefore, these violations are classified in the aggregate as a Severity Level III problem in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions" (Enforcement Policy), NUREG-1600. In accordance with the

> Enforcement Policy, a civil penalty is normally considered for a Severity Level III violation or problem.
>
> However, I have decided, after consultation with the Director, Office of Enforcement, to exercise enforcement discretion in accordance with Section VII.B.6 of the Enforcement Policy and not propose a civil penalty for the violations associated with the contamination event. The decision to exercise discretion was made given that (1) the violations occurred prior to the decision, in December 1996, to permanently shutdown the Haddam Neck facility; and (2) you were issued a $650,000 civil penalty on May 12, 1997, to address the performance problems that existed prior to the decision to permanently shutdown the facility, and which indicated generally poor performance over a period of time.

So the NRC slapped NU with a penalty of less than one day's revenue at the average nuclear plant, and said that since the plant is shut down anyway, no harm no foul.

What had happened [which is common with significant events] is that a combination of smaller events had aligned. Poor foreign material control during refueling had allowed metal shavings to fall into the reactor. Over the 18 month operating cycle the shavings had chewed holes in the cladding of 85% of the fuel rods, causing massive contamination of the reactor coolant [creating what one might call PU soup – "plutonium uranium" soup].

The reactor piping and reactor containment boundaries were both still intact, so the public was adequately protected from radiation, right?

Well, not exactly. Remember Dave Lochbaum's comment:

> *It seems only a matter of time before the initiating event wheel, the equipment wheel, and the human performance wheel stop in a combination that produces another accident.*

Many years ago tritium had contaminated a couple of Haddam potable water wells, indicating a large plume of groundwater contamination was coming from somewhere, probably a spent fuel pool or refueling water tank leak.

Not a really big deal until you combine it with the [1989] worst fuel damage event in the history of the industry. You put the PU soup into the [leaking] spent fuel pool, the PU soup leaks into the ground, the plume eventually reaches the discharge canal [and the CT and Salmon rivers].

So Haddam managers immediately reported this to NRC, shut down the plant, and called in the big construction equipment to fix it, right?

Well, not exactly.

It would have been nice if the cognizant Haddam managers had [at minimum] halted the [common] practice of allowing fishermen to come onto plant property and fish from the discharge canal. The below guidance on chemical spills and mercury [can build up to thousands of times higher] probably apply to tritium and strontium as well. My understanding is that as many as 15 soil or groundwater radionuclides were found at levels 10 – 20 times federal limits in wells near the discharge canal.

If fisherman did take any bass, carp or catfish from the canal [or the CT river or the adjacent Salmon river] hopefully they did not feed them to small children or pregnant women.

You can access the CT "safe fishing guide" here:

http://www.soundkeeper.org/uploads/fishweb02.pdf

> ***How Do These Contaminants Get Into Fish?***
> Mercury and PCBs can build up in fish to levels that are thousands of times higher than in the water. These contaminants enter the water from [chemical spills or mercury]. You are in the High Risk Group if you are a *pregnant woman*, a *woman planning to become pregnant within 1 year*, or a *child*
> *under the age of 6*. If you are in the High Risk Group, you should not eat certain fish at all

Since the radiation exceeded derived concentration guideline levels (DCGLs) for 15 soil or groundwater radionuclides, this triggered an EPA "superfund" site evaluation performed at Haddam in 2004.

Due to the severity of the soil and groundwater contamination [and the unpredictable potential of it leeching into the CT and Salmon rivers] the NRC task force [working with EPA] recommended continuing radiation monitoring for the Haddam site. However, this task force recommendation was dismissed by the NRC commissioners.

The commission also deleted [from the draft 2006 abnormal report to Congress] the task force conclusions that "unplanned and unmonitored radioactive releases could [continue to] migrate off site … without detection."

Here are changes the NRC commission made before the report went to Congress:

> The report's most significant conclusion was that, although there had been industry events where radioactive liquid was released to the environment in an unplanned and unmonitored fashion, there were no instances identified where the release had an adverse impact on public health and safety. ~~The task force also concluded that under the existing regulatory requirements, the potential exists for unplanned and unmonitored releases of radioactive liquids to migrate off site and into the public domain without detection.~~
>
> Indeed, the maximum potential dose in all of these incidents, a dose unlikely to have been received by any person outside the plants' boundaries, **was less than the dose** an average individual in the United States receives in one day during the course of routine activities from naturally occurring radiation sources (**such as the radium-226 in the building materials of the Capitol**) and was well below the regulatory limit for planned releases.

The NRC commission's claim that the radiation exposure from the groundwater event at Haddam was less than spending one day at the capitol is false. This argument comes from what is called "junk science", you can read more about it here:

http://mediamatters.org/research/200508120001

> In an appearance on Fox News' *Special Report with Brit Hume*, Cato Institute adjunct scholar Steven Milloy cited his study of radiation levels at the U.S. Capitol Building to argue that the health safety standards recently imposed on the proposed Yucca Mountain, Nevada, nuclear waste repository are unduly stringent. But Milloy's findings -- that the radiation exposure at the Capitol is far higher than it would be at the Yucca Mountain facility under Environmental Protection Agency (EPA) limits -- were debunked shortly after he published them in 2001.
> Milloy has a long history of conducting scientific studies that benefit powerful corporate lobbies -- a strategy described as "sound science." The practice has been described in the *American Journal of Public Health* as "sophisticated public relations campaigns controlled by industry executives and lawyers whose aim is to manipulate the standards of scientific proof to serve the corporate interests of their clients."
>
> Proponents of "sound science" purport to expose so-called "junk science," which Milloy has described as "faulty scientific data and analysis used to advance special and, often, hidden agendas" of personal injury lawyers, social activists**, government regulators** and the media."
>
> Milloy currently writes a regular "Junk Science" column for the Fox News website. In recent columns, he has argued that global warming represents "flawed science," that pesticide use in schools poses no threat to students, and that "radical environmentalists" are the "real energy problem."

After I found these details about the Haddam contamination event [and the apparent "junk science" cover up by NRC] I discussed the events with two Millstone NRC resident inspectors.

As I was speaking one resident kept nodding his hear up and down as if to say "yup, that's what happened" after I finished speaking the other resident [the senior resident] said "you know, the Chairman is not NRC."

I said: "Excuse me, the NRC Chairman *is not NRC*?" He said: "The Chairman is not NRC, he is a political appointee." And that is apparently how NRC inspectors live with some of the "political" decisions that NRC makes at the top. I don't know what else an NRC inspector could do.

Haddam Knew About The Radioactive Plume Since The Mid 1970's

David Lochbaum's book "Fission Stories" is a frequently humorous [and occasionally sobering] short story collection of incidences at nuclear plants told in "fishing story" style.

One of the stories is the Haddam "magic skunk" story. The Haddam plant went on line in 1968 with a slightly leaking spent fuel pool. Some time later [months? years?] a large groundwater plume of radioactive tritium reached the wells from which potable water was being piped into the plant.

Going forward the site used bottled drinking water, but wanted to continue to use the [slightly] tritiated water for maintenance [and general] purposes. Not wanting to alarm the public by disclosing that the wells were contaminated [and not wanting employees or visitors to accidently ingest the water] a story was concocted that a skunk had fallen into the well and died, thereby polluting the well.

Large warning signs were posted by the water faucets saying "SKUNK WATER". When I first visited Haddam [not noticing the very large sign] I filled a Styrofoam cup with "skunk water" and was about to drink it, but a technician stopped me and pointed to the sign [and told me the story].

Since multiple wells were contaminated, Lochbaum calls it the "magic skunk theory" as the skunk must have died, come back to life, crawled out and fell and died in the next well [this completely ignores the very credible "multiple skunk" theory] and may be why Lochbaum removed this story from later versions of his [really excellent] book.

During the 1996 safety scrub at Haddam [which like Millstone had been shut down by NRC] it was found a pipe that supplied cooling water to the reactor in an emergency was undersized. Apparently NU engineers had faked a number in a calculation to avoid the expense of installing a new [larger] pipe.

NU management pointed to this and said: "the new pipe will cost at least 100M to replace, so we have decided to permanently decommission the plant". The Millstone 2 reactor head replacement [I was one of the two project engineers] only cost 60M. I have never heard of a pipe costing 100M.

I discussed this [at the time] with the Haddam mechanical engineer who estimated the pipe replacement. He said: "that is way more than I estimated, I don't know where they are getting their numbers". It was not until within the last year that I pieced together what I think may have happened.

I think the "safety scrub" discovered the groundwater plume, and that is what really precipitated the Haddam decommissioning decision, but that this was too big [and alarming and embarrassing] an issue for NRC to disclose to the public, so NRC allied with NU to concoct the story that the ECCS piping was the reason.

After tens of thousands of cubic yards of radioactive soil was removed, the groundwater contamination dropped to less disturbing levels. I don't believe they were able to get the levels below federal EPA guidelines, but I believe NRC accepted some "special calculations" and said "OK, close enough".

Then in October 2005 Haddam finally reported to NRC the spent fuel pool leak that should have been reported about 30 years ago. You can read it here:

http://www.nrc.gov/reading-rm/doc-collections/event-status/event/2005/20051101en.html

> *OFFSITE NOTIFICATION*
>
> *Haddam Neck uncovered evidence of Spent Fuel Pool leakage below ground. The leakage was discovered when removing soil east of the Spent Fuel Building. Consequently, the site notified the Connecticut Department of Environmental Protection. The quantity of water leaked is unknown. Estimates based on historic Spent Fuel Pool evaporation data indicate that the leak was small - on the order of a few gallons per day. Based on readings from down-gradient monitoring wells, there is no travel beyond the property line.*

No groundwater contamination beyond the property line, because the aquifer funnels the grounwater into the discharge canal, which discharges into the CT river next to the Salmon river. Over 30 years, the effect was equivalent to dumping the entire contents of the spent fuel pool [Olympic size, but more than twice as deep] into the CT river.

Any public health affects?

I don't know, but the point is the Haddam managers and the NRC residents [and there must have been a number of them cycling through the Haddam plant, as they usually stay at one site only a few years] are supposed to investigate, and analyze, and report [in accordance with NRC regulations] and correct the problem. They are not qualified to assess the public health impact, not qualified to make the assumption that this kind of leakage is "no big deal".

Of course, the Haddam decommissioning became a little more costly than was expected, so the extra cost was passed on to [you know who] you, the ratepayer. This did not "sit well" with the new DPUC chairman:

[AP November 2005] CT DPUC Condemns Handling of Haddam Neck Decommissioning.

> *CT Department of Public Utility Control (DPUC) commissioner Anne George has accused Connecticut Yankee Power Company of mismanaging the decommissioning of the Haddam Neck Nuclear Power Plant to the detriment of power company customers. George maintains that Connecticut Yankee's fumbling is responsible for more than one-quarter of the $831-million rate increase instituted by the company, raising customer costs by one dollar per month for the next five years.*

If I were the CT governor, I would want to find out exactly what the Haddam managers did [what did they do, when did they do it] what they knew [what did they know, when did they know it] and I would want to discover if any Haddam managers who "looked the other way" are managing at Millstone today.

Organizational-Managerial-Political Influences at Davis Besse

At Davis Besse, managers dismissed three separate engineering requests to install opening needed to fully clean the reactor head:

> MOD 94-0025 (May 27, 1994): "Initiated MOD 94-0025 to install service structure inspection openings. Reasons for the modification include ongoing industry concern involving corrosion of the Inconel 600 reactor vessel nozzles. There is no access to the reactor vessel head or the CRDM reactor vessel nozzles without the installation of the modification. Inspection of the reactor vessel head for boric acid corrosion following an operating cycle is difficult and not always adequate. Video inspections of the head for the CRDM nozzle issue and as follow-up to the CRDM flange inspection do not encompass a 100% inspection of the vessel head. Cleaning of excessive boric acid residue from the reactor vessel head also does not encompass 100%. Installation of these inspection openings would allow a thorough inspection and cleaning of the head. All B&W plants with the exception of Davis-Besse and ANO-1 have installed this modification.

The system engineer then wrote a report saying that one of the CRDs appeared to be cracked and leaking boric acid [appeared to be a through-wall "primary boundary" leak requiring an immediate shut down of the plant].

Looking for an excuse to not shut down the plant, a First Energy executive called up the NRC executive responsible for issuing shut down orders [Sam Collins, Director of the Office of Nuclear Reactor Regulation (NRR)] and said [paraphrase]:

"We found this small crack, but we think we can safety operate for a few more months until our scheduled outage, and we would [really really really] like to keep operating, OK?."

Here is an excerpt from a February 2003 Ohio Blade article:

> NRC staffers wanted the plant shut down no later than Dec. 31, 2001 because they feared its reactor-head nozzles were cracked and leaking. As it turned out, so much acid had gotten out of the reactor that the head nearly ruptured – a scenario that experts now say could have led to a Chernobyl-like meltdown if safety systems and the containment structure had, in turn, failed.
>
> According to a transcript of his second interview with the inspector general's office, Mr. Collins said he had intended to issue the shutdown order when he forwarded it up the chain-of-command on Nov. 16, 2001, to William Travers, NRC executive director of operations. Five days later, the order was passed along to the full NRC board.
>
> NRC staffers received a memo on Nov. 21, 2001, summarizing a meeting that day between Mr. Collins and Robert Saunders, president of FirstEnergy Nuclear Operating Co., the utility's nuclear subsidiary.
>
> The inspector general's office has claimed that meeting was pivotal to the decision Mr. Collins ultimately made – meeting the utility halfway and letting it keep operating Davis-Besse until Feb. 16, 2002, a date which skeptics have viewed as arbitrary … three months later than the shutdown date proposed by the NRC staff.
>
> "There was also feedback at one point from the Chairman at a very high level just indicating his external interest in this and I indicated to him I'm aware of that," Mr. Collins was quoted as saying.
>
> An interviewer asked him to describe what he meant by external.
>
> "My impression, we were talking about elected officials," Mr. Collins said.

So the NRC said "oops we really screwed up, but this has been a great organizational-managerial lesson for us, and don't worry we have certainly learned our lesson."

Well, not exactly.

The NRC blamed the system engineer for not fully cleaning the head, criminally charged him and banned him from the industry for five years [effectively for life as no plant is likely to ever hire him]. He lost his job and his house, was convicted, fined $4,500 and given three years probation.

His attorney wept at the injustice and later asked a juror: "how could you find him guilty?"

The juror replied: "I didn't think he was personally responsible, but someone had to be held accountable."

Meanwhile, the First Energy Operating Company [the subsidiary that operates the five First Energy nuclear plants] agreed to pay a record $28 million fine [or about one week's production revenue] on the condition that the Department of Justice did not prosecute any First Energy managers:

Under the agreement, the Department of Justice will refrain from seeking an indictment or otherwise initiating criminal prosecution of FENOC for all conduct related to the reactor head issue, as long as FENOC remains in compliance with the agreement, which the company fully intends.

The 24 Events That Shaped The Industry

Here is what INPO says about the 24 "events that shaped the industry":

> *"The events were significant enough that to allow them to happen again for lack of response was unacceptable. Hence, remarkable actions were taken to prevent recurrence."*

How "remarkable" were the actions to prevent recurrence? All industry managers were supposed to have learned not to repeat these events.

What were the lessons from the 1993 Millstone event?

> *<u>How This Event Shaped the Nuclear Power Industry</u>*
> *This event brought into focus the dangers of emphasizing production over nuclear safety. A key lesson was the importance of senior nuclear managers periodically emphasizing to personnel that nuclear safety considerations always take priority over production goals*

How Well Did Millstone Learn The Lesson From [It's Own] 1993 Millstone Event?

Unfortunately, last fall Millstone leadership repeated the same kind of [management] error that precipitated the 1993 event. To save a little bit of production time, management violated switchyard work procedures and put production over nuclear [and personnel] safety. Millstone managers scheduled maintenance electricians to work on a live [345,000 volt] switch.

345,000V switches must not be worked live [a 120V wall switch should not be worked live] the work control procedure says:

> *"Every attempt must be made to plan, schedule, and perform work on critical transmission facilities when a unit is out of service."*
>
> *"Unit refueling outages should provide adequate time for scheduling 345kV facility outages."*

The electricians started to disassemble the switch, it created an arc [on a sunny day] so bright that you could not look at it, showered the backs of the rapidly exiting electricians with bits of molten metal, and tripped the plant [because it disabled electrical safety systems]. This event could have easily killed or seriously harmed the workers.

So after this event, Millstone management called safety "stand down" explained the mistakes that the leadership team made and turned it into a good lesson on maintaining leadership focus on safety, right?

Well, not exactly.

Like the NRC actions at Haddam, sometimes when things go bad in a big ugly way, there is a strong desire to cover it up [if you can get away with it] and the root cause team covered it up, arguing that the procedure was missing instructions on how to work the 345KV switch "live".

As INPO coordinator it was my job to do a write-up of what happened for the INPO report. I wrote a draft of what really happened [management put profits ahead of safety and ignored a "must do" switchyard work procedure] and submitted it to management for approval.

The department manager called a meeting in his office to discuss my write-up.

During the discussion I looked directly at the root cause author and said "WC12 says that every attempt must be made to schedule 345KV work during an outage, was every attempt made?" He simply stared back without changing expression, no answer. I said: "was any attempt made?" Again, he simply stared back without changing expression, no answer.

I told the department manager that I stand by my write-up. The department manager told me [surprisingly in front of four people at the table in his office] "we can't say that, what if the public sees it?" and directed me to change the write-up to match the [management sponsored and approved] root cause evaluation write-up.

As I told my supervisor before the meeting, this was an organizational repeat of the 1993 "*emphasizing production over nuclear safety"* event. However, if I had tried to argue or imply this to the department manager, I believe there would have been even less of a chance of avoiding a cover-up.

How Well Did Millstone Learn The Lesson From The 1989 Haddam Fuel Damage Event?

> <u>*How This Event Shaped the Nuclear Power Industry*</u>
> *The industry realized that current programs designed to preclude the introduction of foreign materials into the reactor vessel or spent fuel pool during maintenance activities were in need of significant improvements.*

At Millstone in April 2008, foreign material interfered with the function of a stop valve, creating a reactor coolant leak and requiring Millstone to declared an "Unusual Event" [the lowest level nuclear emergency] due to unidentified leakage greater than 10 gallons per minute.

The root cause evaluation [same author who wrote up the 345,000V switch] said:

> *Engineering failed to keep abreast of industry experience related to spiral wound gaskets and to make recommendations for design and procedure changes.*

I wrote the operating experience report from the root cause evaluation, and sent it to INPO. Later, an engineer came to me and said: "you know, that is not really what happened" and gave me a list that showed he had been in fact keeping abreast of industry experience and communicating it [as he should be] to maintenance.

He told me he strongly disagreed with the root cause evaluation conclusions, and had refused to sign off on the root cause evaluation. While he was on vacation his department manager had signed it off, so it had been completed processed and filed.

I called this manager and said: "why did you sign this off when you knew [the engineer] didn't agree with it?" He said: "sometimes you just have to move on."

Later I was told what really happened was [in an effort to save money] managers instructed supervisors to find some jobs that are not absolutely necessary and cancel them. Apparently the engineer's supervisor had [without notifying him] cancelled the paperwork that he had submitted to update maintenance procedures with the information that would have avoided the event.

Who had instructed the supervisor to find some unnecessary work and cancel it? Most likely the same manager who had signed off the root cause evaluation while the engineer was on vacation. Getting it closed out and filed away ASAP would have been a good move on his part.

Foreign material has been a continuing problem at Millstone, shortly before I retired I suggested to Training that they periodically review INPO foreign material guidance, and verify that it continuing to be properly represented in training plans. Training responded: "INPO does not say this is needed, so we are not doing it".

About a year ago the engineering manager who signed off the root cause took a job in Virginia, and was replaced by an engineering manager from Virginia. When you work at Millstone for a while you become acclimated to poor management, and after a while you cannot even "see it".

The Virginia manager immediately started going through the [very large] backlog of engineering work, saying [appropriately]: "we need to either do this stuff, or decide that we do not need to do this stuff, and cancel it." This was like a breath of fresh "good management" air. I sent an email to the CEO of generation recommending that this manager be promoted to Millstone engineering director.

There was a problem however.

One of the people in engineering told me that this action had uncovered a bunch of restart issues, safety improvement modifications that the 1996 "safety scrub" had flagged, that NU management had promised NRC to address.

NU had said: “Please let us restart now even though not all of the [safety cleanup] work is done, we promise we will fix these things ASAP”. NRC said: “OK, we will allow you to restart now, but be certain you fix these things ASAP” and then NU sold the plants to Dominion.

But the NRC resident inspectors are there, and surely [to safeguard the public] they must be tracking these “restart items” and ensuring that they are all satisfactorily addressed?

Well, not exactly.

A few years ago I went to an industry conference and attended an NRC presentation. It showed how one of the major problems at NRC was the lack of a corrective actions process, the lack of any kind of a tracking system for ensuring that action items are tracked and closed.

When I returned to the Millstone I asked the resident about this and he said: “oh yes, we should have a good system very soon”. Then I asked him to “please let me know when it is in place”. He said: “I will”.

I said: “you don’t have a tracking system, so how will you remember to do this?” He said: “don’t worry, I will remember”.

He never got back to me.

How Do You Address Management Problems Like This?

Last year NRC asked me [invited me as a member of the public] to join a “call in” discussion on their efforts to manage safety culture at new plants being built. I told my supervisor about it and called into the meeting, I was on the phone for about an hour.

The department manager found out about it and told my supervisor to inform me that I was not allowed to attend these kind of NRC meetings during company hours, that I would have to take a vacation day and do it from home. In my view, this was violation of 10CFR50.7 employee protection.

Every nuclear plant is required to post a large [poster size] copy of NRC form 3 which outlines certain responsibilities and rights of employers and employees. One of the employee rights is not to be harassed or discriminated against for taking part in an NRC proceeding [which I interpret as anything the NRC is trying to accomplish].

My supervisor told me that someone who attended the meeting had told the manager I had been misrepresented myself as speaking for Dominion [I had been attending these NRC safety culture discussion for years, the NRC me as, and knew I was speaking as, an independent “expert” member of the public].

The supervisor then told me the Chief Nuclear Officer of Dominion was upset [presumably about my actions]. I just happened to know the CNO very well [we had been discussion safety culture for years] about a week later we sat down to discuss culture and I told him about my supervisor’s comment, and asked him what he was upset about. He said he wasn’t upset, and didn’t even know I had attended a meeting with NRC.

I had been in the group about a year, but the supervisor and manager had been in the group just a couple of months {the supervisor was recently hired and the manager had recently returned from a

long assignment]. I think neither was aware that I knew the CNO, and they were telling me that he was angry [I am guessing] to intimidate me and "keep me in line."

I complained about this treatment to some coworkers. I discovered two other workers within sight of where I sat had in the past been harassed by the same manager [both had filed complaints]. As I had gone to the employee concerns program in the past [with unsatisfactory results] I did not go to ECP, but a coworker contacted the ECP manager, who asked me to meet with him.

I told him about the manager's actions he said "oh yes, we have known about that manager for a long time." I said: "really? well, what have you been doing about it?" He said: "we take some actions, you know those management changes that took place recently [about 6 managers had recently swapped positions] a number of those were due to employee concern issues."

I said: "if all you do is move managers to another department when there are problems, isn't that a bit like how the church deals with problem priests?" The ECP manager appeared offended and said: "we do a lot more than that." I said: "OK, what else do you do?" He said: "I can't tell you, it's confidential." I said: "whatever you are doing, it does not seem to be working."

Lee Olivier [now COO of Northeast Utilities] is widely considered one of the top culture managers in the industry, and was hired specifically [was hired away from the Pilgrim nuclear plant] by NU to lead the 1996 – 1998 safety culture recovery at Millstone. By all accounts by the end of recovery Olivier had managed the culture to an impressively high level of excellence.

As I said, in 2003, a lot of Ohio reporters were doing stories on the Davis Besse event, and many of them attended the 2003 NRC workshop [I did a presentation on safety culture management]. After the workshop, I was interviewed for a half dozen Ohio newspaper articles as an "industry safety culture expert."

I suggested to one of the reporters that he interview Lee Olivier, this was Olivier's comment from the article:

> *If nuclear plant executives would concentrate on building trust with employees and helping them reach their highest potential, the NRC wouldn't have to worry about safety culture inspections, said Lee Olivier, who led the transition at Millstone and is now president and chief operating officer of Connecticut Light and Power Co. "The first thing you do is prove to people you care about excellence, and about them," said Olivier. "When you do these things, you build trust coupled with higher standards and expectations."*

A couple of years later I asked Olivier [basically] "what was your 'secret' for maintaining such a healthy safety culture at Millstone, what was the most important thing?"

Olivier replied:

> *"First you establish clear expectations for leadership behavior. Then there are always a few managers who 'just don't get it'. Now this is the most important thing [for senior managers to do to maintain a healthy safety culture] but it is the thing that most senior managers will not do. The managers who 'just don't get it' cannot remain on the leadership team."*

I recently told the CEO of Dominion generation that during recovery there is no way the manager that ECP "has known about for a long time" would have been allowed [by Olivier] to remain on the leadership team. Personally, I have a [somewhat] softer position.

I believe managers who continually fail to demonstrate the organizational-managerial behaviors [that INPO outlines] that are needed to promote a healthy safety culture [what INPO calls "leadership professionalism"] can remain on the leadership team, but are not qualified [cannot be permitted] to manage a safety related functional area.

Nuclear employees are qualified all the time for this and that safety function. As a design engineer I had a laundry list of qualifications that I needed to keep current. I have been proposing for some time now that managers need to be qualified to manage safety culture. This would involve a much more detailed and comprehensive training program that the current [SCWE] industry training provides. As a Washington attorney who does safety culture training told me: "it is surprising how very little industry managers know about safety culture."

I would recommend developing a NRC regulatory guide called "CARMA" [Culture Assessment and Regulation Management Approach]. That would establish requirements for training workers and managers in safety culture fundamentals and leadership behaviors that maintain a healthy culture, and requirements for periodically assuring that every member of the leadership team is adequately demonstrating these behaviors [in essence, establishing a quality management program for safety culture].

If a bus driver is texting while driving, the passengers must say something, and the behavior of the driver must be evaluated. Perhaps the person needs more training, or perhaps the person should not be a bus driver. Behaviors like this exist for safety culture management, and employees at Millstone [workers and supervisors] frequently complain about managers that exhibit these kind of behaviors. These complaints are typically either ignored, or handled ineffectively by ECP.

For this reason a method of screening leadership behavior and "listening to workers" [without the intimidating presence of management] needs to be institutionalized at Millstone. There is nothing new or unusual about this, most culture experts [Schein, Carroll, Reason] recommend doing something like this periodically to maintain a healthy culture. Shortly after the 1998 recovery restart, John Beck recommended that Millstone leadership institutionalize something like this. I myself have recommended this to Millstone management nine times [about every year] since recovery. Last year I sent the CEO of Dominion generation the below image of what a healthy management team should look like [what the management team at Millstone should look like].

Industry managers really don't want any part of this. Industry managers would like to maintain the status quo, which is "authority without accountability." The fundamental post-deregulation managerial philosophy of "minimal regulatory compliance" would be threatened if managers were

required to "behave properly" and to "listen carefully and responsibly" and address what groups of workers might offer as "organizational process concerns".

The industry lobby group NEI complains loudly if the NRC even hints at starting to develop something that oversees and regulates leadership behavior. To get the NRC to back off, NEI argues: "the licensee is primarily responsible for safety management, not the NRC, so NRC should stay out of management" [and historically the NRC has always backed off]. As Apostolakis said to the Plain Dealer in 2002:

> *"For the last 20 to 25 years," Apostolakis said, "this agency has started research projects on organizational-managerial issues that were abruptly and rudely stopped because, if you do that the argument goes, regulations follow. So we don't understand these issues because we never really studied them. It's a major failure of the system, in my view."*

What the NRC needs to do is to say: "yes, the licensee is primarily responsible for managing safety, but the NRC *is primarily responsible for assuring that safety is being properly managed*" and then give licensees notice that the days of "authority without accountability" [of texting while driving] of "low levels of leadership professionalism" are over.

What NRC Needs to Do Next

NRC needs to ignore the industry lobby and wrap both of it's hands firmly around the safety culture issue. However, every time NRC tries to touch safety culture, the industry lobby group NEI [the Nuclear Energy Institute] complains that safety management is their responsiblility and that NRC must "stay out of management, that's not your job!" In this area NRC has always acted more like a lapdog that a watchdog. The Ohio reporters covering Davis Besse understood this, and this editorial cartoon was published in 2002 after the Davis Besse event.

It is correct that it is not the job of NRC to be a [surrogate] manager of the plants. It is however, the job of NRC to ensure safety culture is being properly managed at the plants. It is the job of NRC to make certain that the leadership team is managing in an ethical and professional manner.

So What Regulates [Monitors, Controls] Safety At Millstone Today?

After the Millstone event, the state of CT realized that NRC might not able to effectively monitor safety at Millstone and created NEAC [Nuclear Energy Advisory Group] that is supposed to monitor the safety culture and alert the governor to safety problems at Millstone. NEAC [comprised of mostly retired submarine commanders and engineers] gets most of it's safety data from the NRC. NRC cannot assess safety culture, so how can NEAC do this from NRC data?

Years ago I attended a couple of NEAC presentations in Waterford and tried to explain this to NEAC, but the sub commanders were highly insulted by any implication that they did not fully understand nuclear safety. Go ahead, you try to explain nuclear safety culture to a nuclear submarine commander and see how far you get.

In 1996 the Millstone were shut down for two years while an unprecedented safety scrub was performed. It was not the NRC that initiated the shutdowns, it was the media. It was the front page Time magazine article [by Eric Pooley] that precipitated [and caused NRC to initiate] the shutdowns.

I think there is abundant evidence that another safety scrub is needed. The NRC resident inspectors has for a very long time now been grumbling about organizational-managerial problems, but NRC does not provide them the "tools" needed to identify the problems and act to correct [regulate] them. It may [again] be up to the media to galvanize public opinion and secure the needed action at Millstone through public officials.

So What Is It That Assures Safety at Millstone today?

I would like to be able to say the NRC, but you are looking at it: the "media."

Articles like this one, if people read them and petition people in positions of authority to take some action. If the CT Governor listens only to NEAC, nothing is going to happen.

As I said NEAC does not listen to me, so about a week ago I emailed three political hopefuls, providing them preliminary information, asking them to contact me:

- Ned Lamont
- Peter Schiff
- Richard Blumenthal

I have many supporting documents [I am not making this stuff up] I am available with any representatives of government who are interested in taking meaningful corrective actions to try to address these problems.

What Can People Reading Who Read This Article Do To Help

As I indicated, I have evidence from [a room full of] experts [ORE managers] that safety is currently under-staffed in the Millstone ORE department, a department that is supposed to do what NRC cannot do – ensure that the most frequent causal factor of nuclear power industry accidents [organizational-managerial failures] does not cause a serious accident at Millstone .

If any [current or former] Millstone employees are aware of other departments understaffed by the layoffs [or other safety related issues not being resourced or addressed] in any of the other [50 or so] departments at Millstone, PLEASE HELP ME TO COMPILE THIS INFORMATION.

[Please do not call me] send an email to the below address that I created for this purpose:

millstoneISP@gmail.com

And do this:

- *Identify* where you think there is a safety problem
- *Analyze* what you think the safety problem is [what does NRC or INPO or another organization or some document say should be done that isn't being done]
- *State* the corrective actions you feel are needed

If the issues appear significant *prima facie*, I will add them to any discussions I may have going forward with people who are either in [or hoping to soon be in] CT government.

What Should Happen Next

Safety is a type of business ethics that ensures business actions do not harm people. Even if safety were not being under-resourced at Millstone, worker terminations coming in the middle of a string of windfall profits should be a clue that Millstone is willing to put profits ahead of the welfare of people.

When a business with public safety responsibilities takes actions to make money that harm people, this kind of action needs to be viewed [by regulators and people in government] as a warning flag that this company willing put profits ahead of people, will put production ahead of safety. This kind of action should be viewed as an indicator of a poor safety culture.

Managers who do not understand this should perhaps not be managing public safety. Regulators and government officials who do not understand this should perhaps not be overseeing public safety. The first lesson that Millstone should have learned from the 1996 shutdowns is that maintaining the trust of all stakeholders is something that is essential.

The first thing that needs to happen is Millstone needs to reverse the terminations and rehire the workers to their jobs. Millstone should be encouraged to allow them to keep their severance payments, as compensation for the disruption that this action [the terminations] caused in their lives.

What should happen next is the CT Governor should not allow Millstone 3 to restart from the current outage [began mid April] until all significant safety issues are identified, analyzed and addressed to the satisfaction of:

- The NRC resident inspectors
- A panel of INPO representatives
- The Millstone Oversight department
- A panel of responsible Millstone managers
- A panel of responsible Millstone workers

By “Responsible Millstone Managers” I am referring to people like the first line supervisors I mentioned and many others like them who have been fighting for a very long time to be allowed to implement needed safety improvements at Millstone. By a “panel” I mean a handful of representatives from these groups that for years have raised safety or quality issues to Millstone management [issues that have been effectively dismissed (not resourced)].

If Millstone people who read this article provide me with a little help, we should be able to make some of these things happen.

A Final Word

US nuclear plants are designed very [very] safe. They can withstand a lot of [very] poor management and still operate safely. My family and I live inside the Millstone evacuation zone, I am not worried, I not going anywhere.

Millstone and US nuclear plants are not like Chernobyl. Even the Russian plants are not [today] designed like Chernobyl. Chernobyl had a very serious design flaw that [the organizational-managerial system] knew about but did not address [covered up] which allowed Chernobyl to continue to operate, with disastrous results.

The reason I have been beating up on NRC for a very long time now [and in this article I “beat up” on Millstone a little] is that people who live near nukes have a right to know what is going on in their back yard, and also that we need better safety management and NRC needs to become a better regulator. NRC needs to go back and learn the lessons of Millstone [correctly this time].

Another reason we need nukes to operate more safely is that we need more of them. Believe it or not, nukes are a much better [healthier more environmentally responsible] way to generate [baseload] electric power than is coal.

Note that I say [baseload] this is very important to understand. The wind does not always blow, the sun does not always shine [for example, often does not shine at night] so until [and unless] an incredibly enormous “magic battery” is somehow invented [and right now there is nothing on the horizon giving even a remote indication that this can someday happen] only nuclear can replace coal.

Due to the work of energy industry lobbyists, old dirty coal plants built before the mid 1970s continue to operate without modern pollution controls. The result is [since TMI] hundreds of thousands of early deaths and millions upon millions of cases of chronic asthma and respiratory disease have occurred that could have been avoided if [after TMI] the US had stayed with it’s planned nuclear expansion policy[as for example France did].

What is killing and harming the health a surprising number of [mostly very old and very young] people is something called “particulate pollution.” It is only over the past decade that this has been clearly understood. One of the largest contributors is coal soot in the air [breathing soot in the air is equivalent to breathing second hand cigarette smoke].

You think you don’t smoke? Think again. You can read about it here:

http://www.americanheart.org/presenter.jhtml?identifier=4419

Additional scary accidents like TMI or Davis Besse [even if no one gets hurt] will end the needed expansion of the industry. So we need nukes, but we need them to operate more safely, and we need to encourage people in government and the NRC to help make this happen.

[End of article]

Dave Collins has a MS in Executive Management and Leadership. With the endorsement of NRC safety culture expert John Sorensen, in 2000 he completed a highly successful study of a "state of the art" safety culture CARMA [culture assessment regulation management approach] study at Millstone. In 2003 wrote a thesis paper on safety culture management. In 2004 he assisted MIT with safety culture modeling and has helped develop industry safety culture training software. He is currently a member of an NRC expert panel to improve safety culture definition, assessment and regulation. After working as a design project engineer, Oversight assessor, human performance supervisor, and INPO coordinator, he retired from Millstone in March of 2009. He continues to work to improve safety management in the nuclear power industry [and beyond] his work continues to be supported by leading academics and authors. David lives in Old Lyme with his wife Kathy.

<u>Endorsements</u>

Dr. Jonathan Wert, Nuclear Industry Safety Culture Consultant:

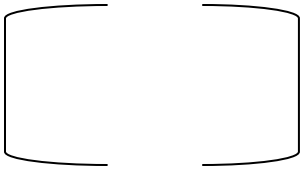
> "David, I consider you to be much more qualified than any of the academicians, psychologists or navy nukes that I know or have read about. You have actual experience with nuclear safety culture where the 'rubber hits the road' ground zero on the firing lines."

Lee Olivier, COO Northeast Utilities [former NU CNO]:

> "David, good to see you using our experience at Millstone as a model of how to successfully make change. You can treat people with a deep rooted respect and care and still make the hard business decisions…it's how it's communicated, it's the level of trust in the organization etc. Really centering around the issues you identified. Again, your paper was extremely thoughtful and well written. Good luck with it." - Lee

David Christian CEO Dominion Generation [2005 comment, not likely to be repeated after this article]:

> "I think [David] is among the finest intellects and communicators in the area of safety culture."



Personally Identifiable Information (PII)
(Identified By NRC Staff)

REVISION 1

I GAVE THIS INFO TO THE DAY APRIL 14. REPORTER REVIEWED SUPPORTNG DOCUMENTS [FOR 3 HOURS] VERIFIED ALL WAS WELL SUPPORTED AND ACCURATE. HOWEVER DAY WILL NOT PRINT UNLESS I RELEASE ALL INTERNAL INPO / MILLSTONE DOCUMENTS TO THEM. MY LAWYERS TELL ME ARTICLE IS PROBABLY OK, BUT NOT TO RELEASE DOCS AS MAY NOT BE LEGAL, SO IS DIFFICULT TO GET THIS INFO TO THE PUBLIC. I AM CHECKING WITH OTHER MEDIA OUTLETS IF YOU CAN HELP PLEASE EMAIL millstoneisp@gmail.com

Millstone Needs Another Safety Scrub, CT Governor Should Review March Worker Layoffs

To help Dominion executives meet Wall Street numbers, In March Millstone reduced staff too quickly, and is currently operating without important safety functions in place that are designed to minimize the chance of an accident. How this could happen with two NRC resident inspectors stationed right on site at Millstone?

I am a recently retired Millstone [engineer, safety system quality assessor, and INPO coordinator]. I also wrote a master's thesis on safety culture management, and I am an industry safety culture [safety management] expert.

In March Millstone reduced staff through early retirements [I was one of the "early retirees"] and also through terminating over 50 workers [the entire management team was exempt]. There are many older workers at Millstone, and the desired staff reductions could have been accomplished over the next 2-4 years through early retirements [I verified this with HR].

In April, I implored the plant manager not to involuntarily terminate any workers, as this [very clearly was not economically necessary. I sent emails to top Dominion management arguing that this action was only to improve short-term profits [beef up Wall Street numbers] and was as unnecessary as it was unethical. "Don't do this" I said.

In January the Millstone plant manager had justified the [100 or so] staff reductions pointing out that some sites have higher INPO ratings than Millstone with [about 10%] lower staffing numbers. [INPO is the Institute of Nuclear Power Operations, the industry "excellence" organization formed after Three Mile Island to recommend operational improvements that minimize the chance of an accident].

While some sites do have higher ratings than Millstone with lower staffing, this is due to the presence of a highly effective leadership teams combined with a strong site-wide safety focus, not because they have 10% fewer people.

A Toyota Prius gets high gas mileage because it has been engineered to operate efficiently with lower quantities of fuel. Putting less gas into your "old clunker" is not going to magically turn it into a Prius. Reducing workers at Millstone is not going to magically make the leadership team more effective, or improve the site-wide safety focus. However, like not putting enough gas in your old clunker, it will result in your not getting where you need to go.

When I found out in late March the staff reductions had been made in the department I had just left [the Organizational Effectiveness department] I said "you can't do this", and for the first two weeks in April have been sending copious documents to top Dominion managers explaining exactly how safety has been [significantly] under-resourced, and why they now need to reverse the [50+] worker terminations and bring these workers back.

If I felt that the staff reductions had no [significant] adverse impact on nuclear safety [while I would have still believed the worker terminations unethical and unnecessary] I would have said "oh well,

that's business I guess" and would not be writing this article. No, this is not "just business" this is a company that is putting short-term profits ahead of the long-term public safety interests of the people of Connecticut.

To understand why I am saying this, the reader needs to understand a little about safety management in the nuclear industry, the historical nuclear safety management that has occurred in the past in Connecticut, and the safety management that is ongoing right now at Millstone.

Putting Profits Ahead of People And Ahead of Safety

According to a New Haven Register article published last month:

> *Dominion's net pre-tax profit from the Millstone 3 generating unit was $440 million in 2009, which translates into ... a return on equity of 115 percent, according to the report. [CT] HB 5505 defines windfall profits as "in excess of 20 percent return on equity."*

Add the production of Millstone 2 and this equates to annual windfall profits of about 770M.

The Iraq war [and other factors] have kept energy prices artificially high for many years, and over the past decade companies like Exxon Mobile have raked in record windfall profits. For much of this time there has not been a "real" shortage of oil, just the "risk" of a shortage of oil. Which means these companies have used the fear of shortages to charge more for their product, not because they "need to", but because they "can" and the government [heavily influenced by the energy lobby] lets them get away with this.

When energy prices go up, companies that rely on oil [or gas or coal] to produce power need raise electricity prices because fuel is a major cost factor. This is not the case with nuclear. The price of uranium oxide is not significantly affected by oil prices, and even if it were, most of the cost of operating a nuclear plant is not the fuel cost, but the cost of the large numbers of staff required to operate a plant safely.

So when energy prices go up, nukes charge more for electricity not because they "need to", but because they "can" and while energy prices have been high [really ever since Dominion purchased Millstone in 2001] Millstone has proven an amazing "cash cow" for Dominion.

How much money has Dominion made on Millstone since 2001? Profits for nukes trend up and down with oil prices, so here is a rough estimate [*2010 oil price projected as of 3/11/2010]:

Year	Price per barrel	Est. Millstone Profit
2001	23.00	331
2002	22.81	328
2003	27.69	399
2004	37.66	542
2005	50.04	721
2006	58.30	840
2007	64.20	924
2008	91.48	1317
2009	53.48	770
*2010	69.85	1006
		Total 7179

So Millstone has made about 6B since purchased by Dominion, and may make up to another billion this year.

Considering how much Dominion makes on Millstone, I wondered why on earth Millstone had felt the need to terminated 50 CT workers in March [all good people with whom I worked and who I know were loyal, dedicated employees]. This was clearly not because Dominion "had to" but because they "could." But why would Dominion do something like this?

Overstaffed or Undermanaged?

In January the plant manager at Millstone rolled out a [Goodnight consulting] chart showing that since 1996 [essentially since deregulation] production performance has improved as staffing levels have dropped, and implied that statistics show that safety and reliability correlate positively with low staffing numbers, and that plants with low staffing generally also have high INPO ratings.

I contacted the owner of Goodnight consulting [Charles Goodnight] he said he does not have access to INPO ratings and never claimed any correlation with low staffing and safety. I think the majority of people in the industry would tell you that high INPO scores correlate more closely to site management team efficacy [management was exempted from the layoffs, no surprise here] than staffing levels that are marginally higher than similar two unit sites.

Goodnight did support some staff reductions, but only if done in a careful, controlled manner, and only after completing something called a "change management plan" to verify that staffing remains sufficient to support critical safety functions. A member of Millstone management told me [this is a month *after* the layoffs] that these "change management plans" were never completed.

Several people have since told me that the "real" cause of the layoffs is that the Dominion did not get the rate increase it wanted from it's [regulated] Virginia plants, and is now taking "a pound of flesh" from it's [deregulated] CT plants.

I wondered, is this dynamic causing money to be given precedence over safety in CT? Could an over-focus on "maximizing profits" [right now, today] be increasing the probability of a nuclear accident in CT?

Short Term Profits Over Long Term Safety

Is Dominion putting [short term] money interests above [long term] safety interests at Millstone to meet [arbitrary] 'Wall Street' goals set by top executives?

INPO does not use the term "accident" it calls serious accidents like TMI a "significant event." INPO says nearly every significant event since 1993 [since deregulation] had "pressure to continue operating" as a causal factor [this was not observed even once prior to deregulation].

> *It is important to note that [pressure to continue operating] was a factor in all but one of the most recent (since 1993) significant events. Therefore, given today's competitive environment,* ***pressure to continue operating*** *may be a notable contributor to future significant events.*

Are competitive pressures due to deregulation causing an increasing focus on money and a decreasing focus on safety?

Do Everything NRC Says And Your Plant Will Operate Safely, Correct?

Well, not exactly.

The mission of NRC is to assure "adequate" public safety, the mission of INPO is to promote "operational excellence". "Operational excellence" is what avoids accidents like TMI.

INPO was established after TMI to encourage the industry to more than the minimum, to do everything reasonably possible to prevent events like TMI [and many others] from recurring. To keep the probability of nuclear accidents ALARA [as low as reasonably achievable].

INPO identifies [not engineering problems but] a weak safety culture [organizational-managerial problems] as the most frequent causal factor of nuclear "events" like TMI and the majority of the others.

As competition increases, more and more operating companies have been adopting a philosophy of "minimal regulatory compliance". This means that management controls costs by doing the bare minimum required to satisfy NRC. The more responsible ones also do the minimum that keeps INPO happy, and the CEO's of these operating companies are rewarded by receiving an "INPO 1" rating for their nuclear plant sites. Average plants get "INPO 2"

The Millstone site has historically been "INPO 2" [average]. However, for a long time now INPO safety metrics have had Millstone on the bottom of the industry. In January, the overall INPO rating for one of the plants was dead last, equivalent to an academic score of "F minus declining." The next INPO review is likely to categorize Millstone as an "INPO 3" a rating given to a handful of the worst performing sites in the industry.

How Likely Are Future Major Accidents?

UCS [Union of Concerned Scientists] Dave Lochbaum is the leading nuclear industry watchdog critic. After the 2002 Davis Besse event he was interviewed by CBS "Sixty Minutes." Below is a precient article Lochbaum wrote several years before the Davis Besse event occurred, warning that a major accident can still occur [as Davis Besse demonsrated]:

http://www.ucsusa.org/nuclear_power/nuclear_power_risk/safety/nuclear-plant-safety-will.html

> *With 103 reactors currently operating in the United States, these data suggest that a major reactor accident may be fairly likely to occur in the near future. It seems only a matter of time before the initiating event wheel, the equipment wheel, and the human performance wheel stop in a combination that produces another accident.*
>
> *Why should anyone be concerned about preventing another reactor accident? After all, the Three Mile Island accident produced some dramatic headlines and prompted a Saturday Night Live skit, but it did not leave portions of the Pennsylvania countryside uninhabitable. If TMI represented the worst-case reactor accident, then it might be acceptable to suffer one such disaster every generation. Unfortunately, things can be much worse than TMI.*

A few years ago Lochbaum left UCS and took a job at NRC. UCS offered me Lochbaum's job, but I was employed at Millstone and said I would consider it after retirement [Lochbaum has since returned to UCS].

What About Safety At Millstone Today?

TMI [and Chernobyl] demonstrated that organizational-managerial problems lead to most of the serious nuclear accidents. If NRC had not figure out how to effectively regulate organizational-managerial issues after TMI and Chernobyl, certainly after the Millstone event the NRC [finally] figured it out and corrected the problem. Right?

Well, not exactly.

In 2003, a lot of Ohio reporters were doing stories on the safety culture problems that led to Davis Besse event, and many of them attended a 2003 NRC workshop on the subject where I did a presentation on "safety culture management". After the workshop, I was interviewed for a half dozen Ohio newspaper articles as an "industry safety culture expert."

If you google "david collins safety culture" you can access a couple of the [many different] papers I have written and presentations I have given. After the 2002 Davis Besse event, this article appeared in a Cleveland newspaper:

2002 Cleveland Plain Dealer *Employees must fix plant's damaged attitude on safety*

> *The Millstone debacle was supposed to have heightened the nuclear industry's awareness of the safety culture issue. The NRC believed Reactor Oversight Program, its new approach to monitoring the nuclear fleet would be a more sensitive, less subjective indicator of how well reactors were operating. Which is why Davis Besse came as such a shock to regulators and the industry: Until the day the hole in the reactor lid was found in March, the plant got uniformly high marks from the NRC's inspections*
>
> *"There clearly were some issues with safety culture at that plant that had not been recognized by us, and not recognized by the top- most management of FirstEnergy," said NRC Chairman Richard Meserve. As he told an industry group in November, "the Davis-Besse episode presents the fundamental question as to whether the NRC's approach to assuring an adequate safety culture is sufficient." "I think if you were to talk with five different people about what safety culture is, you'd probably get five different answers." Meserve said "If we were to find tools to measure a plant's culture objectively, I think a lot of concerns of regulation in that area would diminish."*
>
> *MIT Nuclear Engineering professor George Apostolakis chairs the 12 member NRC safety advisory "think tank" ACRS [Advisory Committee Reactor Safeguards]*
>
> *"For the last 20 to 25 years," Apostolakis said, "this agency has started research projects on organizational-managerial issues that were abruptly and rudely stopped because, if you do that, the argument goes, regulations follow. So we don't understand these issues because we never really studied them. It's a major failure of the system, in my view."*
>
> *David Collins, an engineering analyst at Connecticut's Millstone nuclear power station who studies safety culture, likens it to the moral and ethical code that guides doctors: "An attitude that ensures the [nuclear] technology first does no harm."*
>
> *"We need some mechanism for NRC to remove toxic leadership," suggested David Collins, an engineering analyst at the Millstone Nuclear Power Station in Connecticut, noting that overbearing executives could diminish plant safety. Like several other speakers and committee members, Mr. Collins, expressed reservations about extensive safety culture regulations.*

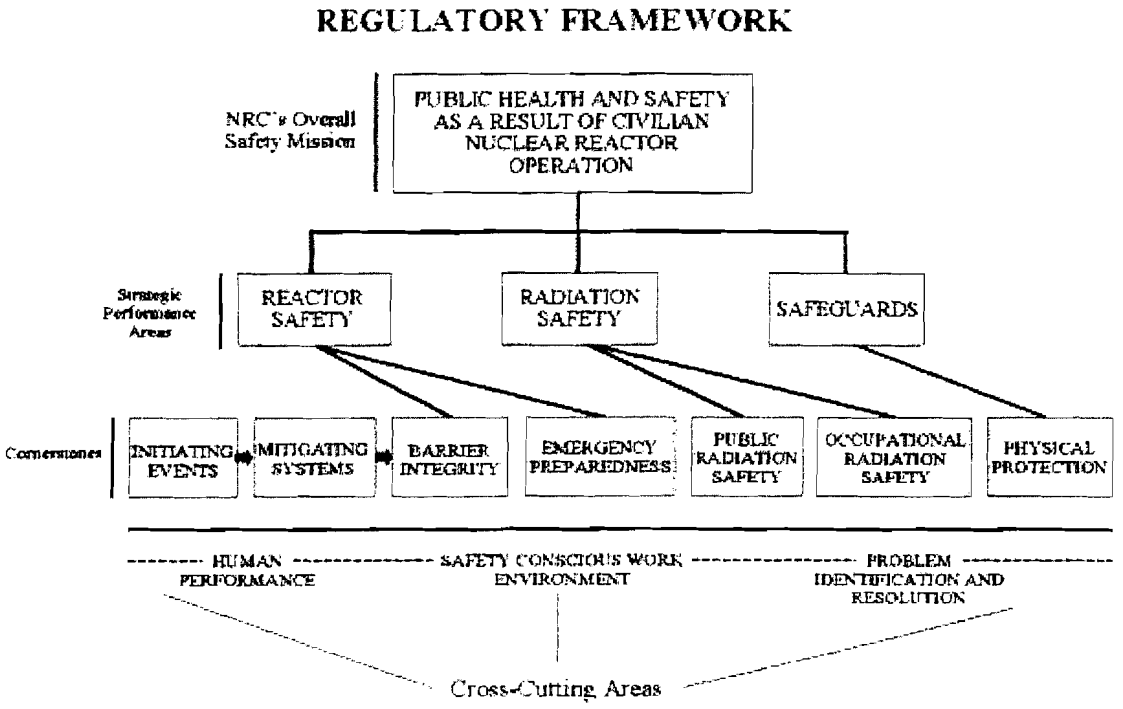
Collins, a safety culture authority and engineering analyst at Millstone, wants the NRC to require operators of all nuclear plants to educate their staffs about good safety culture, then regularly measure employees' attitudes and report the results.

What Is Wrong With NRC Regulations?

NRC has a safety advisory committee of "top engineering experts" [the ACRS – advisory committee reactor safeguards] which is very good at monitoring [regulating] the "engineering" part of safety management using a process called the ROP [regulatory oversight process]. The ROP cornerstones check on things like [does your car have brakes, do you test them, do they seem to be working].

NRC has no committee of "top organizational management experts" and so is not good at regulating the "managerial-organizational" part of safety management, which INPO calls "leadership professionalism", and which can also be called the "organization safety culture".

Here is a nutshell of the ROP, this is what the NRC monitors for safety performance:



The bottom three elements, called "the cross-cutting areas" are the "safety culture" areas that NRC is not good at monitoring [regulating] things like:

- *Has management been cutting corners on safety [below the NRC "radar"] to save money?*
- *Has management been covering up safety issues [from NRC, INPO, other members of management]?*
- *Has management been creating an environment so strongly focused on making money that employees are afraid to bring safety issues to managers [and has the ECP – employee concerns program - been so weak that employees don't bother using it]?*
- *Does management encourage employees to bring forward safety concerns [and thank the employees for communicating them] then proceed to classify them as "low priority" and ignore them?*

Here is the NRC policy statement definition for *safety conscious work environment.* To locate this definition yourself, you can google NRC, open the NRC website, search the word "safety", then scroll down to this definition:

> *The Commission's policy statement describes SCWE as "a work environment where employees are encouraged to raise safety concerns and where concerns are:*
>
> - *Promptly reviewed,*
> - *Given the proper priority based on their potential safety significance, and*
> - *Appropriately resolved with timely feedback to the originator of the concerns*

So how is Millstone doing these days on reviews, safety issue prioritization and providing feedback to employee?

Not so good I am afraid.

In spite of what NRC may tell you, there is a growing pile of evidence that Millstone [for many years now] to save money has not been adequately addressing these areas. How much money are we talking?

Dominion operates seven nuclear plants, the four Virginia plants historically have operated cheaper than any others plants in the country. Millstone is still a "work in progress" but since Millstone was purchased in 2001, I estimate the extra profits from operating "Dominion lean" at just the Virginia plants has made Dominion a minimum of an extra 1.6B.

The Root Of The Problem

NRC does not study safety culture. Here again is the Apostolakis quote from the previous page [Apostolakis was recently promoted to an NRC commissioner]:

> *"... we don't understand [organizational-managerial] issues because we never really studied them"*

The major reason for this is that the ACRS is made up of engineers who view safety management as primarily ensuring that these radiation [safeguard] barriers do not fail:

- *fuel cladding*
- *reactor coolant piping*
- *the reactor containment [the big reinforced concrete dome building]*

None of the ACRS have the necessary expertise to advise NRC on what INPO indicates is the real cause of accidents [significant events] like TMI, Chernobyl and most others, which is organizational-managerial failures.

The (Kemeny) investigation of the accident at TMI reported this:

> *"The one theme that runs through the conclusions we have reached is that the principal deficiencies in commercial reactor safety today are not hardware problems, they are management problems"*

INPO has identified these organizational-managerial [safeguard] barriers, INPO calls them "defense-in-depth" leadership accident prevention barriers:

> *"A robust safety culture requires aggressive leadership emphasizing healthy relationships that promote open communication, trust, teamwork, and continuous improvement. Continuous improvement needs ongoing leadership attention to improve the plant's resistance to events triggered by human error (defense-in-depth). Those in positions of responsibility must see themselves as leaders as well as managers to create an atmosphere of open communication. Therefore, leadership is a defense."*

INPO has identifies these "defense-in-depth" barriers as:

- *Workers*
- *Managers*
- *Internal Oversight [the site Oversight department]*
- *External Oversight - NRC*
- *External Oversight - INPO*

For many years people have been recommending that NRC get safety advice from managerial-organizational experts. NRC needs a panel of *organizational process* safeguard experts equivalent to their *engineering process* safeguard experts [the ACRS].

Then NRC needs to develop regulatory constructs capable of maintaining organizational-managerial failures ALARA [as low as reasonably achievable] as accident causal factors.

After the NRC allowed the Millstone site to restart the units in 1998, and Lee Oliver moved on, Millstone immediately started sliding back into the same pre-1996 "bad management" practices.

No effective safety culture regulations had been institutionalized by NRC. I asked the senior NRC resident at the time "what has been put in place to keep an event like Millstone from happening again here or elsewhere in the industry." He paused and thought for a moment and replied: "nothing I guess."

John Beck is a consultant who is considered a leading safety culture assessor in the nuclear industry. Working for the NRC, he monitored the culture at Millstone [and later at Davis Besse] for a couple of years after recovery [restart]. On departure from Millstone he sent the following cautionary letter to Millstone management [and shared a copy with me]:

> *"This trust in management can be ephemeral...there were a number of areas volunteered by some with whom I spoke where trust was slipping. During the latter stages of restart and early recovery there was a palpable and contagious feeling of hope and genuine enthusiasm at Millstone. It seems to have dimmed since then for some reason. I wonder why?*
>
> *Never forget that previous management failed so miserably, not because they were not intelligent, and not because they did not clearly understand what successful economics looked like in a competitive environment. They failed because they were arrogant, dismissive and refused to listen to the issues and concerns of the people who make this place run."*

If you google "millstone safety culture" the first result you see should be a book on nuclear safety culture discussing the Millstone event and many others.

Pg. 100 of this book says:

> *"The fear is that a poor manager who recklessly and ambitiously tries to make a marginal plant show a profit will break down the safety culture, resulting in an accident prone environment."*

Below is a comment in an email that Edgar Schein sent me last year. Schein is an MIT Organizational Management Professor Emeritus, many years ago he coined the term "organizational culture" and many people consider Schein to be the top organizational culture expert in the world:

> *"At some point the safety assessors have to be prepared to call the problem what it is--senior executives who care more about finances than safety, middle managers who care more about productivity because that is what senior managers reward them for, and supervisors who suppress employee complaints and efforts to identify safety problems because it takes too much time to look into things and to convince their bosses about critical maintenance issues that may be surfacing. What makes safety culture so complicated is that we are trying to build safety into badly managed companies!!! What do you think about that observation?"*
> *- Ed Schein*

Schein is the leading consultant to INPO on safety culture, and is frustrated [as I am] that the NRC only focuses on safety culture for a short time after there is a major "event" and then completely forgets about it. In safety culture this is known as the "ViCE" cycle. After an event you become **Vi**gilant. Then after a while you become **C**omplacent. Then you experience another Event.

Is Millstone management [as Beck says] *"arrogant and dismissive"* do they *"refuse to listen to the issues and concerns of the people who make the place run?"* Is Millstone management [as the book indicates] "recklessly and ambitiously trying to make a marginal plant show a profit?" is management "breaking down the safety culture, resulting in an accident prone environment?" Are NRC and INPO [as Schein says] "trying to built safety into a badly managed company?"

I think so, and I think there is a lot of evidence to support this. Has the "backsliding" since 1998 brought the Millstone leadership team right back to where it was in the early 1990's?

Millstone Leadership During the "Dark Days"

From the NRC report:

[NRC SECY-98-090 - Selected Issues Related to Recovery of Millstone Nuclear Power Station Unit 3]

> In late 1995, the NRC determined that since the late 1980's Millstone Nuclear Power Station had been the source of a large number of employee concerns and allegations related to safety of plant operations and harassment, intimidation, retaliation, and discrimination (HIRD) of employees. The NRC had conducted numerous inspections and investigations that had substantiated many of the concerns and allegations and had cited the licensee for violations.
>
> The NRC also had taken escalated enforcement action. Notwithstanding those actions, the licensee was not effective in handling many employee concerns or in implementing effective corrective action for problems that had been identified by concerned employees.
>
> In December 1995, the NRC established a Millstone Independent Review Group (MIRG) to conduct an evaluation of the history of the handling of employee concerns and allegations.

The charter for the MIRG directed it to evaluate the licensee's effectiveness in addressing Millstone-related employee concerns and allegations. The MIRG was requested to identify root causes, common patterns between cases, and lessons learned and to recommend plant-specific and programmatic corrective actions.

The MIRG conducted a review of licensee allegation files, related inspection reports, NRC's Office of Investigation, and the Office of the Inspector General investigations, enforcement actions, U.S. Department of Labor actions, and previous NRC management reviews from 1985. The review included in depth case studies of selected employees' concerns and allegations to identify root causes, common patterns between cases, and lessons learned.

The MIRG concluded, in its September 1996, report, that in general, an unhealthy work environment, which did not tolerate dissenting views and did not welcome or promote a questioning attitude, had existed at Millstone for several years. This poor environment had resulted in repeated instances of discrimination and ineffective handling of employee concerns.

The MIRG identified seven, principal root causes for of the employee concern problems:

- Effective problem resolution and performance measures;
- Insensitivity to employee needs;
- Reluctance to admit mistakes;
- Inappropriate management style and support for concerned employees;
- Poor communications and teamwork;
- Lack of accountability;
- Ineffective Nuclear Safety Concerns Program (NSCP) implementation.

The MIRG also concluded that these root causes underscored a common theme of **management failure** to provide the dynamic and visible leadership needed **to bring about required, basic attitude changes.** None of the findings of the team were new. **The problems had been identified previously to NNECO management by its own self-assessments, yet the problems continued.**

If we were to ask the question: "Is the Millstone leadership team as bad now as it was in the early 1990's?" Who would be capable of answering this question?

The Five Groups That Oversee Safety

INPO identifies the "defense-in-depth" barriers as:

- *Workers*
- *Managers*
- *Internal Oversight [the site Oversight department]*
- *External Oversight - NRC*
- *External Oversight - INPO*

These are the groups responsible for overseeing safety at Millstone, and these are the groups that can answer the question "is safety being managed adequately at Millstone today?"

In March the New London Day published an article titled: "NRC says 2009 was a safe year at Millstone" so we pretty much know what is the [official] NRC position on this subject, so lets explore how some of the other groups might answer this question.

For a very long time now, INPO safety metrics have had Millstone on the very bottom of the industry. In January, the [overall] INPO rating for Millstone 2 was dead last in the industry, equivalent to an academic score of "F minus declining."

Every year, INPO gives each site in the country a [safety] rating of 1-5. INPO keeps the scores secret [even from it's own staff] and once a years rolls the ratings out to the CEOs of the operating companies [and to senior INPO staff] at what is called the "INPO CEO conference".

The NRC regulatory authority comes from federal laws [NRC can put people who do not comply in jail]. INPO is a "communitarian regulator" and relies completely on CEOs wanting to "do a good job" and [as there are public safety implications] wanting to "do the right thing". INPO wants CEO's who get an INPO 1 rating to be pround, and CEO's who get an INPO 3 rating to say "what the heck is going on here, why am I not a number 1?"

Consultants who [for a living] assess safety culture in the industry have noticed a disturbing trend since deregulation toward "minimal regulatory compliance". Many sites have been doing the bare minimum that the NRC ROP requires, not doing enough to keep INPO happy, and completely dismissing the concerns of staff.

What led to the Millstone shutdowns in 1996 was that Millstone leadership had implemented "minimal regulatory compliance" in the mid 1980's. From the [narrow] perspective of responding to the competitive pressures of deregulation, Millstone leadership was at that time [in a manner of speaking] "way ahead of it's time".

Sites that do an adequate job of minimizing the chance of an accident receive an INPO score of 2. Sites that do an above average job receive a 1, sites that do a below average job receive a 3. The INPO scores of 4, 5 are really only there to make a score of 3 appear to be average. If INPO denies this, ask them to tell you how many sites currently have a score greater than 3, and how many sites currently have a score less than 3.

Millstone is currently a 2 [declining] and the NRC senior resident told me that he feels the staff reductions will push Millstone to an INPO 3 rating. If Millstone does not receive an INPO 3 rating this year, I would not be confident about safety management at Millstone, I would be concerned about the efficacy of the INPO assessment team.

In February the Millstone Oversight department wrote a condition report with a simple four word title: "Millstone Leadership Is Ineffective" listing multiple examples of inconsistent compliance with procedures and repeated loss of configuration control. These are the same issues that NRC identified in 1996 that precipitated the shutdowns.

A number of employees [workers and managers] have complained to me that it feels like Millstone is headed back to becoming one of the worst leadership teams in the industry, or is already there.

Is safety being adequately managed at Millstone right now?

One Department Where Safety Is Not Being Managed Adequately Right Now

I was a long time electrical project engineer [I led one of two engineering teams that replaced the Millstone reactor head in 2005, a very large 60M project] I also worked for a time as an Oversight assessor, a human performance supervisor, and for the last two years before retirement in March I worked in the Organizational Effectiveness department.

In the Organizational Effectiveness department I worked as the INPO SEE-IN coordinator [making certain the site properly evaluates and learns the lessons of TMI, Chernobyl, Davis Besse and many other minor events].

With regard to the impact of the March worker terminations, the only department that I can speak to is the one that I worked in [the Organizational Effectiveness department] but I would think it is likely that the March terminations created unsafe [understaffed] conditions in some other departments, possibly many other departments.

Safety is not being managed adequately right now in the Organizational Effectiveness department.

Evidence of Under-staffing Safety in the Organizational Effectiveness Department

When I heard that Millstone had laid off 50 workers in March , I was surprised. When I heard how many staff had been reduced from the department I had just left [Organizational Effectiveness] I was concerned, because the department oversees some very important safety functions such as:

- Organizational safety culture and human performance
- Leadership effectiveness [what INPO calls "professionalism"]
- The CAP - Corrective Actions Process [what NRC calls "the window to the safety culture"]
- Evaluation of the INPO "SEE-IN significant event" documents that teach the organization how to avoid accidents
- Reports of Millstone events published to help other sites avoid similar problems [called Operating Experience] and processing of similar reports that come in to help Millstone

In 2009 the NRC senior resident inspector told me he would like to see the ORE function "beefed up" . The NRC inspector wanted the ORE manager elevated to the director level, so management would finally "listen" to leadership improvement recommendations that ORE had for years been trying to implement. Many others [including myself] felt the efficacy of the ORE department needed to be "beefed up" [I felt significant improvements were needed in the areas of safety culture management and leadership efficacy].

Instead of being "beefed up" in March the ORE staff was cut in half. But this is just the opinion of an industry safety culture expert, an NRC senior resident inspector, and a smattering of various Millstone employees [workers, managers, Oversight assessors etc.] right?

Well, not exactly.

One of the Virginia Dominion ORE managers was visiting the Millstone ORE department a couple months ago. Concerned about planned cuts in ORE department staffing, in 2009 he took advantage of a trip to INPO and asked a room full of his industry counterpart ORE managers "what did they believe was the absolute minimum staffing level for an ORE department to do it's job adequately". He gave me the staffing number, and Millstone is now at about 50% of that number.

When a roomful of industry experts say that staffing is [far] too low to do the job, and the job is what INPO says needed to be done to avoid nuclear accidents, I don't care what kind of ROP regulatory views NRC may have on the subject, safety is being under-resourced.

I told the Virginia ORE manager to take his concerns to the top of the company, to sit in CEO Tom Farrell's chair if needed to make them listen. He said "I can't do that" but it probably didn't matter, because Farrell probably would not have listened anyway.

Why do I say this?

Dominion is one of the largest energy companies in the US. In 2009 CEO Tom Farrell was named six-sigma manager of the year for his cost control abilities. This was not "Dominion six sigma manager of the year" this was global. 43 companies around the world. The CEO of the company that operates Millstone is the top cost-cutting executive on the planet.

So [after failing about nine times to get the concept through to my Dominion nuclear food chain] I sent an email to CEO Farrell [and I copied the COO] explaining that I have studied six-sigma extensively in the masters program I took, and [did you know] six-sigma actually began as a quality management process, and [did you know] some industries like the medical industry [who by necessity are a little more evolved in safety management than is nuclear] actually use six-sigma for safety culture quality management.

Mr. Farrell did not reply, but I did received a call from Dominion's top nuclear manager [CEO of generation] who growled "Mr. Farrell does not require any spurious email messages from you."

I thought it was sort of an interesting reply, so I wrote it down and dated it. That was pretty much the end of the conversation and my safety enhancement employee suggestion.

Other than growling, when the CEO of generation called me another interesting thing occurred. I had saved my email to Farrell in a folder titled "culture issues" when the CEO of generation called, I went to retrieve it but it was gone, like someone in IT had expunged it from my files. I noticed that COO has replied "thanks" [possibly without reading the message] and his reply contained the full body of my message.

So I saved it by forwarding it to my home email, and placed the COO reply message in my culture folder and watched what happened. The next day it was gone too. I had previously emailed Farrell about pollution controls at Dominion's coal plants [an area where Dominion and Farrell appear to be doing a fine job] those messages were still there. What was going on I wondered?

Oh well, no big deal [I guess].

[It's not like I was complaining about safety at some coal mine in West Virginia].

Workers Who Stood Up For Safety Were Terminated, Supervisors Who Stood Up For Safety Were Reassigned

In March three people in ORE were involuntarily terminated, and the two department supervisors were reassigned.

One had been working very hard at getting more managers to go out and do more field observation to help reduce procedure compliance problems [most sites do much more of this than Millstone].

One of the workers [ironically] had been complaining vocally about the [double standard of] managers being exempted from the layoffs.

The remaining terminated workers had been working very hard to get the site [especially the training department which for some reason is particularly bad at this] to properly review and implement the recommendations of INPO most safety significant documents [called the periodic SOERs - significant operating event reports]. She would flag the deficiencies, and I would follow up on them with the departments.

For example, one of the SOERs is on the lessons of Chernobyl. The training department is supposed to make sure that managers are trained on Chernobyl [what caused the event, what will ensure something like this does not happen in the US].

Here is an email message I received from a Millstone trainer in February, about a month before this worker was terminated:

> *Dave,*
> *We have not done [Chernobyl training] in the last 3 years as part of the continuing training. The real question is where, who and how do we make these commitments, and put them into a system that makes people aware of them? To the best of my knowledge there appears to be no method, other than tribal knowledge, of these commitments and their recurrence.*
> *Any help in this area would be greatly appreciated.*
> *[Senior Millstone Trainer]*

I have no idea if this particular issue was ever adequately addressed, but this is an example of the kind of things that Organizational Effectiveness does.

Two [what I would call] "safety conscious supervisors" were reassigned.

These supervisors had both "pushed back" on some significant safety issues and in March were reassigned out of the Org Effectiveness department [no supervisors were laid off, so they could not be terminated but could be reassigned].

The issues they had "pushed back" on were configuration management problems [the kind of problems that caused the Millstone shutdown event] and corrective action problems [the kind of problems that led to the Davis Besse event].

Recall the safety Conscious Work Environment definition:

> *The Commission's policy statement describes SCWE as "a work environment where employees are encouraged to raise safety concerns and where concerns are:*
>
> - *Promptly reviewed,*
> - *Given the proper priority based on their potential safety significance, and*
> - *Appropriately resolved with timely feedback to the originator of the concerns*

When a fire door is found broken, most nuclear plants fix the door immediately, and while waiting for maintenance to come, someone stays at the door [called a "fire watch"] to make certain it closes properly. It costs money to have people standing at the doors, and it forces maintenance to fix the doors a little quicker than they might otherwise prefer [it interferes with other scheduled work].

The CNO gave Millstone management a "directive" to "get rid of these [expensive] fire watches" and fire protection engineering "got right on it". To accomplish this, FPE had to eliminate the requirement for fire doors to "automatically close and latch".

The site fire marshal [the fire marshals at the Virginia plants, a local town fire marshal who worked at Millstone, and a state of CT fire marshal] didn't like it. They all felt that a fundamental rule was being violated, and that fire doors needed to "automatically close and latch".

I had identified three NRC guidelines that appeared to me [an engineer, but not a "fire protection" engineer] were being violated. I copied the specific paragraphs and highlighted the specific words in three NRC fire protection guidance documents and emailed the text with my concerns to the fire protection supervisor [and the responsible manager, director, and Dominion Chief Nuclear Officer].

No one ever responded [definition of responsible: response-able] and explained to me specifically how Millstone was in compliance with these three NRC guidance documents.

He emailed me back saying that he "didn't intend that Millstone should violate NRC guidelines to accomplish this" but he never instructed the leadership team to respond to my compliance questions, and no one ever did.

After observing these numerous repeated employee objections for a while, one of the Organizational Effectiveness supervisors wrote an email to management [I was copied] saying that fire protection engineering was moving too fast, pushing the change through without carefully considering the concerns of employees or the fire code requirements.

In spite of this, the change was pushed through over the continuing objections of some employees. The change saves Millstone about 50K a year, an amount equivalent to about a half hour of on-line production. What this change cost in terms of lost [employee and stakeholder] trust is much more difficult to calculate.

Later the same supervisor wrote a letter complaining that CRT [condition report team] managers were "not showing up" to analyze equipment and configuration issues, something INPO had complained about in 2006 [I was copied].

Loss of configuration control was the primary reason NRC shut down Millstone in 1996. The letter implied it was not the first time that he had complained to management about this. After sending out the letter this supervisor told me: "I am not going back to 1996 without at least complaining about it."

The other ORE supervisor had discovered [this same group of CRT managers] had been downgrading the safety significance of condition reports without telling [or discussing this with] the employees who had initiated the reports. He coached the CRT group that they must to stop this (highly unethical) practice, and eventually had to threaten to resign [as chairman of the group] unless they stopped this practice.

Downgrading safety issues raised by workers was likely what led to the 2002 Davis Besse event. The system engineer had made multiple requests for management to approve the installation of access holes to clean and inspect the top of the reactor. The holes were not approved, the top of head could not be inspected, and over the years an undetected acid leak ate through six inches of carbon steel causing a "football sized hole" in the reactor head, leaving only the thin [thickness of a quarter] stainless steel liner bulging from the [around 2000 psi] reactor coolant pressure, ready to burst at any moment.

Some experts at NRC feel Davis Besse may have been just a few months away from a TMI type accident [some say worse]. UCS Lochbaum feels if the liner burst, it may have stopped the control rods from falling resulted in a Chernobyl-type release. I agree some rods may not have dropped, but I have not seem anything that indicates a large release would have occurred [assuming no additional failures and that the other safety systems functioned as designed].

Both of these supervisors were reassigned in March, so the CRT managers are now free to resume their practices without being nagged by what I would call "safety conscious supervisors." What should happen at Millstone is that these sort of "safety conscious supervisors" willing to "stand up for safety" should be moved up, and the [many] Millstone managers who are not "safety conscious" should be moved out.

Metrics in 1996 indicated that Millstone did not just have a poor leadership team, but one of the worst in the history of the industry. The top managers were replaced, but most of these middle managers were allowed to remain [and gradually fill the more senior positions].

I would estimate about 20% of the managers at an average nuclear plant exhibit some of the behaviors that [INPO says] are toxic to a healthy safety culture. At an "INPO 1" plant I would estimate this number probably drops to about 10%.

At Millstone today, I would estimate this number is closer to 33% – 50%.

How Well Has Nuclear Historically Been Managed In Connecticut?

INPO is a secretive organization, so people in CT might be surprised to learn that three of the 24 US nuclear "events that shaped the industry" occurred here in CT. Some of these 24 were very close to becoming a TMI type accident themselves [one was the 1993 event at Millstone].

Actually, there were four of these events in CT, but NRC covered up what was probably the most significant one. As far as I know, the groundwater event at Haddam was the most significant uncontrolled undocumented releases of radiation to the environment that has occurred at any US nuclear plant.

You can read about it here.

> http://www.nytimes.com/1997/09/17/nyregion/hartford-says-utility-hid-nuclear-contamination.html?pagewanted=1

As the Haddam plant was being decommissioned, and the unreported contamination was discovered, NRC did not pursue criminal charges [did not prosecute any NU management] I think for a very pragmatic reason: the NRC resident had also "looked the other way" for many years.

The political cover up was a good deal for NU managers, who were able to move on to managing at Millstone, instead of being banned from the industry and facing criminal prosecution.

Here is what the NRC task force investigation reported:

> The violations associated with the November 1996 contamination event, which are described in the Notice, created a substantial potential for exposures in excess of regulatory limits. Therefore, these violations are classified in the aggregate as a Severity Level III problem in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions" (Enforcement Policy), NUREG-1600. In accordance with the

> Enforcement Policy, a civil penalty is normally considered for a Severity Level III violation or problem.
>
> However, I have decided, after consultation with the Director, Office of Enforcement, to exercise enforcement discretion in accordance with Section VII.B.6 of the Enforcement Policy and not propose a civil penalty for the violations associated with the contamination event. The decision to exercise discretion was made given that (1) the violations occurred prior to the decision, in December 1996, to permanently shutdown the Haddam Neck facility; and (2) you were issued a $650,000 civil penalty on May 12, 1997, to address the performance problems that existed prior to the decision to permanently shutdown the facility, and which indicated generally poor performance over a period of time.

So the NRC slapped NU with a penalty of less than one day's revenue at the average nuclear plant, and said that since the plant is shut down anyway, no harm no foul.

What had happened [which is common with significant events] is that a combination of smaller events had aligned. Poor foreign material control during refueling had allowed metal shavings to fall into the reactor. Over the 18 month operating cycle the shavings had chewed holes in the cladding of 85% of the fuel rods, causing massive contamination of the reactor coolant [creating what one might call PU soup – "plutonium uranium" soup].

The reactor piping and reactor containment boundaries were both still intact, so the public was adequately protected from radiation, right?

Well, not exactly. Remember Dave Lochbaum's comment:

> *It seems only a matter of time before the initiating event wheel, the equipment wheel, and the human performance wheel stop in a combination that produces another accident.*

Many years ago tritium had contaminated a couple of Haddam potable water wells, indicating a large plume of groundwater contamination was coming from somewhere, probably a spent fuel pool or refueling water tank leak.

Not a really big deal until you combine it with the [1989] worst fuel damage event in the history of the industry. You put the PU soup into the [leaking] spent fuel pool, the PU soup leaks into the ground, the plume eventually reaches the discharge canal [and the CT and Salmon rivers].

So Haddam managers immediately reported this to NRC, shut down the plant, and called in the big construction equipment to fix it, right?

Well, not exactly.

It would have been nice if the cognizant Haddam managers had [at minimum] halted the [common] practice of allowing fishermen to come onto plant property and fish from the discharge canal. The below guidance on chemical spills and mercury [can build up to thousands of times higher] probably apply to tritium and strontium as well. My understanding is that as many as 15 soil or groundwater radionuclides were found at levels 10 – 20 times federal limits in wells near the discharge canal.

If fisherman did take any bass, carp or catfish from the canal [or the CT river or the adjacent Salmon river] hopefully they did not feed them to small children or pregnant women.

You can access the CT "safe fishing guide" here:

http://www.soundkeeper.org/uploads/fishweb02.pdf

> ***How Do These Contaminants Get Into Fish?***
> Mercury and PCBs can build up in fish to levels that are thousands of times higher than in the water. These contaminants enter the water from [chemical spills or mercury]. You are in the High Risk Group if you are a *pregnant woman*, a *woman planning to become pregnant within 1 year*, or a *child under the age of 6*. If you are in the High Risk Group, you should not eat certain fish at all

Since the radiation exceeded derived concentration guideline levels (DCGLs) for 15 soil or groundwater radionuclides, this triggered an EPA "superfund" site evaluation performed at Haddam in 2004.

Due to the severity of the soil and groundwater contamination [and the unpredictable potential of it leeching into the CT and Salmon rivers] the NRC task force [working with EPA] recommended continuing radiation monitoring for the Haddam site. However, this task force recommendation was dismissed by the NRC commissioners.

The commission also deleted [from the draft 2006 abnormal report to Congress] the task force conclusions that "unplanned and unmonitored radioactive releases could [continue to] migrate off site ... without detection."

Here are changes the NRC commission made before the report went to Congress:

> The report's most significant conclusion was that, although there had been industry events where radioactive liquid was released to the environment in an unplanned and unmonitored fashion, there were no instances identified where the release had an adverse impact on public health and safety. ~~The task force also concluded that under the existing regulatory requirements, the potential exists for unplanned and unmonitored releases of radioactive liquids to migrate off site and into the public domain without detection.~~
>
> Indeed, the maximum potential dose in all of these incidents, a dose unlikely to have been received by any person outside the plants' boundaries, **was less than the dose** an average individual in the United States receives in one day during the course of routine activities from naturally occurring radiation sources (**such as the radium-226 in the building materials of the Capitol**) and was well below the regulatory limit for planned releases.

The NRC commission's claim that the radiation exposure from the groundwater event at Haddam was less than spending one day at the capitol is false. This argument comes from what is called "junk science", you can read more about it here:

http://mediamatters.org/research/200508120001

> In an appearance on Fox News' *Special Report with Brit Hume*, Cato Institute adjunct scholar Steven Milloy cited his study of radiation levels at the U.S. Capitol Building to argue that the health safety standards recently imposed on the proposed Yucca Mountain, Nevada, nuclear waste repository are unduly stringent. But Milloy's findings -- that the radiation exposure at the Capitol is far higher than it would be at the Yucca Mountain facility under Environmental Protection Agency (EPA) limits -- were debunked shortly after he published them in 2001.

> Milloy has a long history of conducting scientific studies that benefit powerful corporate lobbies -- a strategy described as "sound science." The practice has been described in the *American Journal of Public Health* as "sophisticated public relations campaigns controlled by industry executives and lawyers whose aim is to manipulate the standards of scientific proof to serve the corporate interests of their clients."
>
> Proponents of "sound science" purport to expose so-called "junk science," which Milloy has described as "faulty scientific data and analysis used to advance special and, often, hidden agendas" of personal injury lawyers, social activists, **government regulators** and the media."
>
> Milloy currently writes a regular "Junk Science" column for the Fox News website. In recent columns, he has argued that global warming represents "flawed science," that pesticide use in schools poses no threat to students, and that "radical environmentalists" are the "real energy problem."

After I found these details about the Haddam contamination event [and the apparent "junk science" cover up by NRC] I discussed the events with two Millstone NRC resident inspectors.

As I was speaking one resident kept nodding his hear up and down as if to say "yup, that's what happened" after I finished speaking the other resident [the senior resident] said "you know, the Chairman is not NRC."

I said: "Excuse me, the NRC Chairman *is not NRC*?" He said: "The Chairman is not NRC, he is a political appointee." And that is apparently how NRC inspectors live with some of the "political" decisions that NRC makes at the top. I don't know what else an NRC inspector could do.

Haddam Knew About The Radioactive Plume Since The Mid 1970's

David Lochbaum's book "Fission Stories" is a frequently humorous [and occasionally sobering] short story collection of incidences at nuclear plants told in "fishing story" style.

One of the stories is the Haddam "magic skunk" story. The Haddam plant went on line in 1968 with a slightly leaking spent fuel pool. Some time later [months? years?] a large groundwater plume of radioactive tritium reached the wells from which potable water was being piped into the plant.

Going forward the site used bottled drinking water, but wanted to continue to use the [slightly] tritiated water for maintenance [and general] purposes. Not wanting to alarm the public by disclosing that the wells were contaminated [and not wanting employees or visitors to accidently ingest the water] a story was concocted that a skunk had fallen into the well and died, thereby polluting the well.

Large warning signs were posted by the water faucets saying "SKUNK WATER". When I first visited Haddam [not noticing the very large sign] I filled a Styrofoam cup with "skunk water" and was about to drink it, but a technician stopped me and pointed to the sign [and told me the story].

Since multiple wells were contaminated, Lochbaum calls it the "magic skunk theory" as the skunk must have died, come back to life, crawled out and fell and died in the next well [this completely ignores the very credible "multiple skunk" theory] and may be why Lochbaum removed this story from later versions of his [really excellent] book.

During the 1996 safety scrub at Haddam [which like Millstone had been shut down by NRC] it was found a pipe that supplied cooling water to the reactor in an emergency was undersized. Apparently NU engineers had faked a number in a calculation to avoid the expense of installing a new [larger] pipe.

NU management pointed to this and said: "the new pipe will cost at least 100M to replace, so we have decided to permanently decommission the plant". The Millstone 2 reactor head replacement [I was one of the two project engineers] only cost 60M. I have never heard of a pipe costing 100M.

I discussed this [at the time] with the Haddam mechanical engineer who estimated the pipe replacement. He said: "that is way more than I estimated, I don't know where they are getting their numbers". It was not until within the last year that I pieced together what I think may have happened.

I think the "safety scrub" discovered the groundwater plume, and that is what really precipitated the Haddam decommissioning decision, but that this was too big [and alarming and embarrassing] an issue for NRC to disclose to the public, so NRC allied with NU to concoct the story that the ECCS piping was the reason.

After thousands of cubic feet of radioactive soil was excavated, the groundwater contamination dropped to less disturbing levels. I understand they were able to get the levels below federal EPA guidelines, and NRC developed a "special compromise" allowing soil and groundwater contamination to remain, as long as radiation exposure at the surface was < 25mR per year.

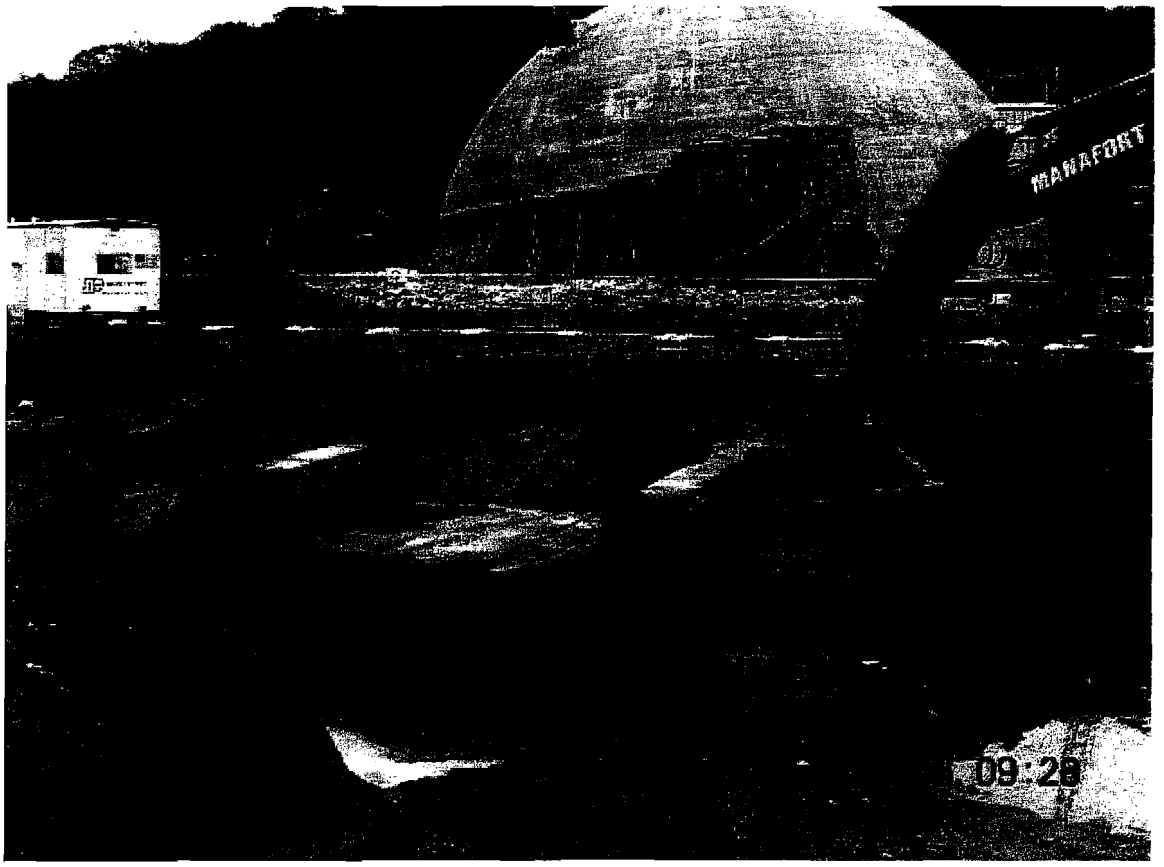
Sorry, but I don't trust these guys. As part of the LTP [license termination plan] I would have wanted to see a detailed EPA evaluation of the final site that was signed off by a responsible member of local or state government [such as someone from CT DEP]. This is what NRC informed EPA superfund director Michael Cook in March 2004:

> *Since the Haddam Neck site already has an approved LTP, the general time period for having a Level 1 consultation has passed. However, the approved LTP for this site contains derived concentration guideline levels (DCGLs) for 20 radionuclides, which are provided in the enclosed table. The DCGLs for 15 of these radionuclides exceed the MOU trigger values for soil [i.e., tritium (H-3), niobium-94, cesium-137 (Cs-137), europium-152 (Eu-152), and Eu-154]; and/or groundwater [H-3, carbon-14, manganese-54, iron-55, cobalt-60, nickel-63, strontium-90, technetium-99, Cs-134, Cs-137, Eu-152, Eu-154, Eu-155, and plutonium-241)].*
> *Before the NRC license is terminated the doses to the average member of the critical group at the Haddam Neck site will be in compliance with NRC's criteria in Part 20 Subpart E that provides all-pathways dose criteria of 0.25 millisieverts per year (25 millirem per year) plus as low as reasonably achievable (ALARA), to an average member of the critical group. The dose criteria in Part 20 Subpart E are fully protective of the public health and safety, and were the result of a comprehensive rulemaking, including an accompanying generic environmental impact statement.*

I would also want specific signed off documents of what happened to all that [tens of thousands of cubic feet] of contaminated soil. I would want details of the exact quantity removed, and papers showing that same quantity properly disposed of]. If large quantities of radioactive soil was left on the property and just covered over with 4 feet of dirt, the radioactive groundwater plume could return [for example, if we get a lot of rain like in March].

Therefore I feel there should be either continuing monitoring [probably by DEP] at Haddam, or the canal and nearby rivers [CT and Salmon] should be posted with a lot of very visible, weatherproof signs: "tritium and strontium contamination area, trout fishing only".

In 2004 disposal cost for a cubic foot of low level waste exceeded $400 a cubic foot. This creates a huge economic incentive to do something else with [some of] the soil, such as [for example] burying it deeper on the Haddam property [turning Haddam into a low level waste repository] or dumping it into the CT river. Of course, there is no reason to believe that people at NRC or the Haddam plant would be irresponsible with the management of contaminated soil, right?



Well, not exactly. You can read about it here [excerpt]:

http://video.wtnh.com/news/1997/111397.html

New Concerns About Contaminated Soil
(WTNH) _ Concerns about contaminated soil have spread from Haddam to Waterford. Many Connecticut residents are wondering if we're walking on some very "dangerous ground."

A few months ago, radioactive soil was discovered at the Connecticut Yankee plant in Haddam Neck, and at a nearby day care center. Now there are concerns about soil at some ball fields in Waterford, which is home to the Millstone power plant.

RICH GALLAGHER / NU: "We found no contamination [at Millstone] no excess levels of radioactivity or anything..." Despite that, more tests will be conducted here. Largely because of what's happened at NU's other nuclear power plant: 'Connecticut Yankee' in Haddam Neck.

Recently, tests revealed low levels of radiation on and off the site, at among other places, a nearby day care center. Apparently, the center had used contaminated soil in its playground area.

In October 2005 Haddam finally reported to NRC the spent fuel pool leak that should have been reported about 30 years ago. You can read about it here:

http://www.nrc.gov/reading-rm/doc-collections/event-status/event/2005/20051101en.html

> OFFSITE NOTIFICATION
>
> *Haddam Neck uncovered evidence of Spent Fuel Pool leakage below ground. The leakage was discovered when removing soil east of the Spent Fuel Building. Consequently, the site notified the Connecticut Department of Environmental Protection. The quantity of water leaked is unknown. Estimates based on historic Spent Fuel Pool evaporation data indicate that the leak was small - on the order of a few gallons per day. Based on readings from down-gradient monitoring wells, there is no travel beyond the property line.*

No groundwater contamination beyond the property line, because the aquifer funnels the groundwater into the discharge canal, which discharges into the CT river next to the Salmon river. Over 30 years, the effect was equivalent to dumping the entire contents of the spent fuel pool [Olympic size, but more than twice as deep] into the CT river.

Any public health affects?

I don't know, but the point is the Haddam managers and the NRC residents don't know either. They are not qualified to ignore government reporting regulations [ignore the law] and make the judgment call that there is no public health impact, this is really "no big deal", and does not need to be reported [or addressed].

Of course, allowing a radioactive groundwater plume to spread and intensify for 30 years caused the Haddam decommissioning to be a little more costly than was expected, but don't worry this did not cause any criminal prosecution or financial troubles for NU, the cost was simply passed on to you, the consumer [ratepayer]:

[AP November 2005] CT DPUC Condemns Handling of Haddam Neck Decommissioning.

> *CT Department of Public Utility Control (DPUC) commissioner Anne George has accused Connecticut Yankee Power Company of mismanaging the decommissioning of the Haddam Neck Nuclear Power Plant to the detriment of power company customers. George maintains that Connecticut Yankee's fumbling is responsible for more than one-quarter of the $831-million rate increase instituted by the company, raising customer costs by one dollar per month for the next five years.*

If I were the CT governor, I would want to find out exactly what the Haddam managers did [what did they do, when did they do it] what they knew [what did they know, when did they know it] and I would want to find out if any Haddam managers who "looked the other way" are managing at Millstone today [and if they should be allowed to keep their well-paying jobs].

Organizational-Managerial-Political Influences at Davis Besse

At Davis Besse in 2002, they found a big scary hole in the top of the reactor, the NRC blamed the system engineer for not fully cleaning and inspecting the reactor head, criminally charged him, and banned him from the industry for five years.

In previous years he had petitioned plant managers [three times] to approve installation of inspection openings needed to "thorough inspection and cleaning of the head" here is the text of one of the modification requests:

> *MOD 94-0025 (May 27, 1994): "Initiated MOD 94-0025 to install service structure inspection openings. Reasons for the modification include ongoing industry concern involving corrosion of the Inconel 600 reactor vessel nozzles. There is no access to the reactor vessel head or the CRDM reactor vessel nozzles without the installation of the modification. Inspection of the reactor vessel head for boric acid corrosion following an operating cycle is difficult and not always adequate. Video inspections of the head for the CRDM nozzle issue and as follow-up to the CRDM flange inspection do not encompass a 100% inspection of the vessel head. Cleaning of excessive boric acid residue from the reactor vessel head also does not encompass 100%. Installation of these inspection openings would allow a thorough inspection and cleaning of the head. All B&W plants with the exception of Davis-Besse and ANO-1 have installed this modification.*

NRC does not require this [regulations are generic, not specific to individual designs] so it was up to the professionalism of the leadership team to "do the right thing" but they would not approve [and permanently deferred] the modification requests.

Then about a year before the hole was discovered the system engineer wrote a condition report saying that [the best he could tell with limited visibility] was that one of the CRDs [control rod drives] was cracked and leaking boric acid [something that if true, required an immediate shut down of the reactor]. The system engineer also brought 9 unusual digital photos of the side of the reactor vessel to the NRC resident inspector, showing where many large streaks of red rust-colored liquid had run down from the top to the bottom of the reactor, asking:

"Is this normal? Has NRC seen anything like this before?" The resident ignored the request [because his job was to investigate regulatory violations, not to be a "gopher" for an engineer].

After being notified of a probable primary boundary leak, and looking for any excuse to not have to shut down the plant, a First Energy executive contacted the only NRC executive who can issue a shut down orders [Sam Collins, Director of the Office of Nuclear Reactor Regulation (NRR)] and said [paraphrase]:

> *"We may have this little crack, but we think it is nothing serious and we feel can keep operating safety for a few more months, and we would [really really really] like to stay on line until our scheduled refueling outage, can you help us out?"*

Here is an excerpt from a February 2003 Ohio Blade article:

> *NRC staffers wanted the plant shut down no later than Dec. 31, 2001 because they feared its reactor-head nozzles were cracked and leaking. As it turned out, so much acid had gotten out of the reactor that the head nearly ruptured - a scenario that experts now say could have led to a Chernobyl-like meltdown if safety systems and the containment structure had, in turn, failed.*

According to a transcript of his second interview with the inspector general's office, Mr. Collins said he had intended to issue the shutdown order when he forwarded it up the chain-of-command on Nov. 16, 2001, to William Travers, NRC executive director of operations. Five days later, the order was passed along to the full NRC board.

NRC staffers received a memo on Nov. 21, 2001, summarizing a meeting that day between Mr. Collins and Robert Saunders, president of FirstEnergy Nuclear Operating Co., the utility's nuclear subsidiary. The inspector general's office has claimed that meeting was pivotal to the decision Mr. Collins ultimately made - meeting the utility halfway and letting it keep operating Davis-Besse until Feb. 16, 2002, a date which skeptics have viewed as arbitrary ... three months later than the shutdown date proposed by the NRC staff.

"There was also feedback at one point from the Chairman at a very high level just indicating external interest in this and I indicated to him I'm aware of that," Mr. Collins was quoted as saying. An interviewer asked him to describe what he meant by [external interest]. "My impression, we were talking about elected officials," Mr. Collins said.

Ohio Senator Voinovich maybe? So of course, the NRC then said:

"Oops we really messed up, we should have investigated the rust photos, we should not have allowed the plant to keep operating, we should not have blamed the system engineer, we should have investigated if there were other examples of 'minimal regulatory compliance', this has been a great organizational-managerial lesson for us, we are going to learn from it and investigate MRC in the rest of the industry and make sure these kind of events don't happen again in the industry."

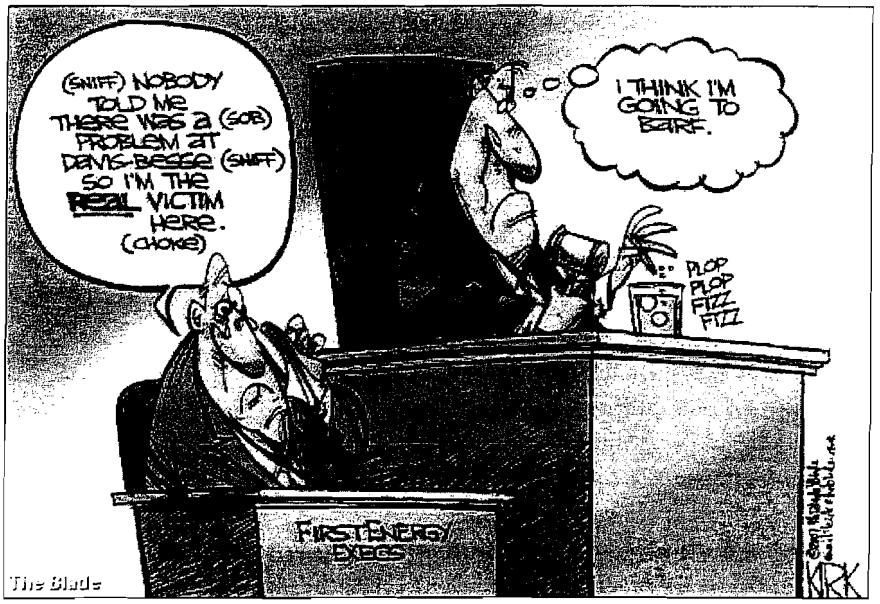
Well, not exactly.

The NRC blamed the system engineer for not fully cleaning the head, criminally charged him and banned him from the industry for five years [effectively for life since no plant is ever going to hire him]. He lost his job and his house, he was criminally convicted, fined $4,500 and given three years probation.

His attorney wept at the injustice and later asked a juror: "how could you find him guilty?" The juror replied: "well, I didn't think he was personally responsible, but someone had to be held accountable."

Meanwhile, the First Energy Operating Company [the subsidiary that operates the five First Energy nuclear plants] paid a record $28 million fine [or about one week's production revenue] on the condition that the Department of Justice did not prosecute any First Energy managers:

Under the agreement, the Department of Justice will refrain from seeking an indictment or otherwise initiating criminal prosecution of FENOC for all conduct related to the reactor head issue, as long as FENOC remains in compliance with the agreement, which the company fully intends.



The 24 Events That Shaped The Industry

Here is what INPO says about the 24 "events that shaped the industry":

> *"The events were significant enough that to allow them to happen again for lack of response was unacceptable. Hence, remarkable actions were taken to prevent recurrence."*

How "remarkable" were the actions to prevent recurrence? All industry managers were supposed to have learned not to repeat these events.

What were the lessons from the 1993 Millstone event?

> *How This Event Shaped the Nuclear Power Industry*
> *This event brought into focus the dangers of emphasizing production over nuclear safety. A key lesson was the importance of senior nuclear managers periodically emphasizing to personnel that nuclear safety considerations always take priority over production goals*

How Well Did Millstone Learn The Lesson From [It's Own] 1993 Millstone Event?

Unfortunately, last fall Millstone leadership repeated the same kind of [management] error that precipitated the 1993 event. To save a little bit of production time, management violated switchyard work procedures and put production over nuclear [and personnel] safety. Millstone managers scheduled maintenance electricians to work on a live [345,000 volt] switch.

345,000V switches must not be worked live [a 120V wall switch should not be worked live] the work control procedure says:

> *"Every attempt must be made to plan, schedule, and perform work on critical transmission facilities when a unit is out of service."*
>
> *"Unit refueling outages should provide adequate time for scheduling 345kV facility outages."*

The electricians started to disassemble the switch, it created an arc [on a sunny day] so bright that you could not look at it, showered the backs of the rapidly exiting electricians with bits of molten metal, and tripped the plant [because it disabled electrical safety systems]. This event could have easily killed or seriously harmed the workers.

So after this event, Millstone management called safety "stand down" explained the mistakes that the leadership team made and turned it into a good lesson on maintaining leadership focus on safety, right?

Well, not exactly.

Like the NRC actions at Haddam, sometimes when things go bad in a big ugly way, there is a strong desire to cover it up [if you can get away with it] and the root cause team covered it up, arguing that the procedure was missing instructions on how to work the 345KV switch "live".

As INPO coordinator it was my job to do a write-up of what happened for the INPO report. I wrote a draft of what really happened [management put profits ahead of safety and ignored a "must do" switchyard work procedure] and submitted it to management for approval.

The department manager called a meeting in his office to discuss my write-up.

During the discussion I looked directly at the root cause author and said "WC12 says that every attempt must be made to schedule 345KV work during an outage, was every attempt made?" He simply stared back without changing expression, no answer. I said: "was any attempt made?" Again, he simply stared back without changing expression, no answer.

I told the department manager that I stand by my write-up. The department manager told me [surprisingly in front of four people at the table in his office] "we can't say that, what if the public sees it?" and directed me to change the write-up to match the [management sponsored and approved] root cause evaluation write-up.

As I told my supervisor before the meeting, this was an organizational repeat of the 1993 *"emphasizing production over nuclear safety"* event. However, if I had tried to argue or imply this to the department manager, I believe there would have been even less of a chance of avoiding a cover-up.

How Well Did Millstone Learn The Lesson From The 1989 Haddam Fuel Damage Event?

> *How This Event Shaped the Nuclear Power Industry*
> *The industry realized that current programs designed to preclude the introduction of foreign materials into the reactor vessel or spent fuel pool during maintenance activities were in need of significant improvements.*

At Millstone in April 2008, foreign material interfered with the function of a stop valve, creating a reactor coolant leak and requiring Millstone to declared an "Unusual Event" [the lowest level nuclear emergency] due to unidentified leakage greater than 10 gallons per minute.

The root cause evaluation [same author who wrote up the 345,000V switch] said:

> *Engineering failed to keep abreast of industry experience related to spiral wound gaskets and to make recommendations for design and procedure changes.*

I wrote the operating experience report from the root cause evaluation, and sent it to INPO. Later, an engineer came to me and said: "you know, that is not really what happened" and gave me a list that showed he had been in fact keeping abreast of industry experience and communicating it [as he should be] to maintenance.

He told me he strongly disagreed with the root cause evaluation conclusions, and had refused to sign off on the root cause evaluation. While he was on vacation his department manager had signed it off, so it had been completed processed and filed.

I called this manager and said: "why did you sign this off when you knew [the engineer] didn't agree with it?" He said: "sometimes you just have to move on."

Later I was told what really happened was [in an effort to save money] managers instructed supervisors to find some jobs that are not absolutely necessary and cancel them. Apparently the engineer's supervisor had [without notifying him] cancelled the paperwork that he had submitted to update maintenance procedures with the information that would have avoided the event.

Who had instructed the supervisor to find some unnecessary work and cancel it? Most likely the same manager who had signed off the root cause evaluation while the engineer was on vacation. Getting it closed out and filed away ASAP would have been a good move on his part.

Foreign material has been a continuing problem at Millstone, shortly before I retired I suggested to Training that they periodically review INPO foreign material guidance, and verify that it continuing to be properly represented in training plans. Training responded: "INPO does not say this is needed, so we are not doing it".

About a year ago the engineering manager who signed off the root cause took a job in Virginia, and was replaced by an engineering manager from Virginia. When you work at Millstone for a while you become acclimated to poor management, and after a while you cannot even "see it".

The Virginia manager immediately started going through the [very large] backlog of engineering work, saying [appropriately]: "we need to either do this stuff, or decide that we do not need to do this stuff, and cancel it." This was like a breath of fresh "good management" air. I sent an email to the CEO of generation recommending that this manager be promoted to Millstone engineering director.

There was a problem however.

One of the people in engineering told me that this action had uncovered a bunch of restart issues, safety improvement modifications that the 1996 "safety scrub" had flagged, that NU management had promised NRC to address.

NU had said: "Please let us restart now even though not all of the [safety cleanup] work is done, we promise we will fix these things ASAP". NRC said: "OK, we will allow you to restart now, but be certain you fix these things ASAP" and then NU sold the plants to Dominion.

But the NRC resident inspectors are there, and surely [to safeguard the public] they must be tracking these "restart items" and ensuring that they are all satisfactorily addressed?

Well, not exactly.

A few years ago I went to an industry conference and attended an NRC presentation. It showed how one of the major problems at NRC was the lack of a corrective actions process, the lack of any kind of a tracking system for ensuring that action items are tracked and closed.

When I returned to the Millstone I asked the resident about this and he said: "oh yes, we should have a good system very soon". Then I asked him to "please let me know when it is in place". He said: "I will".

I said: "you don't have a tracking system, so how will you remember to do this?" He said: "don't worry, I will remember".

He never got back to me.

How Do You Address Management Problems Like This?

Last year NRC asked me [invited me as a member of the public] to join a "call in" discussion on their efforts to manage safety culture at new plants being built. I told my supervisor about it and called into the meeting, I was on the phone for about an hour.

The department manager found out about it and told my supervisor to inform me that I was not allowed to attend these kind of NRC meetings during company hours, that I would have to take a vacation day and do it from home. In my view, this was violation of 10CFR50.7 employee protection.

Every nuclear plant is required to post a large [poster size] copy of NRC form 3 which outlines certain responsibilities and rights of employers and employees. One of the employee rights is not to be harassed or discriminated against for taking part in an NRC proceeding [which I interpret as anything the NRC is trying to accomplish].

My supervisor told me that someone who attended the meeting had told the manager I had been misrepresented myself as speaking for Dominion [I had been attending these NRC safety culture discussion for years, the NRC me as, and knew I was speaking as, an independent "expert" member of the public].

The supervisor then told me the Chief Nuclear Officer of Dominion was upset [presumably about my actions]. I just happened to know the CNO very well [we had been discussion safety culture for years] about a week later we sat down to discuss culture and I told him about my supervisor's comment, and asked him what he was upset about. He said he wasn't upset, and didn't even know I had attended a meeting with NRC.

I had been in the group about a year, but the supervisor and manager had been in the group just a couple of months {the supervisor was recently hired and the manager had recently returned from a long assignment]. I think neither was aware that I knew the CNO, and they were telling me that he was angry [I am guessing] to intimidate me and "keep me in line."

I complained about this treatment to some coworkers. I discovered two other workers within sight of where I sat had in the past been harassed by the same manager [both had filed complaints]. As I had gone to the employee concerns program in the past [with unsatisfactory results] I did not go to ECP, but a coworker contacted the ECP manager, who asked me to meet with him.

I told him about the manager's actions he said "oh yes, we have known about that manager for a long time." I said: "really? well, what have you been doing about it?" He said: "we take some actions,

you know those management changes that took place recently [about 6 managers had recently swapped positions] a number of those were due to employee concern issues."

I said: "if all you do is move managers to another department when there are problems, isn't that a bit like how the church deals with problem priests?" The ECP manager appeared offended and said: "we do a lot more than that." I said: "OK, what else do you do?" He said: "I can't tell you, it's confidential." I said: "whatever you are doing, it does not seem to be working."

Lee Olivier [now COO of Northeast Utilities] is widely considered one of the top culture managers in the industry, and was hired specifically [was hired away from the Pilgrim nuclear plant] by NU to lead the 1996 - 1998 safety culture recovery at Millstone. By all accounts by the end of recovery Olivier had managed the culture to an impressively high level of excellence.

As I said, in 2003, a lot of Ohio reporters were doing stories on the Davis Besse event, and many of them attended the 2003 NRC workshop [I did a presentation on safety culture management]. After the workshop, I was interviewed for a half dozen Ohio newspaper articles as an "industry safety culture expert."

I suggested to one of the reporters that he interview Lee Olivier, this was Olivier's comment from the article:

> *If nuclear plant executives would concentrate on building trust with employees and helping them reach their highest potential, the NRC wouldn't have to worry about safety culture inspections, said Lee Olivier, who led the transition at Millstone and is now president and chief operating officer of Connecticut Light and Power Co. "The first thing you do is prove to people you care about excellence, and about them," said Olivier. "When you do these things, you build trust coupled with higher standards and expectations."*

A couple of years later I asked Olivier [basically] "what was your 'secret' for maintaining such a healthy safety culture at Millstone, what was the most important thing?"

Olivier replied:

> *"First you establish clear expectations for leadership behavior. Then there are always a few managers who 'just don't get it'. Now this is the most important thing [for senior managers to do to maintain a healthy safety culture] but it is the thing that most senior managers will not do. The managers who 'just don't get it' cannot remain on the leadership team."*

I recently told the CEO of Dominion generation that during recovery there is no way the manager that ECP "has known about for a long time" would have been allowed [by Olivier] to remain on the leadership team. Personally, I have a [somewhat] softer position.

I believe managers who continually fail to demonstrate the organizational-managerial behaviors [that INPO outlines] that are needed to promote a healthy safety culture [what INPO calls "leadership professionalism"] can remain on the leadership team, but are not qualified [cannot be permitted] to manage a safety related functional area.

Nuclear employees are qualified all the time for this and that safety function. As a design engineer I had a laundry list of qualifications that I needed to keep current. I have been proposing for some time now that managers need to be qualified to manage safety culture. This would involve a much more detailed and comprehensive training program that the current [SCWE] industry training

provides. As a Washington attorney who does safety culture training told me: "it is surprising how very little industry managers know about safety culture."

I would recommend developing a NRC regulatory guide called "CARMA" [Culture Assessment and Regulation Management Approach]. That would establish requirements for training workers and managers in safety culture fundamentals and leadership behaviors that maintain a healthy culture, and requirements for periodically assuring that every member of the leadership team is adequately demonstrating these behaviors [in essence, establishing a quality management program for safety culture].

If a bus driver is texting while driving, the passengers must say something, and the behavior of the driver must be evaluated. Perhaps the person needs more training, or perhaps the person should not be a bus driver. Behaviors like this exist for safety culture management, and employees at Millstone [workers and supervisors] frequently complain about managers that exhibit these kind of behaviors. These complaints are typically either ignored, or handled ineffectively by ECP.

For this reason a method of screening leadership behavior and "listening to workers" [without the intimidating presence of management] needs to be institutionalized at Millstone. There is nothing new or unusual about this, most culture experts [Schein, Carroll, Reason] recommend doing something like this periodically to maintain a healthy culture. Shortly after the 1998 recovery restart, John Beck recommended that Millstone leadership institutionalize something like this. I myself have recommended this to Millstone management nine times [about every year] since recovery. Last year I sent the CEO of Dominion generation the below image of what a healthy management team should look like [what the management team at Millstone should look like].

Industry managers really don't want any part of this. Industry managers would like to maintain the status quo, which is "authority without accountability." The fundamental post-deregulation managerial philosophy of "minimal regulatory compliance" would be threatened if managers were required to "behave properly" and to "listen carefully and responsibly" and address what groups of workers might offer as "organizational process concerns".

The industry lobby group NEI complains loudly if the NRC even hints at starting to develop something that oversees and regulates leadership behavior. To get the NRC to back off, NEI argues: "the licensee is primarily responsible for safety management, not the NRC, so NRC should stay out of management" [and historically the NRC has always backed off]. As Apostolakis said to the Plain Dealer in 2002:

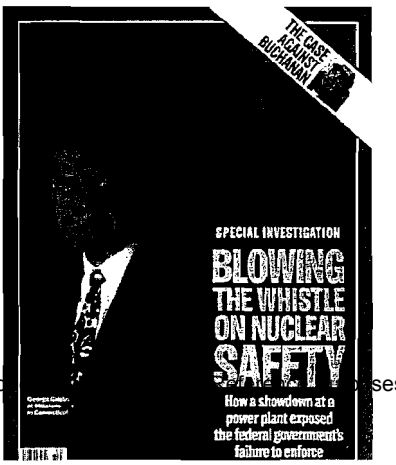
"For the last 20 to 25 years," Apostolakis said, "this agency has started research projects on organizational-managerial issues that were abruptly and rudely stopped because, if you do that the argument goes, regulations follow. So we don't understand these issues because we never really studied them. It's a major failure of the system, in my view."

What the NRC needs to do is to say: "yes, the licensee is primarily responsible for managing safety, but the NRC *is primarily responsible for assuring that safety is being properly managed*" and then give licensees notice that the days of "authority without accountability" [of texting while driving] of "low levels of leadership professionalism" are over.

What NRC Needs to Do Next

NRC needs to ignore the industry lobby and wrap both of it's hands firmly around the safety culture issue. However, every time NRC tries to touch safety culture, the industry lobby group NEI [the Nuclear Energy Institute] complains that safety management is their responsibility and that NRC must "stay out of management, that's not your job!" In this area NRC has always acted more like a lapdog that a watchdog. The Ohio reporters covering Davis Besse understood this, and this editorial cartoon was published in 2002 after the Davis Besse event.

It is correct that it is not the job of NRC to be a [surrogate] manager of the plants. It is however, the job of NRC to ensure safety culture is being properly managed at the plants. It is the job of NRC to make certain that the leadership team is managing in an ethical and professional manner.



So What Regulates [Monitors, Controls] Safety At Millstone Today?

After the Millstone event, the state of CT realized that NRC might not able to effectively monitor safety at Millstone and created NEAC [Nuclear Energy Advisory Group] that is supposed to monitor the safety culture and alert the governor

to safety problems at Millstone. NEAC [comprised of mostly retired submarine commanders and engineers] gets most of it's safety data from the NRC. NRC cannot assess safety culture, so how can NEAC do this from NRC data?

Years ago I attended a couple of NEAC presentations in Waterford and tried to explain this to NEAC, but the sub commanders were highly insulted by any implication that they did not fully understand nuclear safety. Go ahead, you try to explain nuclear safety culture to a nuclear submarine commander and see how far you get.

In 1996 the Millstone were shut down for two years while an unprecedented safety scrub was performed. It was not the NRC that initiated the shutdowns, it was the media. It was the front page Time magazine article [by Eric Pooley] that precipitated [and caused NRC to initiate] the shutdowns.

I think there is abundant evidence that another safety scrub is needed. The NRC resident inspectors has for a very long time now been grumbling about organizational-managerial problems, but NRC does not provide them the "tools" needed to identify the problems and act to correct [regulate] them. It may [again] be up to the media to galvanize public opinion and secure the needed action at Millstone through public officials.

So [If Not NRC] What Regulates Safety Management In The Nuclear Industry?

I would like to be able to say the NRC, but you are looking at it: the "media."

Articles like this one, and people who read them, and then go petition people in positions of authority to take some action to improve safety management. If the CT Governor listens only to NEAC, nothing is going to happen.

As I said NEAC does not listen to me, so about a week ago I emailed three political hopefuls, providing them preliminary information, asking them to contact me:

- Ned Lamont
- Peter Schiff
- Richard Blumenthal

I have many supporting documents [I am not making this stuff up] I am available with any representatives of government who are interested in taking meaningful corrective actions to try to address these problems.

What [Exactly] Needs To Happen At Millstone?

Lee Olivier was one of the best culture managers in the industry, and during recovery his "marching orders" from NU executives were to do whatever was necessary to develop a healthy safety culture, which [in a way] made it "easy". The plant manager at Millstone right now is a very good man, and is not a bad culture manager.

However, the "marching orders" from Dominion executives [increasingly since Tom Farrell became CEO] have been "do everything necessary to cut costs and help Dominion meet Wall Street numbers". Lee Olivier may not have fared much better in this circumstance.

What has to change is cost management pressure from above [Dominion executives] needs to be reduced and safety management pressure from below [workers, managers, Millstone Oversight dept] needs to be increased [more "bottom up" authority needs to be institutionalized].

To do this, the employee concerns function must change dramatically. Instead of one guy [who sits in a lonely out of sight office outside the power block whom you rarely ever see] a construct needs to be institutionalized that views and maintains the quality of the safety culture like any of the quality [safety related] systems at the plant, because [although it looks a little different] that is exactly what it is:

> Safety Culture (Quality Management)
> *A organizational-managerial safety system requiring the same level maintenance and quality management as engineered safety systems. NRC needs to as "Safety Culture" to the [10CFR50 Appendix B list of quality systems] so that operating organizations will dedicate the necessary resources to safety culture quality.*
>
> Safety Culture (High Reliability Organization)
> *In a high hazard industry, professional leadership attitudes that ensure hazardous processes are managed so that risk to human life and the environment is maintained acceptably low, thereby assuring stakeholder trust.*
>
> High Reliability Organization (HRO)
> *The operating organization in a High Hazard Industry that manages processes with significant inherent risk to human life or the environment. Examples: a nuclear power operating organization.*
>
> High Hazard Industry (HHI)
> *An industry that operates and manages processes with significant inherent risk to human life or the environment. Examples: nuclear power industry, medical industry, chemical industry, various mass transportation, military, NASA.*

Millstone – Dominion leadership does not want to institutionalize any "bottom up" authority, as this would alter the existing managerial approach from "MCR" to "ALARA" , result in suboptimal ROI, and would increase Millstone operating costs by about 40M per year.

> Minimal Regulatory Compliance (MRC)
> *A HRO safety management approach that assumes the government is primarily responsible for safety operations, that minimal satisfaction of government regulations will assure safe operations, and that optimal production [cost control, ROI] economics require that concerns of stakeholder beyond those required to minimally satisfy the regulator not be resourced. MRC theory relies heavily on regulations to manage risk, as the organizational "defense in depth" barriers (worker, manager, internal oversight, communitarian regulator) are either not funded or under-resourced and become eroded over time [see opposing theory "ALARA"].*
>
> As Low As Reasonably Achievable (ALARA)
> *A HRO safety management approach that assumes licensees are primarily responsible for safe operations, and that governmental regulatory compliance [alone] does not assure safe operations, and that addressing all reasonable stakeholder safety concerns is required to maintain operating risk acceptably low. [see opposing theory Minimal Regulatory Compliance] also see James Reason "Managing the Risk of Organizational Accidents" 2000, pg. 75 .*

With current oil prices, 2010 Millstone windfall profits are projected to be just over 1B for the year 2010. Since purchase by Dominion, the lowest Millstone yearly profits has been 331M.

Therefore 40M per year to fund ALARA operating risk equates to about 4 - 12% of annual revenues.

The CT Governor should prevent restart of the Millstone 3 unit for a period of one year [until April 15, 2011] pending investigation and resolution of any issues [identified in this article or elsewhere] that the judgment of those parties identified by INPO as being responsible for managing operating risk [workers, managers, internal oversight, external oversight] present an unacceptable public health risk to the citizens of the state of CT.

I estimate these issues cannot be resolved in less than a period of 6 months. I therefore recommend that after 6 months the Governor allow Millstone to request permission to restart upon presentation of evidence that these issues have been resolved to the satisfaction of the above parties.

What Millstone Workers Can Do To Help

As I indicated, I have evidence from [a room full of] experts [ORE managers] that safety is currently under-staffed in the Millstone ORE department, a department that is supposed to do what NRC cannot do – ensure that the most frequent causal factor of nuclear power industry accidents [organizational-managerial failures] does not cause a serious accident at Millstone .

If any [current or former] Millstone employees are aware of other departments understaffed by the layoffs [or other safety related issues not being resourced or addressed] in any of the other [50 or so] departments at Millstone, PLEASE HELP ME COMPILE THIS INFORMATION.

[Do not call] send an email to the below address:

millstoneISP@gmail.com

Do this:

- *Identify* where you think staffing may be under-resourced [department, group, other]
- *Assess* what should be done that probably won't be [due to staffing] and identify which organization says it should to be done [NRC, INPO, other]
- *State* what corrective actions are needed [return the terminated workers, other]

If *prima facie* the issues appear significant, I will add them to my discussions going forward.

What Should Happen Next

Safety is a type of business ethics that ensures business actions do not harm people. Even if safety were not being under-resourced at Millstone, worker terminations coming in the middle of a string of windfall profits should be a clue that Millstone is willing to put profits ahead of the welfare of people.

When a business with public safety responsibilities takes actions to make money that harm people, this kind of action needs to be viewed [by regulators and people in government] as a warning flag that this company willing put profits ahead of people, will put production ahead of safety. This kind of action should be viewed as an indicator of a poor safety culture.

Managers who do not understand this should perhaps not be managing public safety. Regulators and government officials who do not understand this should perhaps not be overseeing public

safety. The first lesson that Millstone should have learned from the 1996 shutdowns is that maintaining the trust of all stakeholders is something that is essential.

The first thing that needs to happen is Millstone needs to reverse the terminations and rehire the workers to their jobs. Millstone should allow them to keep their severance payments, as compensation for the disruption that this action [the terminations] caused in their lives.

What should happen next is the CT Governor should not allow Millstone 3 to restart from the current outage [began mid April] until all significant safety issues are identified, analyzed and addressed to the satisfaction of:

- The NRC resident inspectors
- A panel of INPO representatives
- The Millstone Oversight department
- A panel of responsible Millstone managers
- A panel of responsible Millstone workers

By "Responsible Millstone Managers" I am referring to people like the first line supervisors I mentioned and many others like them who have been fighting for a very long time to be allowed to implement needed safety improvements at Millstone. By a "panel" I mean a handful of representatives from these groups that for years have raised safety or quality issues to Millstone management [issues that have been effectively dismissed (not resourced)].

If Millstone people who read this article will help me, together we should be able to make some of these things happen.

A Final Word

US nuclear plants are designed very [very] safe. They can withstand a lot of [very] poor management and still operate safely. My family and I live inside the Millstone evacuation zone, I am not worried, I not going anywhere.

Millstone and US nuclear plants are not like Chernobyl. Even the Russian plants are not [today] designed like Chernobyl. Chernobyl had a very serious design flaw that [the organizational-managerial system] knew about but did not address [covered up] which allowed Chernobyl to continue to operate, with disastrous results.

The reason I have been beating up on NRC for a very long time now [and in this article I "beat up" on Millstone a little] is that people who live near nukes have a right to know what is going on in their back yard, and also that we need better safety management and NRC needs to become a better regulator. NRC needs to go back and learn the lessons of Millstone [correctly this time].

Another reason we need nukes to operate more safely is that we need more of them. Believe it or not, nukes are a much better [healthier more environmentally responsible] way to generate [baseload] electric power than is coal.

Note that I say [baseload] this is very important to understand. The wind does not always blow, the sun does not always shine [for example, often does not shine at night] so until [and unless] an incredibly enormous "magic battery" is somehow invented [and right now there is nothing on the horizon giving even a remote indication that this can someday happen] only nuclear can replace coal.

Due to the work of energy industry lobbyists, old dirty coal plants built before the mid 1970s continue to operate without modern pollution controls. The result is [since TMI] hundreds of thousands of early deaths and millions upon millions of cases of chronic asthma and respiratory

disease have occurred that could have been avoided if [after TMI] the US had stayed with it's planned nuclear expansion policy[as for example France did].

What is killing and harming the health a surprising number of [mostly very old and very young] people is something called "particulate pollution." It is only over the past decade that this has been clearly understood. One of the largest contributors is coal soot in the air [breathing soot in the air is equivalent to breathing second hand cigarette smoke].

You think you don't smoke? Think again. You can read about it here:

http://www.americanheart.org/presenter.jhtml?identifier=4419

Additional scary accidents like TMI or Davis Besse [even if no one gets hurt] will end the needed expansion of the industry. So we need nukes, but we need them to operate more safely, and we need to encourage people in government and the NRC to help make this happen.

[End of article]

Dave Collins has a MS in Executive Management and Leadership. With the endorsement of NRC safety culture expert John Sorensen, in 2000 he completed a highly successful study of a "state of the art" safety culture CARMA [culture assessment regulation management approach] study at Millstone. In 2003 wrote a thesis paper on safety culture management. In 2004 he assisted MIT with safety culture modeling and has helped develop industry safety culture training software. He is currently a member of an NRC expert panel to improve safety culture definition, assessment and regulation. After working as a design project engineer, Oversight assessor, human performance supervisor, and INPO coordinator, he retired from Millstone in March of 2009. He continues to work to improve safety management in the nuclear power industry [and beyond] his work continues to be supported by leading academics and authors. David lives in the New London county with his wife Kathy.

Endorsements

Dr. Jonathan Wert, Nuclear Industry Safety Culture Consultant:

> *"David, I consider you to be much more qualified than any of the academicians, psychologists or navy nukes that I know or have read about. You have actual experience with nuclear safety culture where the 'rubber hits the road' ground zero on the firing lines."*

Lee Olivier, COO Northeast Utilities [former NU CNO]:

> *"David, good to see you using our experience at Millstone as a model of how to successfully make change. You can treat people with a deep rooted respect and care and still make the hard business decisions...it's how it's communicated, it's the level of trust in the organization etc. Really centering around the issues you identified. Again, your paper was extremely thoughtful and well written. Good luck with it." - Lee*

David Christian CEO Dominion Generation [caution: older comment, may have expired as of this article]:

> *"I think [David] is among the finest intellects and communicators in the area of safety culture."*

d by NRC Staff for Reference Purposes)

REVISION 2

Bad Management Has Returned To Millstone, CT Governor Should Review Whether Staff Reductions Are Affecting Public Safety

PREFACE [APRIL 29, 2010]

I GAVE THIS INFO TO DOMINION MILLSTONE MANAGEMENT IN EARLY APRIL. I RECEIVED NO FEEDBACK THAT INDICATED TO ME THAT DOMINION / MILLSTONE WAS OR SOON WOULD BE TAKING ANY SIGNIFICANT ACTIONS TO INVESTIGATE [AND IF NECESSARY] ADDRESS THESE ISSUES. AFTER INFORMING DOMINION / MILLSTONE [FOR ABOUT A WEEK] OF MY INTENTIONS TO 'GO PUBLIC' UNLESS THESE ISSUES WERE INVESTIGATED AND ADDRESSED, I PROVIDED THIS INFO TO THE NEW LONDON DAY ON APRIL 14.

ON APRIL 15 FOR 3 HOURS I ALLOWED A DAY REPORTER TO VIEW [REVIEW] A LARGE NUMBER OF INTERNAL INPO AND MILLSTONE DOCUMENTS TO VERIFY THE ACCURACY OF THIS INFO. THE DAY DID NOT DISPUTE THE ACCURACY OF ANY OF THE INFO CONTAINED IN THIS DOCUMENT, BUT REFUSED [AND TO THIS DATE REFUSES] TO PUBLISH ANY OF THIS UNLESS I RELEASE COPIES OF THE SUPPORTING DOCUMENTS TO THE PAPER.

MY LAWYERS TELL ME WRITING AN ARTICLE LIKE THIS [WITH DOCUMENT EXCERPTS] IS PROBABLY OK, BUT RELEASING INTERNAL DOCUMENTS COULD BE ILLEGAL, SO IT HAS BEEN DIFFICULT GETTING THIS INFO COMMUNICATED TO THE PUBLIC. I AN NOT INTERESTED IN "FEEDING" IRRESPONSIBLE ANTI-NUCLEAR GROUPS, BUT I FEEL THAT PEOPLE INTERESTED IN THE CONTINUING SAFE USE OF NUCLEAR POWER SHOULD BE ABLE TO ACCESS THIS INFO.

FOR ABOUT 30 YEARS NOW, SINCE BAD MANAGEMENT WAS FIRST IDENTIFIED AS A PRIMARY CONTRIBUTOR TO THE THREE MILE ISLAND ACCIDENT, CHERNOBYL AND MOST OTHER ACCIDENTS, US NUCLEAR INDUSTRY LOBBYISTS HAVE BLOCKED NRC EFFORTS TO STUDY AND CONTROL [REGULATE] THE VERY SIGNIFICANT RISK POSED BY "BAD MANAGEMENT"[ALSO REFERED TO AS A "WEAK ORGANIZATIONAL SAFETY CULTURE"].

THE PEOPLE WHO MANAGE MILLSTONE [AND DOMINION'S VIRGINIA PLANTS] ARE FUNDAMENTALLY GOOD PEOPLE [MOST ARE VERY GOOD PEOPLE] BUT DOMINION'S NUCLEAR ORGANIZATION HAS TOO OFTEN ACCOMODATED PRESSURE FROM ABOVE [DOMINION CORPORATE] TO BRING IN LARGER AND LARGER PROFITS AND HAS NOT SUFFICIENTLY "PUSHED BACK".

NRC WILL NOT SHUT A PLANT DOWN AND SAY "FIX THIS" UNLESS MAJOR SAFETY PROBLEMS ARE DETECTED AND REMAIN UNCORRECTED. PRIOR TO THE LATEST MAJOR NUCLEAR EVENT [2002 DAVIS BESSE] MANAGEMENT HAD SUCCESSFULLY HID MAJOR SAFETY PROBLEMS FROM THE NRC RIGHTTO THE DAY OF THE EVENT. ONLY THEN WAS IT DISCOVERED THAT THE SAFETY CULTURE HAD BEEN VERY WEAK [BAD MANAGEMENT HAD BEEN IN PLACE].

THE NRC HAD BEEN REPORTING FOR MANY YEARS THAT THE DAVIS BESSE CULTURE WAS HEALTHY. AFTER THE EVENT, THE OHIO PAPERS REPORTED THAT THE NRC WAS SUPPOSED TO HAVE DEVELOPED EFFECTIVE REGULATORY APPROACHES AFTER THE WEAK SAFETY CULTURE [BAD MANAGEMENT] EVENT THAT OCCURRED IN 1996 [MILLSTONE]. THE NRC'S OWN SAFETY ADVISORY GROUP CALLED IT "A MAJOR REGULATORY FAILURE".

THE NRC HAS YET TO DEVELOP EFFECTIVE APPROACHES TO REGULATE SAFETY CULTURE. EARLIER THIS YEAR THE NRC [FOR THE FIRST TIME IN 30 YEARS] LAUNCHED AN EFFORT TO ACCURATELY DEFINE WHAT IS MEANT BY THE TERM "SAFETY CULTURE" AND IDENTIFY ATTRIBUTES ABLE TO INDICATE THE QUALITY OF THE CULTURE [THE QUALITY OF THE MANAGEMENT].

THEREFORE, NEAC MUST NOT WAIT FOR [RELY ON] THE NRC TO DECLARE MILLSTONE MANAGEMENT ACTIONS "UNSAFE", BUT MUST MAKE AN INDEPENDENT ASSESSMENT AND ADVISE THE CT GOVERNOR WHETHER THE RESTART OF MILLSTONE 3 [DUE MID MAY] SHOULD BE DISALLOWED UNTIL THE STAFFING [AND OTHER SAFETY ISSUES] ARE INVESTIGATED AND ADDRESSED.

THE LONG TERM SOLUTION IS FOR NRC TO REQUIRE ALL INDUSTRY LICENSEES TO INTITUTIONALIZE [FULL AND RESPONSIBLE] PROACTIVE ELICITING OF [AND CAREFUL LISTENING TO] EMPLOYEE SAFETY CONCERNS, AND TO [FULLY AND ACCURATELY] ANALYZE ANY EVENT RISK THESE CONCERNS MAY PRESENT, AND TO [FULLY AND APPROPRIATELY] RESPOND TO THEM.

IN THIS DOCUMENT ARE MANY [PAST AND PRESENT] EXAMPLES OF BAD NUCLEAR MANAGEMENT IN THE STATE OF CT. SINCE THIS INFO WAS MADE PUBLIC A WEEK AGO, NRC APPEARS TOBE TAKING THESE ISSUES SERIOUSLY AND INVESTIGATING THEM FULLY.

IF YOU ARE AWARE OF ANY ADDITIONAL EXAMPLES OF BAD NUCLEAR MANAGEMENT IN THE STATE OF CT THAT APPEARS TO BE AFFECTING SAFETY, PLEASE EMAIL THEM TO millstoneisp@gmail.com

Discussion

To help Dominion executives meet Wall Street numbers, In March 2010 Millstone reduced staff a little too quickly, and is operating without some important safety functions designed to minimize the chance of an accident. How this could happen with two NRC resident inspectors stationed right at the site?

I am a recently retired Millstone [engineer, safety system quality assessor, and INPO coordinator]. In 2003 I wrote a master's thesis on safety culture management, and for the past seven years or so have been an acknowledged nuclear power industry safety culture management expert.

In March Millstone reduced staff through early retirements [I was one of the "early retirees"] and also by terminating more than 50 workers [only "worker bees" the entire management team was exempted]. Millstone has many older workers within five years of retirement. Before leaving I implored the plant manager to accomplish the desired staff reductions gradually over the next 2-4 years through early retirements [and I verified with HR that this was acheivable].

In April I also sent emails to top Dominion management that layoffs were [very clearly] not economically necessary, arguing that this action was only to improve short-term profits [beef up Wall Street numbers] and was as unethical as it was unnecessary. "Don't do this" I said.

Too Much Staff Or Not Enough Effective Management?

In January the Millstone plant manager had justified the [100 or so] staff reductions by pointing out that some sites with higher INPO ratings than Millstone also have about 10% less staff. INPO is the "Institute of Nuclear Power Operations" the industry "excellence" organization formed after Three Mile Island to recommend improvements that minimize accidents.

While some sites do have higher ratings than Millstone and with lower staffing numbers, this is much more likely due to effective management teams than slightly lower numbers of staff.

A Toyota Prius goes further with less gas because it has been engineered to operate efficiently. Putting less gas in "your old clunker" is not going to turn it into a Prius. Similarly, reducing staff at Millstone is not going to improve INPO ratings [or the site-wide safety focus]. If you try to turn "your old clunker" into a Prius by giving it less gas, the only reasonable outcome is that you are not going to get where you need to go.

When I found out in late March the amount of staff reductions had been made in the department I retired from [the Organizational Effectiveness department] I said "I don't think this can be done", and for the first two weeks in April have been sending documents to top Dominion managers explaining how activities that support safety are being under-resourced.

If I felt that the staff reductions were not affecting safety [while I would have believed them to be unethical and unnecessary] I would have [had] to say: "it's just business" and I would not be writing this article. No, this more than "just business" this is putting short-term profits ahead of long-term public safety interests.

To understand why I am saying this, the reader needs to understand a little about safety management in the nuclear industry, the historical nuclear safety management that has occurred in the past in Connecticut, and the safety management that is ongoing right now at Millstone.

Putting Profits Ahead of People And Safety

According to a New Haven Register article published last month:

> *Dominion's net pre-tax profit from the Millstone 3 generating unit was $440 million in 2009, which translates into … a return on equity of 115 percent, according to the report. [CT] HB 5505 defines windfall profits as "in excess of 20 percent return on equity."*

Add the production of Millstone 2 and this equates to annual windfall profits of about 770M.

The Iraq war [and other factors] have kept energy prices artificially high for many years, and over the past decade companies like Exxon Mobile have raked in record windfall profits. For much of this time there has not been a "real" shortage of oil, just the "risk" of a shortage of oil. Which means these companies have used the fear of shortages to charge more for their product, not because they "need to", but because they "can" and the government [heavily influenced by the energy lobby] lets them get away with this.

When energy prices go up, companies that rely on oil [or gas or coal] to produce power need raise electricity prices because fuel is a major cost factor. This is not the case with nuclear. The price of uranium oxide is not significantly affected by oil prices, and even if it were, most of the cost of operating a nuclear plant is not the fuel cost, but the cost of the large numbers of staff required to operate a plant safely.

So when energy prices go up, nukes charge more for electricity not because they "need to", but because they "can" and while energy prices have been high [really ever since Dominion purchased Millstone in 2001] Millstone has proven an amazing "cash cow" for Dominion.

How much money has Dominion made on Millstone since 2001? Profits for nukes trend up and down with oil prices, so here is a rough estimate [*2010 oil price projected as of 3/11/2010]:

Year	Price per barrel	Est. Millstone Profit
2001	23.00	331
2002	22.81	328
2003	27.69	399
2004	37.66	542
2005	50.04	721
2006	58.30	840
2007	64.20	924
2008	91.48	1317
2009	53.48	770
*2010	69.85	1006
	Total	7179

So Millstone has made about 6B since purchased by Dominion, and may make up to another billion this year.

Considering how much Dominion makes on Millstone, I wondered why on earth Millstone had felt the need to terminated 50 CT workers in March [all good people with whom I worked and who I know were loyal, dedicated employees]. This was clearly not because Dominion "had to" but because they "could." But why would Dominion do something like this?

Overstaffed or Undermanaged?

In January the plant manager at Millstone rolled out a [Goodnight consulting] chart showing that since 1996 [essentially since deregulation] production performance has improved as staffing levels have dropped, and implied that statistics show that safety and reliability correlate positively with low staffing numbers, and that plants with low staffing generally also have high INPO ratings.

I contacted the owner of Goodnight consulting [Charles Goodnight] he said he does not have access to INPO ratings and never claimed any correlation with low staffing and safety. I think the majority of people in the industry would tell you that high INPO scores correlate more closely to site management team efficacy [management was exempted from the layoffs, no surprise here] than staffing levels that are marginally higher than similar two unit sites.

Goodnight did support some staff reductions, but only if done in a careful, controlled manner, and only after completing something called a "change management plan" to verify that staffing remains sufficient to support critical safety functions. A member of Millstone management told me [this is a month *after* the layoffs] that these "change management plans" were never completed.

Several people have since told me that the "real" cause of the layoffs is that the Dominion did not get the rate increase it wanted from it's [regulated] Virginia plants, and is now taking "a pound of flesh" from it's [deregulated] CT plants.

I wondered, is this dynamic causing money to be given precedence over safety in CT? Could an over-focus on "maximizing profits" [right now, today] be increasing the probability of a nuclear accident in CT?

Short Term Profits Over Long Term Safety?

Is Dominion putting [short term] money interests above [long term] safety interests at Millstone to meet [arbitrary] 'Wall Street' goals set by top executives?

INPO does not use the term "accident" it calls serious accidents like TMI a "significant event." INPO says nearly every significant event since 1993 [since deregulation] had "pressure to continue operating" as a causal factor [this was not observed even once prior to deregulation].

> *It is important to note that [pressure to continue operating] was a factor in all but one of the most recent (since 1993) significant events. Therefore, given today's competitive environment,* ***pressure to continue operating*** *may be a notable contributor to future significant events.*

Are competitive pressures due to deregulation causing an increasing focus on money and a decreasing focus on safety?

Do Everything NRC Says And Your Plant Will Operate Safely, Correct?

Well, not exactly.

The mission of NRC is to assure "adequate" public safety, the mission of INPO is to promote "operational excellence". "Operational excellence" is what avoids accidents like TMI.

INPO was established after TMI to encourage the industry to more than the minimum, to do everything reasonably possible to prevent events like TMI [and many others] from recurring. To keep the probability of nuclear accidents ALARA [as low as reasonably achievable].

INPO identifies [not engineering problems but] a weak safety culture [organizational-managerial problems] as the most frequent causal factor of nuclear "events" like TMI and the majority of the others.

As competition increases, more and more operating companies have been adopting a philosophy of "minimal regulatory compliance". This means that management controls costs by doing the bare minimum required to satisfy NRC. The more responsible ones also do the minimum that keeps INPO happy, and the CEO's of these operating companies are rewarded by receiving an "INPO 1" rating for their nuclear plant sites. Average plants get "INPO 2"

The Millstone site has historically been "INPO 2" [average]. However, for a long time now INPO safety metrics have had Millstone on the bottom of the industry. In January, the overall INPO rating for one of the plants was dead last, equivalent to an academic score of "F minus declining." The next INPO review is likely to categorize Millstone as an "INPO 3" a rating given to a handful of the worst performing sites in the industry.

How Likely Are Future Major Accidents?

UCS [Union of Concerned Scientists] Dave Lochbaum is the leading nuclear industry watchdog critic. After the 2002 Davis Besse event he was interviewed by CBS "Sixty Minutes." Below is a prescient article Lochbaum wrote several years before the Davis Besse event occurred, warning that a major accident can still occur [as Davis Besse demonstrated]:

http://www.ucsusa.org/nuclear_power/nuclear_power_risk/safety/nuclear-plant-safety-will.html

> *With 103 reactors currently operating in the United States, these data suggest that a major reactor accident may be fairly likely to occur in the near future. It seems only a matter of time before the initiating event wheel, the equipment wheel, and the human performance wheel stop in a combination that produces another accident.*
>
> *Why should anyone be concerned about preventing another reactor accident? After all, the Three Mile Island accident produced some dramatic headlines and prompted a Saturday Night Live skit, but it did not leave portions of the Pennsylvania countryside uninhabitable. If TMI represented the worst-case reactor accident, then it might be acceptable to suffer one such disaster every generation. Unfortunately, things can be much worse than TMI.*

A few years ago Lochbaum left UCS and took a job at NRC. UCS offered me Lochbaum's job, but I was employed at Millstone and said I would consider it after retirement [Lochbaum has since returned to UCS].

What About Safety At Millstone Today?

TMI [and Chernobyl] demonstrated that organizational-managerial problems lead to most of the serious nuclear accidents. If NRC had not figured out how to effectively regulate organizational-managerial issues after TMI and Chernobyl, certainly after the Millstone event the NRC [finally] figured it out and corrected the problem. Right?

Well, not exactly.

In 2003, a lot of Ohio reporters were doing stories on the safety culture problems that led to Davis Besse event, and many of them attended a 2003 NRC workshop on the subject where I did a presentation on "safety culture management". After the workshop, I was interviewed for a half dozen Ohio newspaper articles as an "industry safety culture expert."

If you google "david collins safety culture" you can access a couple of the [many different] papers I have written and presentations I have given. After the 2002 Davis Besse event, this article appeared in a Cleveland newspaper:

2002 Cleveland Plain Dealer *Employees must fix plant's damaged attitude on safety*

> *The Millstone debacle was supposed to have heightened the nuclear industry's awareness of the safety culture issue. The NRC believed Reactor Oversight Program, its new approach to monitoring the nuclear fleet would be a more sensitive, less subjective indicator of how well reactors were operating. Which is why Davis Besse came as such a shock to regulators and the industry: Until the day the hole in the reactor lid was found in March, the plant got uniformly high marks from the NRC's inspections*
>
> *"There clearly were some issues with safety culture at that plant that had not been recognized by us, and not recognized by the top- most management of FirstEnergy," said NRC Chairman Richard Meserve. As he told an industry group in November, "the Davis-Besse episode presents the fundamental question as to whether the NRC's approach to assuring an adequate safety culture is sufficient." "I think if you were to talk with five different people about what safety culture is, you'd probably get five different answers." Meserve said "If we were to find tools to measure a plant's culture objectively, I think a lot of concerns of regulation in that area would diminish."*
>
> *MIT Nuclear Engineering professor George Apostolakis chairs the 12 member NRC safety advisory "think tank" ACRS [Advisory Committee Reactor Safeguards]*
>
> *"For the last 20 to 25 years," Apostolakis said, "this agency has started research projects on organizational-managerial issues that were abruptly and rudely stopped because, if you do that, the argument goes, regulations follow. So we don't understand these issues because we never really studied them. It's a major failure of the system, in my view."*
>
> *David Collins, an engineering analyst at Connecticut's Millstone nuclear power station who studies safety culture, likens it to the moral and ethical code that guides doctors: "An attitude that ensures the [nuclear] technology first does no harm."*
>
> *"We need some mechanism for NRC to remove toxic leadership," suggested David Collins, an engineering analyst at the Millstone Nuclear Power Station in Connecticut, noting that overbearing executives could diminish plant safety. Like several other speakers and committee members, Mr. Collins, expressed reservations about extensive safety culture regulations.*

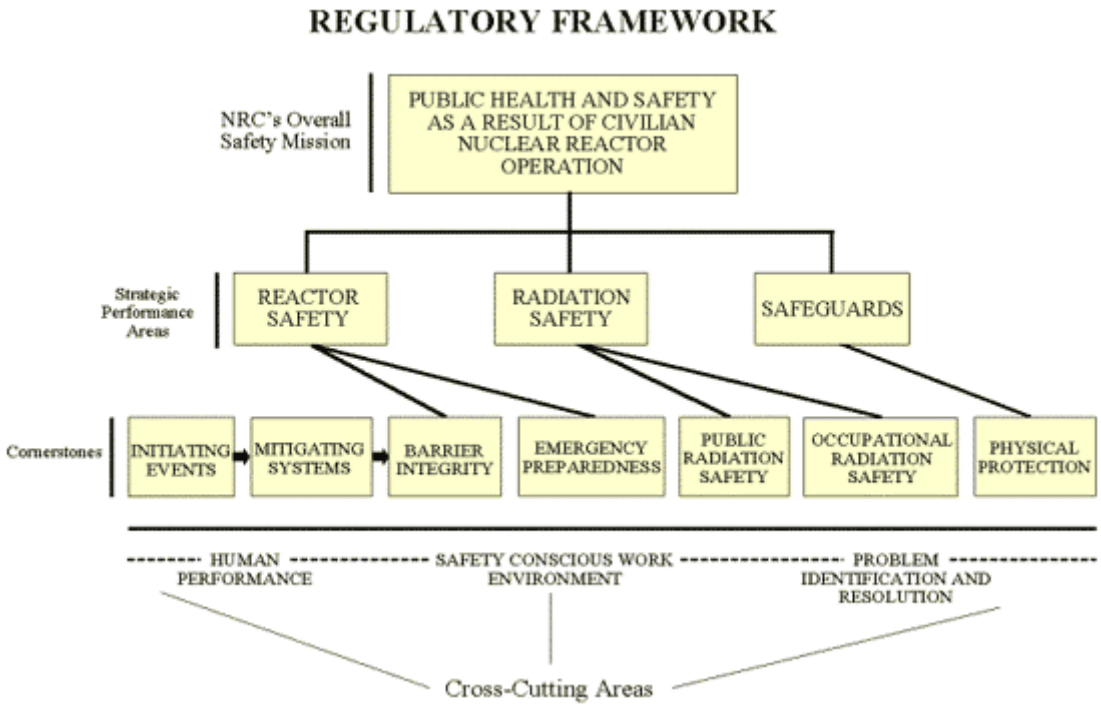
Collins, a safety culture authority and engineering analyst at Millstone, wants the NRC to require operators of all nuclear plants to educate their staffs about good safety culture, then regularly measure employees' attitudes and report the results.

What Is Wrong With NRC Regulations?

NRC has a safety advisory committee of "top engineering experts" [the ACRS – advisory committee reactor safeguards] which is very good at monitoring [regulating] the "engineering" part of safety management using a process called the ROP [reactor oversight process]. The ROP cornerstones check on things like [does your car have brakes, do you test them, do they seem to be working].

NRC has no committee of "top organizational management experts" and so is not good at regulating the "managerial-organizational" part of safety management, which INPO calls "leadership professionalism", and which can also be called the "organization safety culture".

Here is a nutshell of the ROP, this is what the NRC monitors for safety performance:



The bottom three elements, called "the cross-cutting areas" are the "safety culture" areas that NRC is not good at monitoring [regulating] things like:

- *Has management been cutting corners on safety [below the NRC "radar"] to save money?*
- *Has management been covering up safety issues [from NRC, INPO, other members of management]?*
- *Has management been creating an environment so strongly focused on making money that employees are afraid to bring safety issues to managers [and has the ECP – employee concerns program - been so weak that employees don't bother using it]?*
- *Does management encourage employees to bring forward safety concerns [and thank the employees for communicating them] then proceed to classify them as "low priority" and ignore them?*

Here is the NRC policy statement definition for *safety conscious work environment*. To locate this definition yourself, you can google NRC, open the NRC website, search the word "safety", then scroll down to this definition:

> *The Commission's policy statement describes SCWE as "a work environment where employees are encouraged to raise safety concerns and where concerns are:*
>
> - *Promptly reviewed,*
> - *Given the proper priority based on their potential safety significance, and*
> - *Appropriately resolved with timely feedback to the originator of the concerns*

So how is Millstone doing these days on reviews, safety issue prioritization and providing feedback to employee?

Not so good I am afraid.

In spite of what NRC may tell you, there is a growing pile of evidence that Millstone [for many years now] to save money has not been adequately addressing these areas. How much money are we talking?

Dominion operates seven nuclear plants, the four Virginia plants historically have operated cheaper than any others plants in the country. Millstone is still a "work in progress" but since Millstone was purchased in 2001, I estimate the extra profits from operating "Dominion lean" at just the Virginia plants has made Dominion a minimum of an extra 1.6B.

The Root Of The Problem

NRC does not study safety culture. Here again is the Apostolakis quote from the previous page [Apostolakis was recently promoted to an NRC commissioner]:

> "*… we don't understand [organizational-managerial] issues because we never really studied them"*

The major reason for this is that the ACRS is made up of engineers who view safety management as primarily ensuring that these radiation [safeguard] barriers do not fail:

- *fuel cladding*
- *reactor coolant piping*
- *the reactor containment [the big reinforced concrete dome building]*

None of the ACRS have the necessary expertise to advise NRC on what INPO indicates is the real cause of accidents [significant events] like TMI, Chernobyl and most others, which is organizational-managerial failures.

The (Kemeny) investigation of the accident at TMI reported this:

> *"The one theme that runs through the conclusions we have reached is that the principal deficiencies in commercial reactor safety today are not hardware problems, they are management problems"*

INPO has identified these organizational-managerial [safeguard] barriers, INPO calls them "defense-in-depth" leadership accident prevention barriers:

> *"A robust safety culture requires aggressive leadership emphasizing healthy relationships that promote open communication, trust, teamwork, and continuous improvement. Continuous improvement needs ongoing leadership attention to improve the plant's resistance to events triggered by human error (defense-in-depth). Those in positions of responsibility must see themselves as leaders as well as managers to create an atmosphere of open communication. Therefore, leadership is a defense."*

INPO has identifies these "defense-in-depth" barriers as:

- *Workers*
- *Managers*
- *Internal Oversight [the site Oversight department]*
- *External Oversight - NRC*
- *External Oversight - INPO*

For many years people have been recommending that NRC get safety advice from managerial-organizational experts. NRC needs a panel of *organizational process* safeguard experts equivalent to their *engineering process* safeguard experts [the ACRS].

Then NRC needs to develop regulatory constructs capable of maintaining organizational-managerial failures ALARA [as low as reasonably achievable] as accident causal factors.

After the NRC allowed the Millstone site to restart the units in 1998, and Lee Oliver moved on, Millstone immediately started sliding back into the same pre-1996 "bad management" practices.

No effective safety culture regulations had been institutionalized by NRC. I asked the senior NRC resident at the time "what has been put in place to keep an event like Millstone from happening again here or elsewhere in the industry." He paused and thought for a moment and replied: "nothing I guess."

John Beck is a consultant who is considered a leading safety culture assessor in the nuclear industry. Working for the NRC, he monitored the culture at Millstone [and later at Davis Besse] for a couple of years after recovery [restart]. On departure from Millstone he sent the following cautionary letter to Millstone management [and shared a copy with me]:

> *"This trust in management can be ephemeral...there were a number of areas volunteered by some with whom I spoke where trust was slipping. During the latter stages of restart and early recovery there was a palpable and contagious feeling of hope and genuine enthusiasm at Millstone. It seems to have dimmed since then for some reason. I wonder why?*
>
> *Never forget that previous management failed so miserably, not because they were not intelligent, and not because they did not clearly understand what successful economics looked like in a competitive environment. They failed because they were arrogant, dismissive and refused to listen to the issues and concerns of the people who make this place run."*

If you google "millstone safety culture" the first result you see should be a book on nuclear safety culture discussing the Millstone event and many others.

Pg. 100 of this book says:

> *"The fear is that a poor manager who recklessly and ambitiously tries to make a marginal plant show a profit will break down the safety culture, resulting in an accident prone environment."*

Below is a comment in an email that Edgar Schein sent me last year. Schein is an MIT Organizational Management Professor Emeritus, many years ago he coined the term "organizational culture" and many people consider Schein to be the top organizational culture expert in the world:

> *"At some point the safety assessors have to be prepared to call the problem what it is--senior executives who care more about finances than safety, middle managers who care more about productivity because that is what senior managers reward them for, and supervisors who suppress employee complaints and efforts to identify safety problems because it takes too much time to look into things and to convince their bosses about critical maintenance issues that may be surfacing. What makes safety culture so complicated is that we are trying to build safety into badly managed companies!!! What do you think about that observation?"*
> *- Ed Schein*

Schein is the leading consultant to INPO on safety culture, and is frustrated [as I am] that the NRC only focuses on safety culture for a short time after there is a major "event" and then completely forgets about it. In safety culture this is known as the "ViCE" cycle. After an event you become **Vi**gilant. Then after a while you become **C**omplacent. Then you experience another E**v**ent.

Is Millstone management [as Beck says] *"arrogant and dismissive"* do they *"refuse to listen to the issues and concerns of the people who make the place run?"* Is Millstone management [as the book indicates] *"recklessly and ambitiously trying to make a marginal plant show a profit?"* is management *"breaking down the safety culture, resulting in an accident prone environment?"* Are NRC and INPO [as Schein says] *"trying to built safety into a badly managed company?"* I think so, and I think there is a lot of evidence to support this.

Has the "backsliding" since 1998 brought the Millstone leadership team right back to where it was in the early 1990's?

Millstone Leadership During the "Dark Days"

From the NRC report:

[NRC SECY-98-090 - Selected Issues Related to Recovery of Millstone Nuclear Power Station Unit 3]

> *In late 1995, the NRC determined that since the late 1980's Millstone Nuclear Power Station had been the source of a large number of employee concerns and allegations related to safety of plant operations and harassment, intimidation, retaliation, and discrimination (HIRD) of employees. The NRC had conducted numerous inspections and investigations that had substantiated many of the concerns and allegations and had cited the licensee for violations.*
>
> *The NRC also had taken escalated enforcement action. Notwithstanding those actions, the licensee was not effective in handling many employee concerns or in implementing effective corrective action for problems that had been identified by concerned employees.*
>
> *In December 1995, the NRC established a Millstone Independent Review Group (MIRG) to conduct an evaluation of the history of the handling of employee concerns and allegations. The*

charter for the MIRG directed it to evaluate the licensee's effectiveness in addressing Millstone-related employee concerns and allegations. The MIRG was requested to identify root causes, common patterns between cases, and lessons learned and to recommend plant-specific and programmatic corrective actions.

The MIRG conducted a review of licensee allegation files, related inspection reports, NRC's Office of Investigation, and the Office of the Inspector General investigations, enforcement actions, U.S. Department of Labor actions, and previous NRC management reviews from 1985. The review included in depth case studies of selected employees' concerns and allegations to identify root causes, common patterns between cases, and lessons learned.

The MIRG concluded, in its September 1996, report, that in general, an unhealthy work environment, which did not tolerate dissenting views and did not welcome or promote a questioning attitude, had existed at Millstone for several years. This poor environment had resulted in repeated instances of discrimination and ineffective handling of employee concerns.

The MIRG identified seven, principal root causes for of the employee concern problems:

- *Effective problem resolution and performance measures;*
- *Insensitivity to employee needs;*
- *Reluctance to admit mistakes;*
- *Inappropriate management style and support for concerned employees;*
- *Poor communications and teamwork;*
- *Lack of accountability;*
- *Ineffective Nuclear Safety Concerns Program (NSCP) implementation.*

The MIRG also concluded that these root causes underscored a common theme of management failure to provide the dynamic and visible leadership needed to bring about required, basic attitude changes. None of the findings of the team were new. The problems had been identified previously to NNECO management by its own self-assessments, yet the problems continued.

If we were to ask the question: "Is the Millstone leadership team as bad now as it was in the early 1990's?" Who would be capable of answering this question?

The Five Groups That Oversee Nuclear Safety

INPO identifies the "defense-in-depth" barriers as:

- *Workers*
- *Managers*
- *Internal Oversight [the site Oversight department]*
- *External Oversight - NRC*
- *External Oversight - INPO*

These are the groups responsible for overseeing safety at Millstone, and these are the groups that can answer the question "is safety being managed adequately at Millstone today?"

In March the New London Day published an article titled: "NRC says 2009 was a safe year at Millstone" so we pretty much know what is the [official] NRC position on this subject, so lets explore how some of the other groups might answer this question.

For a very long time now, INPO safety metrics have had Millstone on the very bottom of the industry. In January, the [overall] INPO rating for Millstone 2 was dead last in the industry, equivalent to an academic score of "F minus declining."

Every year, INPO gives each site in the country a [safety] rating of 1-5. INPO keeps the scores secret [even from it's own staff] and once a years rolls the ratings out to the CEOs of the operating companies [and to senior INPO staff] at what is called the "INPO CEO conference".

The NRC regulatory authority comes from federal laws [NRC can put people who do not comply in jail]. INPO is a "communitarian regulator" and relies completely on CEOs wanting to "do a good job" and [as there are public safety implications] wanting to "do the right thing". INPO wants CEO's who get an INPO 1 rating to be proud, and CEO's who get an INPO 3 rating to say "what the heck is going on here, why am I not a number 1?"

Consultants who [for a living] assess safety culture in the industry have noticed a disturbing trend since deregulation toward "minimal regulatory compliance". Many sites have been doing the bare minimum that the NRC ROP requires, not doing enough to keep INPO happy, and completely dismissing the concerns of staff.

What led to the Millstone shutdowns in 1996 was that Millstone leadership had implemented "minimal regulatory compliance" in the mid 1980's. From the [narrow] perspective of responding to the competitive pressures of deregulation, Millstone leadership was at that time [in a manner of speaking] "way ahead of it's time".

Sites that do an adequate job of minimizing the chance of an accident receive an INPO score of 2. Sites that do an above average job receive a 1, sites that do a below average job receive a 3. The INPO scores of 4, 5 are really only there to make a score of 3 appear to be average. If INPO denies this, ask them to tell you how many sites currently have a score greater than 3, and how many sites currently have a score less than 3.

Millstone is currently a 2 [declining] and the NRC senior resident told me that he feels the staff reductions will push Millstone to an INPO 3 rating. If Millstone does not receive an INPO 3 rating this year, I would not be confident about safety management at Millstone, I would be concerned about the efficacy of the INPO assessment team.

In February the Millstone Oversight department wrote a condition report with a simple four word title: "Millstone Leadership Is Ineffective" listing multiple examples of inconsistent compliance with procedures and repeated loss of configuration control. These are the same issues that NRC identified in 1996 that precipitated the shutdowns.

A number of employees [workers and managers] have complained to me that it feels like Millstone is headed back to becoming one of the worst leadership teams in the industry, or is already there.

Is safety being adequately managed at Millstone right now?

One Department Where Safety Is Being Understaffed Right Now

I was a long time electrical project engineer [I led one of two engineering teams that replaced the Millstone reactor head in 2005, a very large 60M project] I also worked for a time as an Oversight assessor, a human performance supervisor, and for the last two years before retirement in March I worked in the Organizational Effectiveness department.

In the Organizational Effectiveness department I worked as the INPO SEE-IN coordinator [making certain the site properly evaluates and learns the lessons of TMI, Chernobyl, Davis Besse and many less significant events].

With regard to the impact of the March worker terminations, the only department that I can speak to is the one that I worked in [the Organizational Effectiveness department] but I would think it is likely that the March terminations created unsafe [understaffed] conditions in some other departments, possibly many other departments.

Safety is not staffed adequately right now in the Organizational Effectiveness department. One of my family members happens to be an excellent juggler, and can do many amazing things juggling three balls. However, give this person four balls to juggle and within seconds one of them is dropped.

My brother is a manager at a large insurance company, and part of what he does is to look at insuring event risk. I sent him a draft of the paper you are reading and he sent me a [very recent] Wall Street Journal article on staff cuts at the Tulsa police department [and the affect on safety in the community] called “In Lean Times, Police Cuts Spark Debate Over Safety”.

Here is an excerpt from the article:

> *The debate will come to a head next month when the city council sets a budget for next fiscal year. Officers are in no mood to reconsider wage or benefit cuts. They say they're hoping a public outcry will force the council to bring more officers on board.*
>
> *But no outcry has materialized. Everyone these days is getting by with less. The police should be able to do it, too, said Twan Jones, a 38-year-old community activist. "They have people being paid nice salaries to figure it out."*

I replied to my brother that [in my view] this is what is happening right now at Millstone “just cut staff and figure it out":

> *Dean,*
>
> *Often it comes down to how many balls can an average person be reasonably expected to juggle? Our sister can do amazing things with 3 balls, but always struggles with 4 [she soon drops them].*
>
> *There seems to be a kind of a "staffing Peter's principle" effect right now that is being widely socially accepted [even for safety functions]. It holds: "keep cutting the staff and keep tasking the remaining staff with more until it becomes [painfully] obvious that everyone is struggling to doing their job effectively, and that is your optimal staffing level"*
>
> *This can work surprisingly well for managers because: 1) you are obviously a superior manager [and deserving of a bonus] as you have demonstrated the ability to do more with*

fewer resources than any of your predecessors and 2) as a manager you can produce evidence on almost any of your employees that they have been "underperforming" which empowers you to eliminate [terminate] any of them that you wish.

I would say this is a very unhealthy situation for the maintenance of safety and quality. The root of the problem is really the lack of development of any [clear objective "transparent"] quality management criteria. Since "quality" is defined as "what the customer will accept", if the "customer" [in this case a member of the public who want more services but does not want to paying more taxes] ignores the quality issue and says: "the police have highly paid experts, let them figure it out".

With this kind of dynamic in place, the situation in Tulsa is unlikely to improve.

- Dave

Evidence of Under-staffing Safety in the Organizational Effectiveness Department

When I heard that Millstone had laid off 50 workers in March , I was surprised. When I heard how many staff had been reduced from the department I had just left [Organizational Effectiveness] I was concerned, because the department oversees some very important safety functions such as:

- *Organizational safety culture and human performance*
- *Leadership effectiveness [what INPO calls "professionalism"]*
- *The CAP - Corrective Actions Process [what NRC calls "the window to the safety culture"]*
- *Evaluation of the INPO "SEE-IN significant event" documents that teach the organization how to avoid accidents*
- *Reports of Millstone events published to help other sites avoid similar problems [called Operating Experience] and processing of similar reports that come in to help Millstone*

In 2009 the NRC senior resident inspector told me he would like to see the ORE function "beefed up" . The NRC inspector wanted the ORE manager elevated to the director level, so management would finally "listen" to leadership improvement recommendations that ORE had for years been trying to implement. Many others [including myself] felt the efficacy of the ORE department needed to be "beefed up" [I felt significant improvements were needed in the areas of safety culture management and leadership efficacy].

Instead of being "beefed up" in March the ORE staff was cut in half. But this is just the opinion of an industry safety culture expert, an NRC senior resident inspector, and a smattering of various Millstone employees [workers, managers, Oversight assessors etc.] right?

Well, not exactly.

One of the Virginia Dominion ORE managers was visiting the Millstone ORE department a couple months ago. Concerned about planned cuts in ORE department staffing, in 2009 he took advantage of a trip to INPO and asked a room full of his industry counterpart ORE managers "what did they believe was the absolute minimum staffing level for an ORE department to do it's job adequately". He gave me the staffing number, and Millstone is now at about 50% of that number.

When a roomful of industry experts say that staffing is [far] too low to do the job, and the job is what INPO says needed to be done to avoid nuclear accidents, I don't care what kind of ROP regulatory views NRC may have on the subject, safety is being under-resourced.

I told the Virginia ORE manager to take his concerns to the top of the company, to sit in CEO Tom Farrell's chair if needed to make them listen. He said "I can't do that" but it probably didn't matter, because Farrell probably would not have listened anyway.

Why do I say this?

Dominion is one of the largest energy companies in the US. In 2009 CEO Tom Farrell was named six-sigma manager of the year for his cost control abilities. This was not "Dominion six sigma manager of the year" this was global. 43 companies around the world. The CEO of the company that operates Millstone is the top cost-cutting executive on the planet.

So [after failing about nine times to get the concept through to my Dominion nuclear food chain] I sent an email to CEO Farrell [and I copied the COO] explaining that I have studied six-sigma extensively in the masters program I took, and [did you know] six-sigma actually began as a quality management process, and [did you know] some industries like the medical industry [who by necessity are a little more evolved in safety management than is nuclear] actually use six-sigma for safety culture quality management.

Mr. Farrell did not reply, but I did received a call from Dominion's top nuclear manager [CEO of generation] who growled "Mr. Farrell does not require any spurious email messages from you."

I thought it was sort of an interesting reply, so I wrote it down and dated it. That was pretty much the end of the conversation and my safety enhancement employee suggestion.

Other than growling, when the CEO of generation called me another interesting thing occurred. I had saved my email to Farrell in a folder titled "culture issues" when the CEO of generation called, I went to retrieve it but it was gone, like someone in IT had expunged it from my files. I noticed that COO has replied "thanks" [possibly without reading the message] and his reply contained the full body of my message.

So I saved it by forwarding it to my home email, and placed the COO reply message in my culture folder and watched what happened. The next day it was gone too. I had previously emailed Farrell about pollution controls at Dominion's coal plants [an area where Dominion and Farrell appear to be doing a fine job] those messages were still there. What was going on I wondered?

Oh well, no big deal [I guess].

[It's not like I was complaining about safety at some coal mine in West Virginia].

Workers Who Were Working Hard To Improve Safety Were Terminated, Supervisors Who "Stood Up For Safety" Were Reassigned

In March three workers in ORE were involuntarily terminated, and two department supervisors who had "stood up for safety" were reassigned.

One worker had been working hard to make more managers to go out and do more inspections to improve safety and quality [most sites do much more of this than Millstone] this worker was laid off.

One of the workers had been complaining very vocally about the [double standard of] managers being exempt from the layoffs [this worker was laid off].

The third workers had been working very hard to get management [especially the training department which for some reason does a particularly bad job of this] to properly review and implement the recommendations of INPO most safety significant documents [called the periodic SOERs - significant operating event reports]. She would flag the deficiencies, I would follow up on them.

For example, one of the SOERs is on the lessons of Chernobyl. The training department is supposed to make sure all managers are trained on Chernobyl, what caused the event, what managers can do to make sure similar things do not occur at their plant.

Here is an email message I received from a Millstone trainer in February, about a month before this worker was terminated:

> *Dave,*
> *We have not done [Chernobyl training] in the last 3 years as part of the continuing training. The real question is where, who and how do we make these commitments, and put them into a system that makes people aware of them? To the best of my knowledge there appears to be no method, other than tribal knowledge, of these commitments and their recurrence.*
> *Any help in this area would be greatly appreciated.*
> *[Senior Millstone Trainer]*

I have no idea if this particular issue was ever properly addressed, but this is one example of the kind of things that Organizational Effectiveness does.

Another example of what Org Effectiveness does is to ensure that the site does proper evaluation of the INPO SEE-IN [significant event evaluation and information network] documents that help plants evaluate whether they are properly protected against significant events that have occurred in the US [and worldwide] nuclear industries.

I found that some people in the Millstone Operations department would do a very good job reviewing these documents, and others would do a terrible job. I discovered that the Dominion OE program did not include the proper INPO guidance for evaluating the "corrective actions" sections of the SEE-IN documents [which often accounts for about 50% of the review].

I contacted INPO and a performance improvement manager emailed me that, yes I was correct, Dominion should be performing these evaluations. I also received an email from INPO from a long time [I believe retired] Dominion employee [now working at INPO] saying: "the corrective actions section does not need to be reviewed, we have never done this at Dominion".

I would say if the entire Dominion NBU [nuclear business unit] has never done this, and the NBU is interested in optimal accident prevention, the NBU should go back and perform [and also document] this review [all plants, all applicable SEE-IN documents]. To do this properly, the NBU would need to go back and review what INPO has put out since1980.

The Two Organizational Effectiveness Supervisors Who Had "Stood Up For Safety" Were Reassigned

Two [what I would call] "safety conscious supervisors" [unusually safety minded] were reassigned.

These supervisors had "pushed back" on some significant safety issues, and in March were reassigned out of the Org Effectiveness department. No supervisors were laid off, so they could not be terminated but could be reassigned].

The issues they had "pushed back" on were configuration management problems [the kind of problems that caused the Millstone shutdown event] and corrective action problems [the kind of problems that led to the Davis Besse event].

Recall the safety Conscious Work Environment definition:

> *The Commission's policy statement describes SCWE as "a work environment where employees are encouraged to raise safety concerns and where concerns are:*
>
> - *Promptly reviewed,*
> - *Given the proper priority based on their potential safety significance, and*
> - *Appropriately resolved with timely feedback to the originator of the concerns*

The Fire Door Issue

When a fire door is found broken, most nuclear plants fix the door immediately, and while waiting for maintenance to come, someone stays at the door [called a "fire watch"] to make certain it closes properly. It costs money to have people standing at the doors, and it forces maintenance to fix the doors a little quicker than they might otherwise prefer [it interferes with other scheduled work].

The CNO gave Millstone management a "directive" to "get rid of these [expensive] fire watches" and fire protection engineering "got right on it". To accomplish this, FPE had to eliminate the requirement for fire doors to "automatically close and latch".

The site fire marshal [the fire marshals at the Virginia plants, a local town fire marshal who worked at Millstone, and a state of CT fire marshal] didn't like it. They all felt that a fundamental rule was being violated, and that fire doors needed to "automatically close and latch".

I had identified three NRC guidelines that appeared to me [an engineer, but not a "fire protection" engineer] were being violated. I copied the specific paragraphs and highlighted the specific words in three NRC fire protection guidance documents and emailed the text with my concerns to the fire protection supervisor [and the responsible manager, director, and Dominion Chief Nuclear Officer].

No one ever responded [definition of responsible: response-able] and explained to me specifically how Millstone was in compliance with these three NRC guidance documents.

He emailed me back saying that he "didn't intend that Millstone should violate NRC guidelines to accomplish this" but he never instructed the leadership team to respond to my compliance questions, and no one ever did.

After observing these numerous repeated employee objections for a while, one of the Organizational Effectiveness supervisors wrote an email to management [I was copied] saying that fire protection engineering was moving too fast, pushing the change through without carefully considering the concerns of employees or the fire code requirements.

In spite of this, the change was pushed through over the continuing objections of some employees. The change saves Millstone about 50K a year, an amount equivalent to about a half hour of on-line production. What this change cost in terms of lost [employee and stakeholder] trust is much more difficult to calculate.

Loss Of Configuration Control – The Issue That Led To The 1996 Millstone Shutdown

Later the same supervisor wrote a letter complaining that CRT [condition report team] managers were "not showing up" to analyze equipment and configuration issues, something INPO had complained about in 2006 [I was copied].

Loss of configuration control was the primary reason NRC shut down Millstone in 1996. The letter implied it was not the first time that he had complained to management about this. After sending out the letter this supervisor told me: "I am not going back to 1996 without at least complaining about it."

The other ORE supervisor had discovered [this same group of CRT managers] had been downgrading the safety significance of condition reports without telling [or discussing this with] the employees who had initiated the reports. He coached the CRT group that they must to stop this (highly unethical) practice, and eventually had to threaten to resign [as chairman of the group] unless they stopped this practice.

Both of these supervisors were reassigned in March, so the CRT managers are now free to resume their practices without being nagged by what I would call "safety conscious supervisors." This is not a healthy situation at Millstone.

What should be happening at Millstone is that "safety conscious supervisors" who are willing to "stand up for safety" should be moved up, and it is the Millstone managers who are not willing to "stand up for safety" that should be moved out. What is happening is managers who go along with cost cutting are valued and moved up, and managers who continually push back are held back or reassigned.

There are an unusually [I hope this is unusual in the industry] large number of managers at Millstone today not willing to "push back", not willing to "stand up for safety". Some of the reasons for this are that:

- many managers who were members of the historically bad 1996 management team are still in positions of authority at Millstone and
- after Millstone was allowed to restart the NRC never established [required, institutionalized] the kind of methods many experts say are needed to maintain a healthy culture and
- the ViCE cycle factor.

With regard to the "ViCE cycle, it takes around 17 years [give or take, sometimes a lot sooner] after a significant event has cause an organization to "get religion" to pretty much completely lose it's "safety vigilance" return to a "complacent culture" and open the door to another [often similar] event. This is partly due to leadership turnover and the resulting loss of organizational memory.

As example, the NASA challenger accident occurred in 1986 and 17 years later in 2003 the Challenger accident occurred. An event foreshadowing TMI occurred at Davis Besse in 1977, and 17 years later in 2002 the acid hole event occurred.

At Millstone in 1993 a "Davis Besse like" event occurred that was close to becoming a "minor TMI like" event. In this case it was not a leaking CRD causing a hole in the reactor, but a leaking reactor coolant valve. Instead of shutting down and fixing the problem, to keep the plant running Millstone management kept tightening valve bolts, drilling holes in the valve [to inject sealant] and "peening"[hitting it over and over again with a pneumatic hammer]. Like at Davis Besse, workers reported a suspected "through wall leak" to management [which would have required an

immediate plant shut down] but management was "locked on" to fixing the leak, and the process continued until a bolt snapped off.

Had the valve integrity failed during this process [a very real concern] it is probably that local workers would have lost their lives, and the plant would have experienced a LOCA [an "unisolable" loss of coolant accident] or a minor TMI type event. It is likely Millstone would have been able shut down the plant without suffering serious core damage, and after a long shutdown, some significant cleanup efforts [and significant loss of public trust] would have been able to restart.

So Millstone 2 had this event in 1993, and the lesson Millstone was supposed to learn was:

> "*…not to emphasizing production over nuclear safety. A key lesson was the importance of senior nuclear managers periodically emphasizing to personnel that nuclear safety considerations always take priority over production goals"*

Then last fall in 2009 Millstone leadership repeated the same kind of [management] error that precipitated the 1993 event. To save a little bit of production time, managers violated switchyard work procedures [emphasized production over nuclear and personnel safety] and scheduled maintenance electricians to work on a live [345,000 volt] switch outside of the refueling outage window [more on this later].

What About Chernobyl?

In 1975 there was a partial meltdown in Leningrad reactor Unit 1 [a design identical to Chernobyl] that released 1.5 MCi into the environment, then the Chernobyl event occurred in 1985 just 10 years later. However, a "post glasnost" book by a soviet engineer indicates there may have been as many as 10 serious Soviet accidents in the 19 years before Chernobyl that were "covered up".

Unger 1994 "Controlling Technology – Ethics And The Responsible Engineer":

An even more basic factor is the secrecy and the restrictions on dissent that characterized Soviet society prior to the Gorbachev era, which commenced just before the Chernobyl disaster. Information about previous accidents at Soviet nuclear power plants had been almost totally suppressed, becoming available in bits and pieces only after the advent of *glasnost*. Not only was the general public not informed but even technical people in the industry were kept in ignorance. The government claimed a virtually perfect safety record in the nuclear power field. The falsity of that claim is exposed in a recent book about Chernobyl by Grigori Medvedev, a senior Soviet nuclear engineer. He summarizes 10 serious accidents between 1966 and 1985 and states that they represent just the tip of the iceberg. Included is a 1975 partial meltdown in a Leningrad RBMK reactor that released 1.5 MCi into the environment, an incident at the Chernobyl No. 1 reactor in 1982 in the course of which repair workers were exposed to severe radiation and radioactive material was released near Pripyat, and a relief valve failure at the Balakovo pressurized water reactor that took the lives of 14 people in 1985.

Related to this is the 1957 disaster at Kyshtym in the Ural Mountains. A major explosion (chemical or steam) occurred at a site used for the disposal of nuclear wastes resulting from atomic bomb production. It distributed tens of millions of curies of strontium-90 and other radioactive materials that necessitated the abandonment of some 1000 km^2 of land in the area, and the

Since the supervisors who "pushed back" were reassigned in March, CRT managers are free to resume their [ethically questionable corrective actions process] practices without being bothered or nagged by [or having their practices exposed by] what I would call "safety conscious supervisors." As I said, this is not a healthy situation at Millstone. Why is this so significant?

Because these are the very same kind of management actions that downgraded and dismissed [and "covered up"] some very significant safety issues at the Davis Besse plant in Ohio.

The Serious Nuclear Event That No One Outside Of Ohio Knows About

Everyone in Ohio knows about the Davis Besse event, but it happened within 6 months of the terrorist attack on the World Trade Centers and so was bumped off most media headlines by the continuing 9/11 coverage. This is why there is a more positive public perception of the nuclear industry country-wide than there is in some localized areas [such as Ohio].

A system engineer had made multiple requests for management to approve the installation of access holes to clean and inspect the top of the reactor. The holes were not approved, so the top of head could not be properly inspected, and over the years an [undetected] acid leak ate through six inches of carbon steel making a "football sized hole" in the top of the reactor, leaving only a thin [thickness of a quarter] stainless steel liner bulging from the [2000 psi] reactor pressure, that could have burst at any moment.

Some experts at NRC feel Davis Besse may have been just a few months away from a TMI type accident [some say worse]. UCS Lochbaum feels if the liner had burst, it may have stopped the control rods from falling resulted in a large [Chernobyl-type?] release of radiation. Assuming there were no [other] system problems being covered up and hidden from the NRC, and the remaining safety systems functioned as designed, I believe the accident would very likely not have [significantly] exceeded TMI.

The point is, to save money and to keep operating, management covered up and ignored safety issues raised by workers, and this is what precipitated the 2002 Davis Besse event [more on this later].

How Well Has Nuclear Historically Been Managed In Connecticut?

INPO is a secretive organization, so people in CT might be surprised to learn that three of the 24 US nuclear "events that shaped the industry" occurred here in CT. Some of these 24 were very close to becoming a TMI type accident themselves [one was the 1993 event at Millstone].

Actually, there were four of these events in CT, but NRC covered up what was probably the most significant one. As far as I know, the groundwater event at Haddam was the most significant uncontrolled undocumented releases of radiation to the environment that has occurred at any US nuclear plant.

You can read about it here.

> http://www.nytimes.com/1997/09/17/nyregion/hartford-says-utility-hid-nuclear-contamination.html?pagewanted=1

As the Haddam plant was being decommissioned, and the unreported contamination was discovered, NRC did not pursue criminal charges [did not prosecute any NU management] I think for a very pragmatic reason: the NRC resident had also "looked the other way" for many years.

The political cover up was a good deal for NU managers, who were able to move on to managing at Millstone, instead of being banned from the industry and facing criminal prosecution.

Here is what the NRC task force investigation reported:

> The violations associated with the November 1996 contamination event, which are described in the Notice, created a substantial potential for exposures in excess of regulatory limits. Therefore, these violations are classified in the aggregate as a Severity Level III problem in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions" (Enforcement Policy), NUREG-1600. In accordance with the Enforcement Policy, a civil penalty is normally considered for a Severity Level III violation or problem.
>
> However, I have decided, after consultation with the Director, Office of Enforcement, to exercise enforcement discretion in accordance with Section VII.B.6 of the Enforcement Policy and not propose a civil penalty for the violations associated with the contamination event. The decision to exercise discretion was made given that (1) the violations occurred prior to the decision, in December 1996, to permanently shutdown the Haddam Neck facility; and (2) you were issued a $650,000 civil penalty on May 12, 1997, to address the performance problems that existed prior to the decision to permanently shutdown the facility, and which indicated generally poor performance over a period of time.

So the NRC slapped NU with a penalty of less than one day's revenue at the average nuclear plant, and said that since the plant is shut down anyway, no harm no foul.

What had happened [which is common with significant events] is that a combination of smaller events had aligned. Poor foreign material control during refueling had allowed metal shavings to fall into the reactor. Over the 18 month operating cycle the shavings had chewed holes in the cladding of 85% of the fuel rods, causing massive contamination of the reactor coolant [creating what one might call PU soup – "plutonium uranium" soup].

The reactor piping and reactor containment boundaries were both still intact, so the public was adequately protected from radiation, right?

Well, not exactly. Remember Dave Lochbaum's comment:

> *It seems only a matter of time before the initiating event wheel, the equipment wheel, and the human performance wheel stop in a combination that produces another accident.*

Many years ago tritium had contaminated a couple of Haddam potable water wells, indicating a large plume of groundwater contamination was coming from somewhere, probably a spent fuel pool or refueling water tank leak.

Not a really big deal until you combine it with the [1989] worst fuel damage event in the history of the industry. You put the PU soup into the [leaking] spent fuel pool, the PU soup leaks into the ground, the plume eventually reaches the discharge canal [and the CT and Salmon rivers].

So Haddam managers immediately reported this to NRC, shut down the plant, and called in the big construction equipment to fix it, right?

Well, not exactly.

It would have been nice if the cognizant Haddam managers had [at minimum] halted the [common] practice of allowing fishermen to come onto plant property and fish from the discharge canal. The below guidance on chemical spills and mercury [can build up to thousands of times higher] probably apply to tritium and strontium as well. My understanding is that as many as 15 soil or groundwater radionuclides were found at levels 10 – 20 times federal limits in wells near the discharge canal.

If fisherman did take any bass, carp or catfish from the canal [or the CT river or the adjacent Salmon river] hopefully they did not feed them to small children or pregnant women.

You can access the CT "safe fishing guide" here:

http://www.soundkeeper.org/uploads/fishweb02.pdf

> ***How Do These Contaminants Get Into Fish?***
> Mercury and PCBs can build up in fish to levels that are thousands of times higher than in the water. These contaminants enter the water from [chemical spills or mercury]. You are in the High Risk Group if you are a *pregnant woman*, a *woman planning to become pregnant within 1 year*, or a *child*
> *under the age of 6*. If you are in the High Risk Group, you should not eat certain fish at all

Since the radiation exceeded derived concentration guideline levels (DCGLs) for 15 soil or groundwater radionuclides, this triggered an EPA "superfund" site evaluation performed at Haddam in 2004.

Due to the severity of the soil and groundwater contamination [and the unpredictable potential of it leeching into the CT and Salmon rivers] the NRC task force [working with EPA] recommended continuing radiation monitoring for the Haddam site. However, this task force recommendation was dismissed by the NRC commissioners.

The commission also deleted [from the draft 2006 abnormal report to Congress] the task force conclusions that "unplanned and unmonitored radioactive releases could [continue to] migrate off site … without detection."

Here are changes the NRC commission made before the report went to Congress:

> *The report's most significant conclusion was that, although there had been industry events where radioactive liquid was released to the environment in an unplanned and unmonitored fashion, there were no instances identified where the release had an adverse impact on public health and safety. ~~The task force also concluded that under the existing regulatory requirements, the potential exists for unplanned and unmonitored releases of radioactive liquids to migrate off site and into the public domain without detection.~~*
>
> *Indeed, the maximum potential dose in all of these incidents, a dose unlikely to have been received by any person outside the plants' boundaries,* ***was less than the dose*** *an average individual in the United States receives in one day during the course of routine activities from naturally occurring radiation sources (such as the radium-226 in the building materials of the Capitol) and was well below the regulatory limit for planned releases.*

The NRC commission's claim that the radiation exposure from the groundwater event at Haddam was less than spending one day at the capitol is false. This argument comes from what is called "junk science", you can read more about it here:

http://mediamatters.org/research/200508120001

> *In an appearance on Fox News' Special Report with Brit Hume, Cato Institute adjunct scholar Steven Milloy cited his study of radiation levels at the U.S. Capitol Building to argue that the health safety standards recently imposed on the proposed Yucca Mountain, Nevada, nuclear waste repository are unduly stringent. But Milloy's findings -- that the radiation exposure at the Capitol is far higher than it would be at the Yucca Mountain facility under Environmental Protection Agency (EPA) limits -- were debunked shortly after he published them in 2001. Milloy has a long history of conducting scientific studies that benefit powerful corporate lobbies -- a strategy described as "sound science." The practice has been described in the American Journal of Public Health as "sophisticated public relations campaigns controlled by industry executives and lawyers whose aim is to manipulate the standards of scientific proof to serve the corporate interests of their clients."*
>
> *Proponents of "sound science" purport to expose so-called "junk science," which Milloy has described as "faulty scientific data and analysis used to advance special and, often, hidden agendas" of personal injury lawyers, social activists**, government regulators** and the media."*
>
> *Milloy currently writes a regular "Junk Science" column for the Fox News website. In recent columns, he has argued that global warming represents "flawed science," that pesticide use in schools poses no threat to students, and that "radical environmentalists" are the "real energy problem."*

After I found these details about the Haddam contamination event [and the apparent "junk science" cover up by NRC] I discussed the events with two Millstone NRC resident inspectors.

As I was speaking one resident kept nodding his hear up and down as if to say "yup, that's what happened" after I finished speaking the other resident [the senior resident] said "you know, the Chairman is not NRC."

I said: "Excuse me, the NRC Chairman *is not NRC*?" He said: "The Chairman is not NRC, he is a political appointee." And that is apparently how NRC inspectors live with some of the "political" decisions that NRC makes at the top. I don't know what else an NRC inspector could do.

Haddam Knew About The Radioactive Plume Since The Mid 1970's

David Lochbaum's book "Fission Stories" is a frequently humorous [and occasionally sobering] short story collection of incidences at nuclear plants told in "fishing story" style.

One of the stories is the Haddam "magic skunk" story. The Haddam plant went on line in 1968 with a slightly leaking spent fuel pool. Some time later [months? years?] a large groundwater plume of radioactive tritium reached the wells from which potable water was being piped into the plant.

Going forward the site used bottled drinking water, but wanted to continue to use the [slightly] tritiated water for maintenance [and general] purposes. Not wanting to alarm the public by disclosing that the wells were contaminated [and not wanting employees or visitors to accidently ingest the water] a story was concocted that a skunk had fallen into the well and died, thereby polluting the well.

Large warning signs were posted by the water faucets saying "SKUNK WATER". When I first visited Haddam [not noticing the very large sign] I filled a Styrofoam cup with "skunk water" and was about to drink it, but a technician stopped me and pointed to the sign [and told me the story].

Since multiple wells were contaminated, Lochbaum calls it the "magic skunk theory" as the skunk must have died, come back to life, crawled out and fell and died in the next well [this completely ignores the very credible "multiple skunk" theory] and may be why Lochbaum removed this story from later versions of his [really excellent] book.

During the 1996 safety scrub at Haddam [which like Millstone had been shut down by NRC] it was found a pipe that supplied cooling water to the reactor in an emergency was undersized. Apparently NU engineers had faked a number in a calculation to avoid the expense of installing a new [larger] pipe.

NU management pointed to this and said: "the new pipe will cost at least 100M to replace, so we have decided to permanently decommission the plant". The Millstone 2 reactor head replacement [I was one of the two project engineers] only cost 60M. I have never heard of a pipe costing 100M.

I discussed this [at the time] with the Haddam mechanical engineer who estimated the pipe replacement. He said: "that is way more than I estimated, I don't know where they are getting their numbers". It was not until within the last year that I pieced together what I think may have happened.

I think the "safety scrub" discovered the groundwater plume, and that is what really precipitated the Haddam decommissioning decision, but that this was too big [and alarming and embarrassing] an issue for NRC to disclose to the public, so NRC allied with NU to concoct the story that the ECCS piping was the reason.

After thousands of cubic feet of radioactive soil was excavated, the groundwater contamination dropped to less disturbing levels. I understand they were able to get the levels below federal EPA guidelines, and NRC developed a "special compromise" allowing soil and groundwater contamination to remain, as long as radiation exposure at the surface was < 25mR per year.

Sorry, but I don't trust these guys. As part of the LTP [license termination plan] I would have wanted to see a detailed EPA evaluation of the final site that was signed off by a responsible member of local or state government [such as someone from CT DEP]. This is what NRC informed EPA superfund director Michael Cook in March 2004:

> *Since the Haddam Neck site already has an approved LTP, the general time period for having a Level 1 consultation has passed. However, the approved LTP for this site contains derived concentration guideline levels (DCGLs) for 20 radionuclides, which are provided in the enclosed table. The DCGLs for 15 of these radionuclides exceed the MOU trigger values for soil [i.e.,tritium (H-3), niobium-94, cesium-137 (Cs-137), europium-152 (Eu-152), and Eu-154];and/or groundwater [H-3, carbon-14, manganese-54, iron-55, cobalt-60, nickel-63, strontium-90, technetium-99, Cs-134, Cs-137, Eu-152, Eu-154, Eu-155, and plutonium-241)]. Before the NRC license is terminated the doses to the average member of the critical group at the Haddam Neck site will be in compliance with NRC's criteria in Part 20 Subpart E that provides all-pathways dose criteria of 0.25 millisieverts per year (25 millirem per year) plus as low as reasonably achievable (ALARA), to an average member of the critical group. The dose criteria in Part 20 Subpart E are fully protective of the public health and safety, and were the result of a comprehensive rulemaking, including an accompanying generic environmental impact statement.*

I would also want specific signed off documents of what happened to all that [tens of thousands of cubic feet] of contaminated soil. I would want details of the exact quantity removed, and papers showing that same quantity properly disposed of]. If large quantities of radioactive soil was left on

the property and just covered over with 4 feet of dirt, the radioactive groundwater plume could return [for example, if we get a lot of rain like in March].

This is why there should be continuing monitoring [probably by DEP] at Haddam, or the canal and nearby rivers [CT and Salmon] should be posted with some clearly visible, weatherproof signs: "tritium and strontium contamination, trout fishing area only".

In 2004 disposal cost for a cubic foot of low level waste exceeded $400 a cubic foot. This creates a huge economic incentive to do something else with [some of] the soil, such as [for example] burying it deeper on the Haddam property [turning Haddam into a low level waste repository] or dumping it into the CT river. Of course, there is no reason to believe that people at NRC or the Haddam plant would be irresponsible with the management of contaminated soil, right?

Well, not exactly. You can read about it here [excerpt]:

> http://video.wtnh.com/news/1997/111397.html
>
> **New Concerns About Contaminated Soil**
> *(WTNH) _ Concerns about contaminated soil have spread from Haddam to Waterford. Many Connecticut residents are wondering if we're walking on some very "dangerous ground."*
>
> *A few months ago, radioactive soil was discovered at the Connecticut Yankee plant in Haddam Neck, and at a nearby day care center. Now there are concerns about soil at some ball fields in Waterford, which is home to the Millstone power plant.*

> *RICH GALLAGHER / NU: "We found no contamination [at Millstone] no excess levels of radioactivity or anything..." Despite that, more tests will be conducted here. Largely because of what's happened at NU's other nuclear power plant: 'Connecticut Yankee' in Haddam Neck.*
>
> *Recently, tests revealed low levels of radiation on and off the site, at among other places, a nearby day care center. Apparently, the center had used contaminated soil in its playground area.*

In October 2005 Haddam finally reported to NRC the spent fuel pool leak that should have been reported about 30 years ago. You can read about it here:

http://www.nrc.gov/reading-rm/doc-collections/event-status/event/2005/20051101en.html

> OFFSITE NOTIFICATION
>
> *Haddam Neck uncovered evidence of Spent Fuel Pool leakage below ground. The leakage was discovered when removing soil east of the Spent Fuel Building. Consequently, the site notified the Connecticut Department of Environmental Protection. The quantity of water leaked is unknown. Estimates based on historic Spent Fuel Pool evaporation data indicate that the leak was small - on the order of a few gallons per day. Based on readings from down-gradient monitoring wells, there is no travel beyond the property line.*

No groundwater contamination beyond the property line, because the aquifer funnels the groundwater into the discharge canal, which discharges into the CT river next to the Salmon river. Over 30 years, the effect was equivalent to dumping the entire contents of the spent fuel pool [Olympic size, but more than twice as deep] into the CT river.

Any public health affects?

I don't know, but the point is the Haddam managers and the NRC residents at the time didn't know either. They were not qualified to ignore government reporting regulations [to ignore the "law"] and make a judgment call that there was no public health impact, and that this did not need to be reported.

Allowing a radioactive groundwater plume to spread for 30 years [and after 1999 greatly intensify in radiation] caused the Haddam decommissioning to become a little more costly than was initially planned for. The weak NRC reporting of events has allowed this cost not to be incurred by NU, but passed on to the consumer [the ratepayer]:

[AP November 2005] CT DPUC Condemns Handling of Haddam Neck Decommissioning.

> *CT Department of Public Utility Control (DPUC) commissioner Anne George has accused Connecticut Yankee Power Company of mismanaging the decommissioning of the Haddam Neck Nuclear Power Plant to the detriment of power company customers. George maintains that Connecticut Yankee's fumbling is responsible for more than one-quarter of the $831-million rate increase instituted by the company, raising customer costs by one dollar per month for the next five years.*

If I were the CT governor, I would want to find out exactly what the Haddam managers did [what did they do, when did they do it] what they knew [what did they know, when did they know it] and I would want to find out if any Haddam managers who "looked the other way" are managing at Millstone today [and if they should keep their current positions].

More On The Organizational-Managerial-Political Influences That Led To Davis Besse

At Davis Besse in 2002, they found a big scary hole in the top of the reactor, the NRC blamed the system engineer for not fully cleaning and inspecting the reactor head, criminally charged him, and banned him from the industry for five years.

In previous years he had petitioned plant managers [three times] to approve installation of inspection openings he argued were needed for a "thorough inspection and cleaning of the head" here is the text of one of the modification requests:

> *MOD 94-0025 (May 27, 1994): "Initiated MOD 94-0025 to install service structure inspection openings. Reasons for the modification include ongoing industry concern involving corrosion of the Inconel 600 reactor vessel nozzles. There is no access to the reactor vessel head or the CRDM reactor vessel nozzles without the installation of the modification. Inspection of the reactor vessel head for boric acid corrosion following an operating cycle is difficult and not always adequate. Video inspections of the head for the CRDM nozzle issue and as follow-up to the CRDM flange inspection do not encompass a 100% inspection of the vessel head. Cleaning of excessive boric acid residue from the reactor vessel head also does not encompass 100%. Installation of these inspection openings would allow a thorough inspection and cleaning of the head. All B&W plants with the exception of Davis-Besse and ANO-1 have installed this modification.*

NRC does not require this, NRC regulations are typically generic, not specific to individual plant designs, so something like this depends on the professionalism of the leadership team to "do the right thing", but Davis Besse management would not approve and [in effect] permanently deferred the modification requests.

In April 2000 [about two years before the hole was discovered] the system engineer wrote a condition report that indicated one of the CRDs [control rod drives] was cracked and leaking boric acid:

> *"…there is a high probability that G9 is a leaking CRD."*

And also:

> *"No reasonable assurance exists that the leak will not propagate."*

If true, this required an immediate shut down of the reactor [the plant]. The system engineer also brought 9 unusual digital photos of the side of the reactor vessel to the NRC resident inspector, showing where many large streaks of red rust-colored liquid had run down from the top to the bottom of the reactor, asking [in effect]:

"Is this normal? Has NRC seen anything like this before?"

The resident ignored the request, perhaps because his job description was to investigate regulatory violations, not to run down technical issues for a system engineer.

In other words: "not my job, man".

After being notified of a probable primary boundary leak, and looking for any excuse to not shut down the plant, a First Energy executive contacted the only NRC executive able to issue a "shut

down order" [Sam Collins, Director of the Office of Nuclear Reactor Regulation (NRR)] and said [paraphrase]:

> *"We seem to have this tiny crack, we think it is really nothing serious and we feel can keep operating safety for a few more months. We would [really really really] like to stay on line until our scheduled refueling outage, if you can help us out we would sure appreciate it."*

Here is an excerpt from a February 2003 Ohio Blade article:

> *NRC staffers wanted the plant shut down no later than Dec. 31, 2001 because they feared its reactor-head nozzles were cracked and leaking. As it turned out, so much acid had gotten out of the reactor that the head nearly ruptured – a scenario that experts now say could have led to a Chernobyl-like meltdown if safety systems and the containment structure had, in turn, failed.*
>
> *According to a transcript of his second interview with the inspector general's office, Mr. Collins said he had intended to issue the shutdown order when he forwarded it up the chain-of-command on Nov. 16, 2001, to William Travers, NRC executive director of operations. Five days later, the order was passed along to the full NRC board.*
>
> *NRC staffers received a memo on Nov. 21, 2001, summarizing a meeting that day between Mr. Collins and Robert Saunders, president of FirstEnergy Nuclear Operating Co., the utility's nuclear subsidiary. The inspector general's office has claimed that meeting was pivotal to the decision Mr. Collins ultimately made – meeting the utility halfway and letting it keep operating Davis-Besse until Feb. 16, 2002, a date which skeptics have viewed as arbitrary … three months later than the shutdown date proposed by the NRC staff.*
>
> *"There was also feedback at one point from the Chairman at a very high level just indicating external interest in this and I indicated to him I'm aware of that," Mr. Collins was quoted as saying. An interviewer asked him to describe what he meant by [external interest]. "My impression, we were talking about elected officials," Mr. Collins said.*

Ohio Senator Voinovich? [I have no idea but it would probably need to be at that level]

So [of course] the NRC then said:

> *"Oops we really messed up, we should have followed up on those rust photos, we should not have allowed that plant to keep operating, we should not have blamed that system engineer, we should have investigated if there were other examples of 'minimal regulatory compliance' affecting safety systems at Davis Besse or elsewhere in the industry, we really need to get a better handle on assessing the event risk that managerial-organizational issues present [bad management, weak safety cultures] this has been a great lesson for us, we are going to learn from it, find a way to do better going forward, and make sure these kind of managerial-organizational events like Millstone and Davis Besse don't happen again in the US nuclear industry."*

Well, not exactly.

The NRC blamed the system engineer for not fully cleaning the head, criminally charged him and banned him from the industry for five years [effectively for life since no plant is ever going to hire him]. He lost his job and his house, he was criminally convicted, fined $4,500 and given three years probation.

His attorney wept at the injustice and later asked a juror: "how could you find him guilty?" The juror replied: "well, I didn't think he was personally responsible, but someone had to be held accountable."

The NRC also applied enforcement actions to the First Energy Nuclear Operating Company [NRC EA-05-071]:

> *From at least May 18, 2000, to February 16, 2002, FENOC started up and operated the Davis-Besse Station in Modes 1 through 4 while being aware of the presence of significant boric acid deposits, on the reactor pressure vessel head, which were indicative of reactor coolant system leakage and which could not be justified as being caused by reactor coolant system non-pressure boundary leakage alone.*
>
> *The NRC determined that the licensee's failure to exercise adequate management oversight and controls, in its assessment of substantial recurring boric acid deposits on the reactor pressure vessel head during 12RFO and the build-up of boric acid deposits on other reactor containment equipment during plant operations, significantly contributed to the length of the Technical Specification violation and the significant reactor pressure vessel head degradation. The licensee's decision to return the unit to power on May 18, 2000, with ongoing reactor coolant system leakage, with significant boric acid deposits on the reactor pressure vessel head, which could not be associated with reactor coolant system non-pressure boundary leakage, and without conducting the reactor pressure vessel head cleaning and inspection required by the boric acid corrosion control procedure, is a serious safety and regulatory concern.*

The First Energy Operating Company [the subsidiary that operates the five First Energy nuclear plants] ultimately paid a record $28 million fine [what the FENOC nuclear plants make in about a week] on the condition that the Department of Justice not prosecute any First Energy managers:

> *Under the agreement, the Department of Justice will refrain from seeking an indictment or otherwise initiating criminal prosecution of FENOC for all conduct related to the reactor head issue, as long as FENOC remains in compliance with the agreement, which the company fully intends.*

How Well Did Millstone Learn The Lesson From [It's Own] 1993 Event?

Here is what INPO says about the 24 "events that shaped the industry":

> *"The events were significant enough that to allow them to happen again for lack of response was unacceptable. Hence, remarkable actions were taken to prevent recurrence."*

The 1993 Millstone valve event was one of the "special 24". How "remarkable" were these "actions to prevent recurrence"? All industry managers were supposed to have learned not to repeat these events. So what about the actual plant that experienced the event? How well did Millstone 2 learn not to repeat it's own event?

What were the lessons from the 1993 Millstone event?

> <u>How This Event Shaped the Nuclear Power Industry</u>
> *This event brought into focus the dangers of emphasizing production over nuclear safety. A key lesson was the importance of senior nuclear managers periodically emphasizing to personnel that nuclear safety considerations always take priority over production goals*

Unfortunately, last fall Millstone leadership repeated the same kind of [management] error that precipitated the 1993 event. To save a little bit of production time, management violated switchyard work procedures and put production over nuclear [and personnel] safety. Millstone managers scheduled maintenance electricians to work on a live [345,000 volt] switch.

345,000V switches must not be worked live [a 120V wall switch should not be worked live] the work control procedure says:

> *"Every attempt must be made to plan, schedule, and perform work on critical transmission facilities when a unit is out of service."*
>
> *"Unit refueling outages should provide adequate time for scheduling 345kV facility outages."*

The electricians started to disassemble the switch, it created an arc [on a sunny day] so bright that you could not look at it, showered the backs of the rapidly exiting electricians with bits of molten metal, and tripped the plant [because it disabled electrical safety systems]. This event could have easily killed or seriously harmed the workers.

So after this event, Millstone management called safety "stand down" explained the mistakes that the leadership team made and turned it into a good lesson on maintaining leadership focus on safety, right?

Well, not exactly.

Like the NRC actions at Haddam, sometimes when things go bad in a big ugly way, there is a strong desire to cover it up [if you can get away with it] and the root cause team covered it up, arguing the procedure was missing instructions on how to safety disassemble a live 345KV switch [you cannot safely disassemble a live 345KV switch, managers violated safe work practices].

As INPO coordinator it was my job to do a write-up of what happened for the INPO report. I wrote a draft of what really happened [managers emphasized production over safety and violated a "must

do" switchyard work procedure] and submitted it to management for approval. The department manager called a meeting in his office to discuss my write-up.

During the discussion [on three occasions] I looked directly at the root cause author and said "WC12 says that every attempt must be made to schedule 345KV work during an outage, was every attempt made?" He simply stared back with no expression, no answer. I said: "was any attempt made?" He simply stared back, no expression, no answer.

The department manager told me [surprisingly in front of two other people at the table] "we can't say that, what if the public sees it?" I told the department manager that I stand by my write-up, but he is the department manager, and if he directs me to write it up to match the root cause evaluation I will.

He said: "write the OE to match the information in the root cause evaluation" and I did.

As I told my supervisor before we both went into the meeting, this is an organizational repeat of the 1993 "*emphasizing production over nuclear safety"* event, but management refuses to "go there".

How Well Did Millstone Learn The Lesson From The 1989 Haddam Fuel Damage Event?

> <u>How This Event Shaped the Nuclear Power Industry</u>
> *The industry realized that current programs designed to preclude the introduction of foreign materials into the reactor vessel or spent fuel pool during maintenance activities were in need of significant improvements.*

At Millstone in April 2008, foreign material interfered with the function of a stop valve, creating a reactor coolant leak and requiring Millstone to declared an "Unusual Event" [the lowest level nuclear emergency] due to unidentified leakage greater than 10 gallons per minute.

The root cause evaluation [same author who wrote up the 345,000V switch] said:

> *Engineering failed to keep abreast of industry experience related to spiral wound gaskets and to make recommendations for design and procedure changes.*

I wrote the operating experience report from the root cause evaluation, and sent it to INPO. Later, an engineer came to me and said: "you know, that is not really what happened" and gave me a list that showed he had been in fact keeping abreast of industry experience and communicating it [as he should be] to maintenance.

He told me he strongly disagreed with the root cause evaluation conclusions, and had refused to sign off on the root cause evaluation. While he was on vacation his department manager had signed it off, so it had been completed processed and filed.

I called this manager and said: "why did you sign this off when you knew [the engineer] didn't agree with it?" He said: "sometimes you just have to move on."

Later I was told what really happened was [in an effort to save money] managers instructed supervisors to find some jobs that are not absolutely necessary and cancel them. Apparently the engineer's supervisor had [without notifying him] cancelled the paperwork that he had submitted to update maintenance procedures with the information that would have avoided the event.

Who had instructed the supervisor to find some unnecessary work and cancel it? Most likely the same manager who had signed off the root cause evaluation while the engineer was on vacation. Getting it closed out and filed away ASAP would have been a good move on his part.

Foreign material has been a continuing problem at Millstone, shortly before I retired I suggested to Training that they periodically review INPO foreign material guidance, and verify that it continuing to be properly represented in training plans. Training responded: "INPO does not say this is needed, so we are not doing it".

About a year ago the engineering manager who signed off the root cause took a job in Virginia, and was replaced by an engineering manager from Virginia. When you work at Millstone for a while you become acclimated to poor management, and after a while you cannot even "see it".

The Virginia manager immediately started going through the [very large] backlog of engineering work, saying [appropriately]: "we need to either do this stuff, or decide that we do not need to do this stuff, and cancel it." This was like a breath of fresh "good management" air. I sent an email to the CEO of generation recommending that this manager be promoted to Millstone engineering director.

There was a problem however.

One of the people in engineering told me that this action had uncovered a bunch of restart issues, safety improvement modifications that the 1996 "safety scrub" had flagged, that NU management had promised NRC to address.

NU had said: "Please let us restart now even though not all of the [safety cleanup] work is done, we promise we will fix these things ASAP". NRC said: "OK, we will allow you to restart now, but be certain you fix these things ASAP" and then NU sold the plants to Dominion.

But the NRC resident inspectors are there, and surely [to safeguard the public] they must be tracking these "restart items" and ensuring that they are all satisfactorily addressed?

Well, not exactly.

A few years ago I went to an industry conference and attended an NRC presentation. It showed how one of the major problems at NRC was the lack of a corrective actions process, the lack of any kind of a tracking system for ensuring that action items are tracked and closed.

When I returned to Millstone I asked the resident about this and he said: "oh yes, we should have a NRC tracking system very soon". Then I asked him to "please let me know when it is in place". He said: "I will".

I said: "you don't have a tracking system, so how will you remember to do this?" He said: "don't worry, I will remember".

He never got back to me.

How Do You Address These Kind Of Management Problems?

Last year NRC asked me [invited me as a member of the public] to join a "call in" discussion on their efforts to manage safety culture at new plants being built. I told my supervisor about it and called into the meeting, I was on the phone for about an hour.

The department manager found out about it and told my supervisor to inform me that I was not allowed to attend these kind of NRC meetings during company hours, that I would have to take a vacation day and do it from home. In my view, this was violation of 10CFR50.7 employee protection.

Every nuclear plant is required to post a large [poster size] copy of NRC form 3 which outlines certain responsibilities and rights of employers and employees. One of the employee rights is not to be harassed or discriminated against for taking part in an NRC proceeding [which I interpret as anything the NRC is trying to accomplish].

My supervisor told me that someone who attended the meeting had told the manager I had been misrepresented myself as speaking for Dominion [I had been attending these NRC safety culture discussion for years, the NRC me as, and knew I was speaking as, an independent "expert" member of the public].

The supervisor then told me the Chief Nuclear Officer of Dominion was upset [presumably about my actions]. I just happened to know the CNO very well [we had been discussion safety culture for years] about a week later we sat down to discuss culture and I told him about my supervisor's comment, and asked him what he was upset about. He said he wasn't upset, and didn't even know I had attended a meeting with NRC.

I had been in the group about a year, but the supervisor and manager had been in the group just a couple of months {the supervisor was recently hired and the manager had recently returned from a long assignment]. I think neither was aware that I knew the CNO, and they were telling me that he was angry [I am guessing] to intimidate me and "keep me in line."

I complained about this treatment to some coworkers. I discovered two other workers within sight of where I sat had in the past been harassed by the same manager [both had filed complaints]. As I had gone to the employee concerns program in the past [with unsatisfactory results] I did not go to ECP, but a coworker contacted the ECP manager, who asked me to meet with him.

I told him about the manager's actions he said "oh yes, we have known about that manager for a long time." I said: "really? well, what have you been doing about it?" He said: "we take some actions, you know those management changes that took place recently [about 6 managers had recently swapped positions] a number of those were due to employee concern issues."

I said: "if all you do is move managers to another department when there are problems, isn't that a bit like how the church deals with problem priests?" The ECP manager appeared offended and said: "we do a lot more than that." I said: "OK, what else do you do?" He said: "I can't tell you, it's confidential." I said: "whatever you are doing, it does not seem to be working."

Lee Olivier [now COO of Northeast Utilities] is widely considered one of the top culture managers in the industry, and was hired specifically [was hired away from the Pilgrim nuclear plant] by NU to lead the 1996 – 1998 safety culture recovery at Millstone. By all accounts by the end of recovery Olivier had managed the culture to an impressively high level of excellence.

As I said, in 2003, a lot of Ohio reporters were doing stories on the Davis Besse event, and many of them attended the 2003 NRC workshop [I did a presentation on safety culture management]. After the workshop, I was interviewed for a half dozen Ohio newspaper articles as an "industry safety culture expert."

I suggested to one of the reporters that he interview Lee Olivier, this was Olivier's comment from the article:

> *If nuclear plant executives would concentrate on building trust with employees and helping them reach their highest potential, the NRC wouldn't have to worry about safety culture inspections, said Lee Olivier, who led the transition at Millstone and is now president and chief operating officer of Connecticut Light and Power Co. "The first thing you do is prove to people you care about excellence, and about them," said Olivier. "When you do these things, you build trust coupled with higher standards and expectations."*

A couple of years later I asked Olivier [basically] "what was your 'secret' for maintaining such a healthy safety culture at Millstone, what was the most important thing?"

Olivier replied:

> *"First you establish clear expectations for leadership behavior. Then there are always a few managers who 'just don't get it'. Now this is the most important thing [for senior managers to do to maintain a healthy safety culture] but it is the thing that most senior managers will not do. The managers who 'just don't get it' cannot remain on the leadership team."*

I recently told the CEO of Dominion generation that during recovery there is no way the manager that ECP "has known about for a long time" would have been allowed [by Olivier] to remain on the leadership team. Personally, I have a [somewhat] softer position.

I believe managers who continually fail to demonstrate the organizational-managerial behaviors [that INPO outlines] that are needed to promote a healthy safety culture [what INPO calls "leadership professionalism"] can remain on the leadership team, but are not qualified [cannot be permitted] to manage a safety related functional area.

Nuclear employees are qualified all the time for this and that safety function. As a design engineer I had a laundry list of qualifications that I needed to keep current. I have been proposing for some time now that managers need to be qualified to manage safety culture. This would involve a much more detailed and comprehensive training program that the current [SCWE] industry training provides. As a Washington attorney who does safety culture training told me: "it is surprising how very little industry managers know about safety culture."

I would recommend developing a NRC regulatory guide called "CARMA" [Culture Assessment and Regulation Management Approach]. That would establish requirements for training workers and managers in safety culture fundamentals and leadership behaviors that maintain a healthy culture, and requirements for periodically assuring that every member of the leadership team is adequately demonstrating these behaviors [in essence, establishing a quality management program for safety culture].

If a bus driver is texting while driving, the passengers must say something, and the behavior of the driver must be evaluated. Perhaps the person needs more training, or perhaps the person should not be a bus driver. Behaviors like this exist for safety culture management, and employees at Millstone [workers and supervisors] frequently complain about managers that exhibit these kind of behaviors. These complaints are typically either ignored, or handled ineffectively by ECP.

For this reason a method of screening leadership behavior and "listening to workers" [without the intimidating presence of management] needs to be institutionalized at Millstone. There is nothing new or unusual about this, most culture experts [Schein, Carroll, Reason] recommend doing

something like this periodically to maintain a healthy culture. Shortly after the 1998 recovery restart, John Beck recommended that Millstone leadership institutionalize something like this. I myself have recommended this to Millstone management nine times [about every year] since recovery. Last year I sent the CEO of Dominion generation the below image of what a healthy management team should look like [what the management team at Millstone should look like].

Industry managers really don't want any part of this. Industry managers would like to maintain the status quo, which is "authority without accountability." The fundamental post-deregulation managerial philosophy of "minimal regulatory compliance" would be threatened if managers were required to "behave properly" and to "listen carefully and responsibly" and address what groups of workers might offer as "organizational process concerns".

The industry lobby group NEI complains loudly if the NRC even hints at starting to develop something that oversees and regulates leadership behavior. To get the NRC to back off, NEI argues: "the licensee is primarily responsible for safety management, not the NRC, so NRC should stay out of management" [and historically the NRC has always backed off]. As Apostolakis said to the Plain Dealer in 2002:

> *"For the last 20 to 25 years," Apostolakis said, "this agency has started research projects on organizational-managerial issues that were abruptly and rudely stopped because, if you do that the argument goes, regulations follow. So we don't understand these issues because we never really studied them. It's a major failure of the system, in my view."*

What the NRC needs to do is to say: "yes, the licensee is primarily responsible for managing safety, but the NRC *is primarily responsible for assuring that safety is being properly managed*" and then give licensees notice that the days of "authority without accountability" [of texting while driving] of "low levels of leadership professionalism" are over.

What NRC Needs to Do Next

NRC needs to ignore the industry lobby and wrap both of it's hands firmly around the safety culture issue. For the past 30 years, every time NRC has tried to study how to better regulate safety culture, [how to safeguard the industry from "bad management"] the industry lobby group NEI [the Nuclear Energy Institute] complains that safety management is the responsibility of the licensees and that NRC needs to "stay out of management" NRC has historically acted more like an industry lapdog that a watchdog on this issue. The Ohio reporters covering Davis Besse understood this, and this editorial cartoon was published in 2002 after the Davis Besse event.

It is correct that it is not the job of NRC to be a [surrogate] manager of the plants. It is however, the job of NRC to ensure safety culture is being properly managed at the plants. At the very of my [106 slide presentation on safety culture] I say this:

> *"Licensees are primarily responsible for assuring proper safety management, and the NRC is primarily responsible for ensuring that licensees are managing safety properly".*

It is the job of NRC to make certain that all licensee leadership teams are managing safety properly [in an ethical and professional manner]. There is no reason for NRC to continue to be a "lapdog" on the issue of regulating professional [ethical effective] leadership behavior. If NRC continues to be a "lapdog" on this issue, NRC is not doing it's job.

So What Regulates [Monitors, Controls] Safety At Millstone Today?

After the Millstone event, the state of CT realized that NRC might not able to effectively monitor safety at Millstone and created NEAC [Nuclear Energy Advisory Group] that is supposed to monitor the safety culture and alert the governor to safety problems at Millstone. NEAC [comprised of mostly retired submarine commanders and engineers] gets most of it's safety data from the NRC. NRC cannot assess safety culture, so how can NEAC do this from NRC data?

In 1996 the Millstone were shut down for two years while an unprecedented safety scrub was performed. It was not the NRC that initiated the shutdowns, it was the media. It was the front page Time magazine article [by Eric Pooley] that precipitated [and caused NRC to initiate] the shutdowns.

There is abundant evidence that another safety intervention is now needed. The NRC resident inspectors have for a very long time now been grumbling about organizational-managerial problems, but NRC does not [yet] have the "tools" needed to identify these kind of

problems and to correct [regulate] them. It may [again] be up to the media [and papers like this one] to galvanize public opinion and secure the needed action at Millstone.

If Managers Are Able To Cover Up [Hide] Bad Management From The NRC, What Protects The Public From [The Significant Event Risk] Presented By Bad Management?

I would like to be able to say the NRC [or "internal Oversight" or INPO], but you are looking at it: the "media."

Articles like this one, and the people who read them, who petition people in positions of authority to take some action to improve safety. Responsible public watchdog groups like NEAC have to take their roles seriously, learn about and explain these issues to the CT Governor, and recommend that reasonable actions be taken, or nothing is going to happen.

Short Term - What [Exactly] Needs To Happen At Millstone?

What has to change is cost management pressure from above [Dominion executives] needs to be reduced and safety management pressure from below [workers, managers, Millstone Oversight dept] needs to be increased [more "bottom up" authority needs to be institutionalized]. Millstone and Davis Besse and other events continue to show that the NRC ROP crosscutting assessments are not [yet] adequate to ensure healthy [low risk] licensee cultures or management.

Therefore, NEAC must not wait for [must not rely on] the NRC to declare Millstone management "unfit" and managerial actions "unsafe", but should make an independent assessment and advise the CT governor on whether Millstone is "safe enough".

The first thing that should happen is for the state of CT to apply an existing state law established during the Millstone event that says if on a prima facie review, there is a complaint that worker terminations have affected safety that Millstone is required to rehire the workers until the events are fully investigated.

I would recommend that NEAC advise the Governor to disallow the restart of Millstone 3 [planned for mid-May] until the staffing safety issue [and the other safety issues identified in this paper] are investigated and addressed to the satisfaction of:

- The NRC resident inspectors
- A panel of INPO representatives
- The Millstone Oversight department
- A panel of responsible Millstone managers
- A panel of responsible Millstone workers
- The CT Attorney General's office

Longer Term - What Should Happen In The Nuclear Power Industry?

The long term solution is for NRC to require all industry licensees to institutionalize [full and responsible] proactive eliciting of [and careful listening to] employee safety concerns, and to [fully and accurately] analyze any event risk these concerns present, and to [fully and appropriately] respond to any concerns that represent event risk.

The NRC has yet to develop effective approaches to regulate safety culture. Earlier this year [for the first time in 30 years] NRC launched a [public workshop] effort to accurately define exactly what is

meant by the term "safety culture" and to identify attributes able to indicate the quality of the culture [the quality of the management]. This means NRC is in the beginning [fledgling] stages of the first step to developing effective regulation for "bad management". As one of the 19 members of the "expert panel" at this point this "public advisory" path does not look very hopeful.

What NRC needs is not advice and input from a large group of stakeholders, better than 95% of whom possess no expert knowledge of safety culture or managerial-organizational issues, but advice from a small group of experts with very substantial and specialized knowledge in this area.

As I said at the beginning, NRC has a safety advisory committee of "top engineering experts" [the ACRS – advisory committee reactor safeguards] which is very good at monitoring [regulating] the "engineering" part of safety management using a process called the ROP [reactor oversight process].

However, event after event indicates that the problems that cause accidents are not failures of the reactor safeguards systems, but failures of management systems.

NRC has no equivalent advisory committee of "top organizational management experts" and as a consequence is not as good at regulating the "managerial-organizational" part of safety management, which INPO calls "leadership professionalism", which can also be called "organization safety culture".

So the longer term solution is for NRC to establish a second advisory committee equivalent to ACRS to advise on "managerial organizational" safeguards. It could be called ACMOS [Advisory Committee Managerial Organizational Safeguards] and for this committee to advise on the development of a process to oversee management just like the ROP [reactor oversight process] currently oversees reactor safeguards systems, it could be called [for lack of a better example] the MOP[management oversight process] or the OOP [organizational oversight process] or the MOOP [or whatever].

A Word About US Nuclear Plants

US nuclear plants are designed very [very] safe. They can withstand a lot of [very] poor management and still operate safely. My family and I live inside the Millstone evacuation zone, I am not worried, I not going anywhere.

Millstone and US nuclear plants are not like Chernobyl. Even the Russian plants are not [today] designed like Chernobyl. Chernobyl had a very serious design flaw that [the organizational-managerial system] knew about but did not address [covered up] which allowed Chernobyl to continue to operate, with disastrous results.

The reason I have been beating up on NRC for a very long time now [and in this article I "beat up" on Millstone a little] is that people who live near nukes have a right to know what is going on in their back yard, and also that we need better safety management and NRC needs to become a better regulator. NRC needs to go back and learn the lessons of Millstone [correctly this time].

Another reason we need nukes to operate more safely is that we need more of them. Believe it or not, nukes are a much better [healthier more environmentally responsible] way to generate [baseload] electric power than is coal.

Note that I say [baseload] this is very important to understand. The wind does not always blow, the sun does not always shine [for example, often does not shine at night] so until [and unless] an incredibly enormous "magic battery" is somehow invented [and right now there is nothing on the horizon giving even a remote indication that this can someday happen] only nuclear can replace coal.

Due to the work of energy industry lobbyists, old dirty coal plants built before the mid 1970s continue to operate without modern pollution controls. The result is [since TMI] hundreds of thousands of early deaths and millions upon millions of cases of chronic asthma and respiratory disease have occurred that could have been avoided if [after TMI] the US had stayed with it's planned nuclear expansion policy[as for example France did].

What is killing and harming the health a surprising number of [mostly very old and very young] people is something called "particulate pollution." It is only over the past decade that this has been clearly understood. One of the largest contributors is coal soot in the air [breathing soot in the air is equivalent to breathing second hand cigarette smoke].

You think you don't smoke? Think again. You can read about it here:

http://www.americanheart.org/presenter.jhtml?identifier=4419

Additional scary accidents like TMI or Davis Besse [even if no one gets hurt] will likely end the needed expansion of the industry. So we need more nukes, but we need them to operate more safely, and we need to encourage the industry regulators to do everything necessary to make this happen.

A Final Word

Safety culture is really a type of business ethic that ensures business actions do not harm people. Even if safety were not being under-resourced at Millstone, worker terminations that occur in the middle of a string of windfall profits should be taken as a clue that the leadership of Dominion / Millstone are willing to put profits ahead of the welfare of people.

When a business with public safety responsibilities takes actions to make money that either harm or increase the risk of harm people, these kind of action needs to be perceived [by regulators and people in government and the public and shareholders other stakeholders] as a warning flag, as an indicator of a potentially poor safety culture.

Managers who do not understand this should perhaps not be managing in a public safety industry. Regulators and government officials who do not understand this should perhaps not be overseeing public safety. The first lesson that Millstone should have learned from the 1996 shutdowns is that maintaining the trust of all stakeholders is essential.

[End of article]

Dave Collins has a MS in Executive Management and Leadership. With the endorsement of NRC safety culture expert John Sorensen, in 2000 he completed a highly successful study of a "state of the art" safety culture CARMA [culture assessment regulation management approach] study at Millstone. In 2003 wrote a thesis paper on safety culture management. In 2004 he assisted MIT with safety culture modeling and has helped develop industry safety culture training software. He is currently a member of an NRC expert panel to improve safety culture definition, assessment and regulation. After working as a design project engineer, Oversight assessor, human performance supervisor, and INPO coordinator, he retired from Millstone in March of 2009. He continues to work to improve safety management in the nuclear power industry [and beyond] his work continues to be supported by leading academics and authors. David lives in the New London county with his wife Kathy.

Endorsements

Dr. Jonathan Wert, Nuclear Industry Safety Culture Consultant:

> *"David, I consider you to be much more qualified than any of the academicians, psychologists or navy nukes that I know or have read about. You have actual experience with nuclear safety culture where the 'rubber hits the road' ground zero on the firing lines."*

Lee Olivier, COO Northeast Utilities [former NU CNO]:

> *"David, good to see you using our experience at Millstone as a model of how to successfully make change. You can treat people with a deep rooted respect and care and still make the hard business decisions…it's how it's communicated, it's the level of trust in the organization etc. Really centering around the issues you identified. Again, your paper was extremely thoughtful and well written. Good luck with it." - Lee*

David Christian CEO Dominion Generation [caution: older comment, may have expired as of this article]:

> *"I think [David] is among the finest intellects and communicators in the area of safety culture."*

REVISION 3

Poor Management Returns To Millstone, NRC And CT Governor Should Review

Preface

I provided this info to Dominion Millstone Management in early April.

I informed Dominion / Millstone of my intention to pursue resolution through other paths [such as the media] unless the issues were investigated and addressed. Nothing indicated to me that dominion / millstone was interested in the details of these issues, or was planning to investigate or address them. On April 14 I provided this info to the New London Day and since that time have shared it with many others.

I have allowed the Day to review whatever internal INPO and Millstone documents they asked to see to verify the accuracy of this info. They reviewed supporting info for 3 hours and [I believe] found no inaccuracies, but the Day continues to refuses to publish this info unless I release copies of all supporting documents to them, which I do not intend to do.

As releasing internal [Millstone, INPO] documents may be illegal, I am not planning to do this, and therefore it has been difficult communicating this info to the public. I am not especially interested in "feeding" irresponsible anti-nuclear groups, but I feel that responsible people [in particular those who live with a nuclear plant in their "back yard"] should be able to see this kind of info and ask NRC and Millstone managers and others questions about it.

Introduction

Since poor management was first identified as a major contributor to accidents such as Three Mile Island, Chernobyl and others, us industry lobbyists have blocked NRC efforts to study and regulate the kind of management behavior that leads to accidents, called a "weak organizational safety culture".

The people who manage millstone [and Dominion's Virginia plants] are good people [most are very good people] but sometimes managers try to accommodated pressure from above to make increasingly larger profits [or bonuses for themselves and their families] without "pushing back", without standing up for safety.

Something that led to the latest major nuclear event [the 2002 Davis Besse] was that management hid some safety problems from the NRC . After the event it was discovered that the safety culture there had been unhealthy for a very long time.

For many years NRC had been reporting that the culture was healthy. The Ohio papers said the NRC was supposed to have developed effective approaches to effectively oversee safety culture [bad management] after the 1996 millstone event, which is why the poor safety culture at Davis Besse came as "such a shock". The NRC's own safety advisory group called it "a major regulatory failure". People who live near millstone should understand that the NRC is working to develop better [robust and effective] approaches for regulating safety culture, but is not quite there yet.

Earlier this year the NRC [for the first time] launched an effort to define what [exactly] is meant by the term "safety culture" and to identify attributes NRC can assess that will reliably indicate the quality of the safety culture.

Until NRC is able to identify unsafe management, NEAC should not wait for [must not rely on] the NRC to declare millstone "unsafe", but must make an independent assessment and advise the ct governor on whether the restart of millstone 3 [due mid may] should be disallowed until staffing [and other safety issues] are investigated and [if necessary] addressed.

This document contains many [past and present] examples of bad nuclear management in the state of ct. The short term solution is to not allow millstone to restart until these issues are investigated and addressed to the satisfaction of all parties responsible for ensuring safety.

The long term solution is for NRC to require all industry licensees to institutionalize [full and responsible] proactive eliciting of [and careful listening to] employee safety concerns, and to [fully and accurately] analyze any event risk these concerns may present, and to [fully and appropriately] respond to them.

If you are aware of any examples of poor nuclear management in the state of CT that appear to be affecting safety and should be addressed, please email them to millstoneisp@gmail.com

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Discussion

To help Dominion executives meet Wall Street numbers, In March 2010 Millstone reduced staff a little too quickly, and is operating without some important safety functions designed to minimize the chance of an accident. How this could happen with two NRC resident inspectors stationed right at the site?

I am a recently retired Millstone [engineer, safety system quality assessor, and INPO coordinator]. In 2003 I wrote a master's thesis on safety culture management, and for the past seven years or so have been an acknowledged nuclear power industry safety culture management expert.

In March Millstone reduced staff through early retirements [I was one of the "early retirees"] and also by terminating more than 50 workers [only "worker bees" the entire management team was exempted]. Millstone has many older workers within five years of retirement. Before leaving I implored the plant manager to accomplish the desired staff reductions gradually over the next 2-4 years through early retirements [and I verified with HR that this was acheivable].

In April I also sent emails to top Dominion management that layoffs were [very clearly] not economically necessary, arguing that this action was only to improve short-term profits [beef up Wall Street numbers] and was as unethical as it was unnecessary. "Don't do this" I said.

Too Much Staff Or Not Enough Management?

In January the Millstone plant manager had justified the [100 or so] staff reductions by pointing out that some sites with higher INPO ratings than Millstone also have about 10% less staff. INPO is the "Institute of Nuclear Power Operations" the industry "excellence" organization formed after Three Mile Island to recommend improvements that minimize accidents. While some sites do have higher ratings than Millstone [and with lower staffing numbers] this is due to effective management teams, not slightly lower numbers of staff.

A Toyota Prius goes further with less gas because it has been engineered to operate efficiently. Putting less gas in "your old clunker" is not going to turn it into a Prius. Similarly, reducing staff at Millstone is not going to improve INPO ratings [or the site-wide safety focus]. If you try to turn "your old clunker" into a Prius by giving it less gas, the only reasonable outcome is that you are not going to get where you need to go.

The information I have indicates the staff reductions in late March in the department from which I retired [Organizational Effectiveness] were unsupportable [safety functions designed to minimize accidents were being significantly under-resourced]. For the first two weeks in April, I tried sending documents to top Dominion managers explaining how activities that support safety were being under-resourced, but I saw no evidence of an effort to understand [or investigate] my concerns.

The Dominion response was: "are there any safety problems right now, today?". My concern is the problem of the chain smoker: unhealthy actions today opening a door for potentially significant health problems tomorrow. There are things INPO says must be done to minimize the chance of a nuclear accident. With the staff cuts there was a high probability these things were not going to be done.

If I felt that the staff reductions were not affecting safety [while I would have believed them to be unethical and unnecessary] I would have [had] to say: "it's just business" and I would not be writing this article. No, this more than "just business" this is putting short-term profits ahead of long-term public safety interests. I have some evidence that this reluctance [really refusal] of Dominion to

listen carefully to my concern [an employee] concern and act [in my view] responsibly may be part of a larger pattern of management performance in the industry which I think needs to be looked at carefully.

To understand why I am saying this, the reader needs to understand something about nuclear safety management ongoing right now at Millstone, the historical safety management that has occurred in Connecticut, and the safety management that is ongoing in the nuclear industry, about half of which is now being operated in a deregulated, competitive market.

Putting Profits Ahead of People [And Safety]

According to a New Haven Register article published last month:

> *Dominion's net pre-tax profit from the Millstone 3 generating unit was $440 million in 2009, which translates into … a return on equity of 115 percent, according to the report. [CT] HB 5505 defines windfall profits as "in excess of 20 percent return on equity."*

Add the production of Millstone 2 and this equates to annual windfall profits of about 770M.

The Iraq war [and other factors] have kept energy prices artificially high for many years, and over the past decade companies like Exxon Mobile have raked in record windfall profits. For much of this time there has not been a "real" shortage of oil, just the "risk" of a shortage of oil. Which means these companies have used the fear of shortages to charge more for their product, not because they "need to", but because they "can" and the government [heavily influenced by the energy lobby] lets them get away with this.

When energy prices go up, companies that rely on oil [or gas or coal] to produce power must increase what they charge for electricity because fuel is a major cost factor. This is not really the case with nuclear. The price of uranium oxide is not significantly affected by oil prices, even if it was, most of the cost of operating a nuclear plant is not fuel, but the large numbers of staff required to operate safely. So when energy prices go up, nukes charge more for electricity not because they "need to", but because they "can" and when energy prices are high [really ever since Dominion purchased Millstone in 2001] nuclear plants can be amazing "cash cows".

How much money has Dominion made on Millstone since 2001? Profits for nukes trend up and down with oil prices, so here is a rough estimate [*2010 oil price projected as of 3/11/2010]:

Year	Price per barrel	Est. Millstone Profit
2001	23.00	331
2002	22.81	328
2003	27.69	399
2004	37.66	542
2005	50.04	721
2006	58.30	840
2007	64.20	924
2008	91.48	1317
2009	53.48	770
*2010	69.85	1006
		Total 7179

So Millstone has made about 6B since purchased by Dominion, and may make up to another billion this year. Considering how much Dominion makes on Millstone, I wondered why [on earth] Millstone felt a business need to terminate 50 CT workers in March [with whom I worked they were hard working dedicated employees].

This was clearly not because Dominion "had to" but because they "could", but why would Dominion do something like this?

Overstaffed or Undermanaged?

In January the plant manager at Millstone rolled out a [Goodnight consulting] chart showing that since 1996 [essentially since deregulation] production performance has improved as staffing levels have dropped, and implied that statistics show that safety and reliability correlate positively with low staffing numbers, and that plants with low staffing generally also have high INPO ratings.

I contacted the owner of Goodnight consulting [Charles Goodnight] he said he does not have access to INPO ratings and never claimed any correlation with low staffing and safety. I think the majority of people in the industry would tell you that high INPO scores correlate more closely to site management team efficacy [management was exempted from the layoffs, no surprise here] than staffing levels that are marginally higher than similar two unit sites.

Goodnight did support some staff reductions, but only if done in a careful, controlled manner, and only after completing something called a "change management plan" to verify that staffing remains sufficient to support critical safety functions. A member of Millstone management told me [this is a month *after* the layoffs] that these "change management plans" were never completed.

Several people have since told me that the "real" cause of the layoffs is that the Dominion did not get the rate increase it wanted from it's [regulated] Virginia plants, and is now taking "a pound of flesh" from it's [deregulated] CT plants.

I wondered, is this dynamic causing money to be given precedence over safety in CT? Could an over-focus on "maximizing profits" [right now, today] be increasing the probability of a nuclear accident in CT?

Is Dominion putting [short term] money interests above [long term] safety interests at Millstone to meet [arbitrary] 'Wall Street' goals set by top executives?

INPO does not use the term "accident" it calls serious accidents like TMI a "significant event." INPO says nearly every significant event since 1993 [since deregulation] had "pressure to continue operating" as a causal factor [this was not observed even once prior to deregulation].

> *It is important to note that [pressure to continue operating] was a factor in all but one of the most recent (since 1993) significant events. Therefore, given today's competitive environment,* ***pressure to continue operating*** *may be a notable contributor to future significant events.*

Are competitive pressures due to deregulation causing an increasing focus on money and a decreasing focus on safety?

Do Everything NRC Says And Your Plant Will Operate Safely, Correct?

Well, not exactly.

The mission of NRC is to assure "adequate" public safety, the mission of INPO is to promote "operational excellence". "Operational excellence" is what avoids accidents like TMI.

INPO was established after TMI to encourage the industry to more than the minimum, to do everything reasonably possible to prevent events like TMI [and many others] from recurring. To keep the probability of nuclear accidents ALARA [as low as reasonably achievable].

INPO identifies [not engineering problems but] a weak safety culture [organizational-managerial problems] as the most frequent causal factor of nuclear "events" like TMI and the majority of the others.

As competition increases, more and more operating companies have been adopting a philosophy of "minimal regulatory compliance". This means that management controls costs by doing the bare minimum required to satisfy NRC. The more responsible ones also do the minimum that keeps INPO happy, and the CEO's of these operating companies are rewarded by receiving an "INPO 1" rating for their nuclear plant sites. Average plants get "INPO 2"

The Millstone site has historically been "INPO 2" [average]. However, for a long time now INPO safety metrics have had Millstone on the bottom of the industry. In January, the overall INPO rating for one of the plants was dead last, equivalent to an academic score of "F minus declining." The next INPO review is likely to categorize Millstone as an "INPO 3" a rating given to a handful of the worst performing sites in the industry.

How Likely Are Future Major Accidents?

UCS [Union of Concerned Scientists] Dave Lochbaum is the leading nuclear industry watchdog critic. After the 2002 Davis Besse event he was interviewed by CBS "Sixty Minutes." Below is a prescient article Lochbaum wrote several years before the Davis Besse event occurred, warning that a major accident can still occur [as Davis Besse demonstrated]:

http://www.ucsusa.org/nuclear_power/nuclear_power_risk/safety/nuclear-plant-safety-will.html

> *With 103 reactors currently operating in the United States, these data suggest that a major reactor accident may be fairly likely to occur in the near future. It seems only a matter of time before the initiating event wheel, the equipment wheel, and the human performance wheel stop in a combination that produces another accident.*
>
> *Why should anyone be concerned about preventing another reactor accident? After all, the Three Mile Island accident produced some dramatic headlines and prompted a Saturday Night Live skit, but it did not leave portions of the Pennsylvania countryside uninhabitable. If TMI represented the worst-case reactor accident, then it might be acceptable to suffer one such disaster every generation. Unfortunately, things can be much worse than TMI.*

A few years ago Lochbaum left UCS and took a job at NRC. UCS offered me Lochbaum's job, but I was employed at Millstone and said I would consider it after retirement [Lochbaum has since returned to UCS].

What About Safety At Millstone Today?

TMI [and Chernobyl] demonstrated that organizational-managerial problems lead to most of the serious nuclear accidents. If NRC had not figured out how to effectively regulate organizational-managerial issues after TMI and Chernobyl, certainly after the Millstone event the NRC [finally] figured it out and corrected the problem. Right?

Well, not exactly.

In 2003, a lot of Ohio reporters were doing stories on the safety culture problems that led to Davis Besse event, and many of them attended a 2003 NRC workshop on the subject where I did a presentation on "safety culture management". After the workshop, I was interviewed for a half dozen Ohio newspaper articles as an "industry safety culture expert."

If you google "david collins safety culture" you can access a couple of the [many different] papers I have written and presentations I have given. After the 2002 Davis Besse event, this article appeared in a Cleveland newspaper:

2002 Cleveland Plain Dealer *Employees must fix plant's damaged attitude on safety*

> *The Millstone debacle was supposed to have heightened the nuclear industry's awareness of the safety culture issue. The NRC believed Reactor Oversight Program, its new approach to monitoring the nuclear fleet would be a more sensitive, less subjective indicator of how well reactors were operating. Which is why Davis Besse came as such a shock to regulators and the industry: Until the day the hole in the reactor lid was found in March, the plant got uniformly high marks from the NRC's inspections*
>
> *"There clearly were some issues with safety culture at that plant that had not been recognized by us, and not recognized by the top- most management of FirstEnergy," said NRC Chairman Richard Meserve. As he told an industry group in November, "the Davis-Besse episode presents the fundamental question as to whether the NRC's approach to assuring an adequate safety culture is sufficient." "I think if you were to talk with five different people about what safety culture is, you'd probably get five different answers." Meserve said "If we were to find tools to measure a plant's culture objectively, I think a lot of concerns of regulation in that area would diminish."*
>
> *MIT Nuclear Engineering professor George Apostolakis chairs the 12 member NRC safety advisory "think tank" ACRS [Advisory Committee Reactor Safeguards]*
>
> *"For the last 20 to 25 years," Apostolakis said, "this agency has started research projects on organizational-managerial issues that were abruptly and rudely stopped because, if you do that, the argument goes, regulations follow. So we don't understand these issues because we never really studied them. It's a major failure of the system, in my view."*
>
> *David Collins, an engineering analyst at Connecticut's Millstone nuclear power station who studies safety culture, likens it to the moral and ethical code that guides doctors: "An attitude that ensures the [nuclear] technology first does no harm."*
>
> *"We need some mechanism for NRC to remove toxic leadership," suggested David Collins, an engineering analyst at the Millstone Nuclear Power Station in Connecticut, noting that overbearing executives could diminish plant safety. Like several other speakers and committee members, Mr. Collins, expressed reservations about extensive safety culture regulations.*

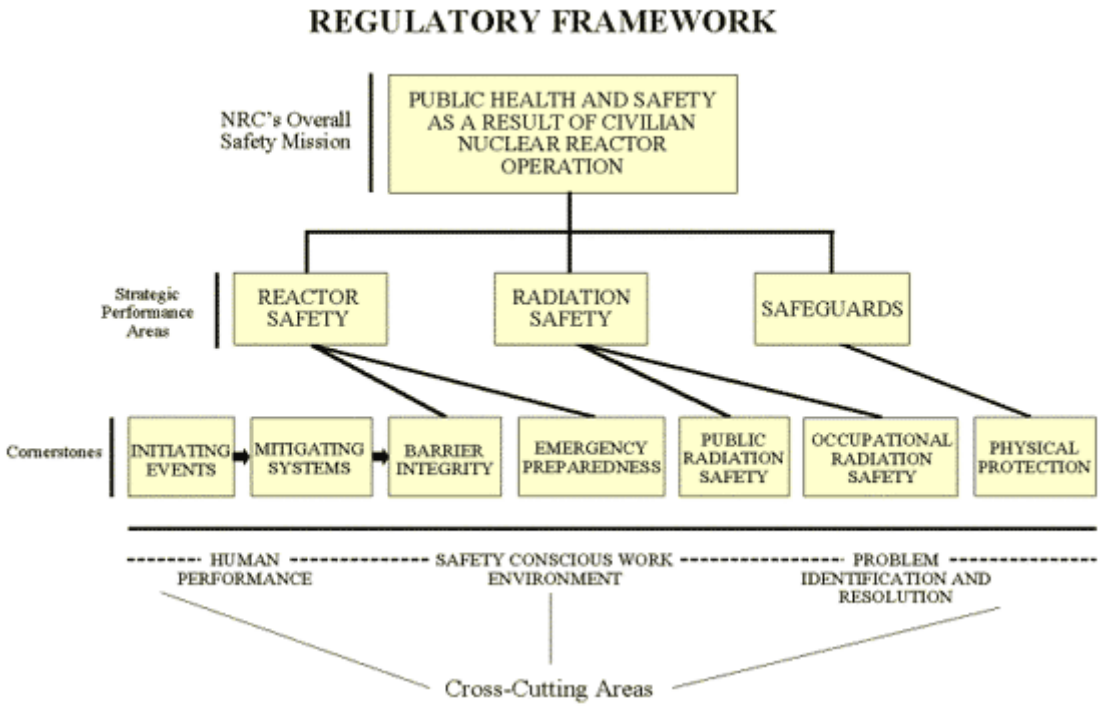
Collins, a safety culture authority and engineering analyst at Millstone, wants the NRC to require operators of all nuclear plants to educate their staffs about good safety culture, then regularly measure employees' attitudes and report the results.

What Is Wrong With NRC Regulations?

NRC has a safety advisory committee of "top engineering experts" [the ACRS – advisory committee reactor safeguards] which is very good at monitoring [regulating] the "engineering" part of safety management using a process called the ROP [reactor oversight process]. The ROP cornerstones check on things like [does your car have brakes, do you test them, do they seem to be working].

NRC has no committee of "top organizational management experts" and so is not good at regulating the "managerial-organizational" part of safety management, which INPO calls "leadership professionalism", and which can also be called the "organization safety culture".

Here is a nutshell of the ROP, this is what the NRC monitors for safety performance:



The bottom three elements, called "the cross-cutting areas" are the "safety culture" areas that NRC is not good at monitoring [regulating] things like:

- *Has management been cutting corners on safety [below the NRC "radar"] to save money?*
- *Has management been covering up safety issues [from NRC, INPO, other members of management]?*
- *Has management been creating an environment so strongly focused on making money that employees are afraid to bring safety issues to managers [and has the ECP – employee concerns program - been so weak that employees don't bother using it]?*
- *Does management encourage employees to bring forward safety concerns [and thank the employees for communicating them] then proceed to classify them as "low priority" and ignore them?*

Here is the NRC policy statement definition for *safety conscious work environment*. To locate this definition yourself, you can google NRC, open the NRC website, search the word "safety", then scroll down to this definition:

> *The Commission's policy statement describes SCWE as "a work environment where employees are encouraged to raise safety concerns and where concerns are:*
>
> - *Promptly reviewed,*
> - *Given the proper priority based on their potential safety significance, and*
> - *Appropriately resolved with timely feedback to the originator of the concerns*

So how is Millstone doing these days on reviews, safety issue prioritization and providing feedback to employee?

Not so good I am afraid.

In spite of what NRC may tell you, there is a growing pile of evidence that Millstone [for many years now] to save money has not been adequately addressing these areas. How much money are we talking?

Dominion operates seven nuclear plants, the four Virginia plants historically have operated cheaper than any others plants in the country. Millstone is still a "work in progress" but since Millstone was purchased in 2001, I estimate the extra profits from operating "Dominion lean" at just the Virginia plants has made Dominion a minimum of an extra 1.6B.

The Root Of The Problem

NRC does not study safety culture. Here again is the Apostolakis quote from the previous page [Apostolakis was recently promoted to an NRC commissioner]:

> "*… we don't understand [organizational-managerial] issues because we never really studied them"*

The major reason for this is that the ACRS is made up of engineers who view safety management as primarily ensuring that these radiation [safeguard] barriers do not fail:

- *fuel cladding*
- *reactor coolant piping*
- *the reactor containment [the big reinforced concrete dome building]*

None of the ACRS have the necessary expertise to advise NRC on what INPO indicates is the real cause of accidents [significant events] like TMI, Chernobyl and most others, which is organizational-managerial failures.

The (Kemeny) investigation of the accident at TMI reported this:

> *"The one theme that runs through the conclusions we have reached is that the principal deficiencies in commercial reactor safety today are not hardware problems, they are management problems"*

INPO has identified these organizational-managerial [safeguard] barriers, INPO calls them "defense-in-depth" leadership accident prevention barriers:

> *"A robust safety culture requires aggressive leadership emphasizing healthy relationships that promote open communication, trust, teamwork, and continuous improvement. Continuous improvement needs ongoing leadership attention to improve the plant's resistance to events triggered by human error (defense-in-depth). Those in positions of responsibility must see themselves as leaders as well as managers to create an atmosphere of open communication. Therefore, leadership is a defense."*

INPO has identifies these "defense-in-depth" barriers as:

- *Workers*
- *Managers*
- *Internal Oversight [the site Oversight department]*
- *External Oversight - NRC*
- *External Oversight - INPO*

For many years people have been recommending that NRC get safety advice from managerial-organizational experts. NRC needs a panel of *organizational process* safeguard experts equivalent to their *engineering process* safeguard experts [the ACRS].

Then NRC needs to develop regulatory constructs capable of maintaining organizational-managerial failures ALARA [as low as reasonably achievable] as accident causal factors.

After the NRC allowed the Millstone site to restart the units in 1998, and Lee Olivier moved on, Millstone immediately started sliding back into the same pre-1996 "bad management" practices.

No effective safety culture regulations had been institutionalized by NRC. I asked the senior NRC resident at the time "what has been put in place to keep an event like Millstone from happening again here or elsewhere in the industry." He paused and thought for a moment and replied: "nothing I guess."

John Beck is a consultant who is considered a leading safety culture assessor in the nuclear industry. Working for the NRC, he monitored the culture at Millstone [and later at Davis Besse] for a couple of years after recovery [restart]. On departure from Millstone he sent the following cautionary letter to Millstone management [and shared a copy with me]:

> *"This trust in management can be ephemeral...there were a number of areas volunteered by some with whom I spoke where trust was slipping. During the latter stages of restart and early recovery there was a palpable and contagious feeling of hope and genuine enthusiasm at Millstone. It seems to have dimmed since then for some reason. I wonder why?*
>
> *Never forget that previous management failed so miserably, not because they were not intelligent, and not because they did not clearly understand what successful economics looked like in a competitive environment. They failed because they were arrogant, dismissive and refused to listen to the issues and concerns of the people who make this place run."*

If you google "millstone safety culture" the first result you see should be a book on nuclear safety culture discussing the Millstone event and many others.

Pg. 100 of this book says:

> *"The fear is that a poor manager who recklessly and ambitiously tries to make a marginal plant show a profit will break down the safety culture, resulting in an accident prone environment."*

Below is a comment in an email that Edgar Schein sent me last year. Schein is an MIT Organizational Management Professor Emeritus, many years ago he coined the term "organizational culture" and many people consider Schein to be the top organizational culture expert in the world:

> *"At some point the safety assessors have to be prepared to call the problem what it is--senior executives who care more about finances than safety, middle managers who care more about productivity because that is what senior managers reward them for, and supervisors who suppress employee complaints and efforts to identify safety problems because it takes too much time to look into things and to convince their bosses about critical maintenance issues that may be surfacing. What makes safety culture so complicated is that we are trying to build safety into badly managed companies!!! What do you think about that observation?"*
> *- Ed Schein*

Schein is the leading consultant to INPO on safety culture, and is frustrated [as I am] that the NRC only focuses on safety culture for a short time after there is a major "event" and then completely forgets about it. In safety culture this is known as the "ViCE" cycle. After an event you become **Vi**gilant. Then after a while you become **C**omplacent. Then you experience another Event.

Is Millstone management [as Beck says] *"arrogant and dismissive"* do they *"refuse to listen to the issues and concerns of the people who make the place run?"* Is Millstone management [as the book indicates] *"recklessly and ambitiously trying to make a marginal plant show a profit?"* is management *"breaking down the safety culture, resulting in an accident prone environment?"* Are NRC and INPO [as Schein says] *"trying to built safety into a badly managed company?"* I think so, and I think there is a lot of evidence to support this.

Has the "backsliding" since 1998 brought the Millstone leadership team right back to where it was in the early 1990's?

Millstone Leadership During the "Dark Days"

From the NRC report:

[NRC SECY-98-090 - Selected Issues Related to Recovery of Millstone Nuclear Power Station Unit 3]

> *In late 1995, the NRC determined that since the late 1980's Millstone Nuclear Power Station had been the source of a large number of employee concerns and allegations related to safety of plant operations and harassment, intimidation, retaliation, and discrimination (HIRD) of employees. The NRC had conducted numerous inspections and investigations that had substantiated many of the concerns and allegations and had cited the licensee for violations.*
>
> *The NRC also had taken escalated enforcement action. Notwithstanding those actions, the licensee was not effective in handling many employee concerns or in implementing effective corrective action for problems that had been identified by concerned employees.*
>
> *In December 1995, the NRC established a Millstone Independent Review Group (MIRG) to conduct an evaluation of the history of the handling of employee concerns and allegations. The*

charter for the MIRG directed it to evaluate the licensee's effectiveness in addressing Millstone-related employee concerns and allegations. The MIRG was requested to identify root causes, common patterns between cases, and lessons learned and to recommend plant-specific and programmatic corrective actions.

The MIRG conducted a review of licensee allegation files, related inspection reports, NRC's Office of Investigation, and the Office of the Inspector General investigations, enforcement actions, U.S. Department of Labor actions, and previous NRC management reviews from 1985. The review included in depth case studies of selected employees' concerns and allegations to identify root causes, common patterns between cases, and lessons learned.

The MIRG concluded, in its September 1996, report, that in general, an unhealthy work environment, which did not tolerate dissenting views and did not welcome or promote a questioning attitude, had existed at Millstone for several years. This poor environment had resulted in repeated instances of discrimination and ineffective handling of employee concerns.

The MIRG identified seven, principal root causes for of the employee concern problems:

- *Effective problem resolution and performance measures;*
- *Insensitivity to employee needs;*
- *Reluctance to admit mistakes;*
- *Inappropriate management style and support for concerned employees;*
- *Poor communications and teamwork;*
- *Lack of accountability;*
- *Ineffective Nuclear Safety Concerns Program (NSCP) implementation.*

The MIRG also concluded that these root causes underscored a common theme of management failure to provide the dynamic and visible leadership needed to bring about required, basic attitude changes. None of the findings of the team were new. The problems had been identified previously to NNECO management by its own self-assessments, yet the problems continued.

If we were to ask the question: "Is the Millstone leadership team as bad now as it was in the early 1990's?" Who would be capable of answering this question?

The Five Groups That Oversee Nuclear Safety

INPO identifies the "defense-in-depth" barriers as:

- *Workers*
- *Managers*
- *Internal Oversight [the site Oversight department]*
- *External Oversight - NRC*
- *External Oversight - INPO*

These are the groups responsible for overseeing safety at Millstone, and these are the groups that can answer the question "is safety being managed adequately at Millstone today?"

In March the New London Day published an article titled: "NRC says 2009 was a safe year at Millstone" so we pretty much know what is the [official] NRC position on this subject, so lets explore how some of the other groups might answer this question.

For a very long time now, INPO safety metrics have had Millstone on the very bottom of the industry. In January, the [overall] INPO rating for Millstone 2 was dead last in the industry, equivalent to an academic score of "F minus declining."

Every year, INPO gives each site in the country a [safety] rating of 1-5. INPO keeps the scores secret [even from it's own staff] and once a year rolls out ratings to the CEOs of the nuclear operating companies at what is called the "INPO CEO conference".

The NRC regulatory authority comes from federal laws [NRC can put people who do not comply in jail]. INPO is a "communitarian regulator" and relies completely on CEOs wanting to "do a good job" and [as there are public safety implications] wanting to "do the right thing". INPO wants CEO's who get an INPO 1 rating to be proud, and CEO's who get an INPO 3 rating to say "what the heck is going on here, why am I not a number 1?"

Consultants who [for a living] assess safety culture in the industry have noticed a disturbing trend since deregulation toward "minimal regulatory compliance". Many sites have been doing the bare minimum that the NRC ROP requires, not doing enough to keep INPO happy, and completely dismissing the concerns of staff.

What led to the Millstone shutdowns in 1996 was that Millstone leadership had implemented "minimal regulatory compliance" in the mid 1980's. From the [narrow] perspective of responding to the competitive pressures of deregulation, Millstone leadership was at that time [in a manner of speaking] "way ahead of it's time".

Sites that do an adequate job of minimizing the chance of an accident receive an INPO score of 2. Sites that do an above average job receive a 1, sites that do a below average job receive a 3. The INPO scores of 4, 5 are really only there to make a score of 3 appear to be average. If INPO denies this, ask them to tell you how many sites currently have a score greater than 3, and how many sites currently have a score less than 3.

Millstone is currently a 2 [declining] and the NRC senior resident told me that he feels the staff reductions will push Millstone to an INPO 3 rating. If Millstone does not receive an INPO 3 rating this year, I would not be confident about safety management at Millstone, I would be concerned about the efficacy of the INPO assessment team.

In February the Millstone Oversight department wrote a condition report with a simple four word title: "Millstone Leadership Is Ineffective" listing multiple examples of inconsistent compliance with procedures and repeated loss of configuration control. These are the same issues that NRC identified in 1996 that precipitated the shutdowns.

A number of employees [workers and managers] have complained to me that it feels like Millstone is headed back to becoming one of the worst leadership teams in the industry, or is already there.

Is safety being adequately managed at Millstone right now?

One Department Where Safety Is Being Understaffed Right Now

I was a long time electrical project engineer [I led one of two engineering teams that replaced the Millstone reactor head in 2005, a very large 60M project] I also worked for a time as an Oversight assessor, a human performance supervisor, and for the last two years before retirement in March I worked in the Organizational Effectiveness department.

In the Organizational Effectiveness department I worked as the INPO SEE-IN coordinator [making certain the site properly evaluates and learns the lessons of TMI, Chernobyl, Davis Besse and many less significant events].

With regard to the impact of the March worker terminations, the only department that I can speak to is the one that I worked in [the Organizational Effectiveness department] but I would think it is likely that the March terminations created unsafe [understaffed] conditions in some other departments, possibly many other departments.

Safety is not staffed adequately right now in the Organizational Effectiveness department. One of my family members happens to be an excellent juggler, and can do many amazing things juggling three balls. However, give this person four balls to juggle and within seconds one of them is dropped.

My brother is a manager at a large insurance company, and part of what he does is to look at insuring event risk. I sent him a draft of the paper you are reading and he sent me a [very recent] Wall Street Journal article on staff cuts at the Tulsa police department [and the affect on safety in the community] called “In Lean Times, Police Cuts Spark Debate Over Safety”.

Here is an excerpt from the article:

> *The debate will come to a head next month when the city council sets a budget for next fiscal year. Officers are in no mood to reconsider wage or benefit cuts. They say they're hoping a public outcry will force the council to bring more officers on board.*
>
> *But no outcry has materialized. Everyone these days is getting by with less. The police should be able to do it, too, said Twan Jones, a 38-year-old community activist. "They have people being paid nice salaries to figure it out."*

I replied to my brother that [in my view] this is what is happening right now at Millstone “just cut staff and figure it out":

> *Dean,*
>
> *Often it comes down to how many balls can an average person be reasonably expected to juggle? Our sister can do amazing things with 3 balls, but always struggles with 4 [she soon drops them].*
>
> *There seems to be a kind of a "staffing Peter's principle" effect right now that is being widely socially accepted [even for safety functions]. It holds: "keep cutting the staff and keep tasking the remaining staff with more until it becomes [painfully] obvious that everyone is struggling to doing their job effectively, and that is your optimal staffing level"*
>
> *This can work surprisingly well for managers because: 1) you are obviously a superior manager [and deserving of a bonus] as you have demonstrated the ability to do more with*

fewer resources than any of your predecessors and 2) as a manager you can produce evidence on almost any of your employees that they have been "underperforming" which empowers you to eliminate [terminate] any of them that you wish.

I would say this is a very unhealthy situation for the maintenance of safety and quality. The root of the problem is really the lack of development of any [clear objective "transparent"] quality management criteria. Since "quality" is defined as "what the customer will accept", if the "customer" [in this case a member of the public who wants more services but does not wish to pay more taxes] ignores the quality issue and says: "the police have highly paid experts, let them figure it out" the situation in Tulsa is unlikely to improve.

- Dave

Evidence of Under-staffing Safety in the Organizational Effectiveness Department

When I heard that Millstone had laid off 50 workers in March , I was surprised. When I heard how many staff had been reduced from the department I had just left [Organizational Effectiveness] I was concerned, because the department oversees some very important safety functions such as:

- *Organizational safety culture and human performance*
- *Leadership effectiveness [what INPO calls "professionalism"]*
- *The CAP - Corrective Actions Process [what NRC calls "the window to the safety culture"]*
- *Evaluation of the INPO "SEE-IN significant event" documents that teach the organization how to avoid accidents*
- *Reports of Millstone events published to help other sites avoid similar problems [called Operating Experience] and processing of similar reports that come in to help Millstone*

In 2009 the NRC senior resident inspector told me he would like to see the ORE function "beefed up" . The NRC inspector wanted the ORE manager elevated to the director level, so management would finally "listen" to leadership improvement recommendations that ORE had for years been trying to implement. Many others [including myself] felt the efficacy of the ORE department needed to be "beefed up" [I felt significant improvements were needed in the areas of safety culture management and leadership efficacy].

Instead of being "beefed up" in March the ORE staff was cut in half. But this is just the opinion of an industry safety culture expert, an NRC senior resident inspector, and a smattering of various Millstone employees [workers, managers, Oversight assessors etc.] right?

Well, not exactly.

One of the Virginia Dominion ORE managers was visiting the Millstone ORE department a couple months ago. Concerned about planned cuts in ORE department staffing, in 2009 he took advantage of a trip to INPO and asked a room full of his industry counterpart ORE managers "what did they believe was the absolute minimum staffing level for an ORE department to do it's job adequately". He gave me the staffing number, and Millstone is now at about 50% of that number.

When a roomful of people with expertise in Org Effectiveness say that staffing is half what is minimally needed, and the tasks are [what INPO says are] needed to avoid nuclear accidents, I don't care what the NRC ROP says, nuclear safety is under-resourced.

I strongly recommended to the Virginia ORE manager that he bring his concerns to the top of the Dominion organization, that he sit in CEO Tom Farrell's chair if needed to make the org listen. He

said “I can’t do that”. Here I see some apparent disconnects with the Dominion core values of “Safety Ethics Excellence and One Dominion”. I think that “One Dominion” means there is supposed to be a premium put on organizational alignment, I think this was not achieved in this case.

It probably didn’t matter, because Farrell probably would not have listened [fully and carefully] to the safety concern of this manager.

Why do I say this? Because last year I brought a concern to Farrell myself.

Dominion is one of the largest energy companies in the US. In 2009 CEO Tom Farrell was named six-sigma manager of the year for his cost control abilities. This was not “Dominion six sigma manager of the year” this was global. 43 companies around the world. The CEO of the company that operates Millstone is considered by some to be the top cost-cutting executive on the planet.

So after failing [I counted] nine times since 2000 to get this concept through to my Dominion nuclear “food chain” since the concept involved six-sigma, I sent an email directly to CEO Farrell [whom I had briefly met on vacation a couple years earlier] and I copied the COO [with whom I have had a number of conversations] explaining that I studied six-sigma fairly extensively in the masters program I took, and that six-sigma actually began as a quality management process, and that some industries like the medical industry [who by necessity are a little more evolved in safety management than is nuclear] actually use six-sigma for safety culture quality management.

Mr. Farrell did not reply, but I did received a call from Dominion’s top nuclear manager [CEO of generation] who growled “Mr. Farrell does not require any spurious email messages from you.” I thought it was an interesting reply, so I wrote it down and dated it, and that was pretty much the end of the conversation [and my safety enhancement employee concern].

Around the time the CEO of generation contacted me another interesting thing happened. I had saved my email to Farrell in a folder titled “culture issues” when the CEO of generation called, I went to retrieve it but it was gone, like someone in IT had expunged it from my files. I noticed that COO has replied “thanks” [possibly without reading the message] and his reply contained the full body of my message.

So I saved it by forwarding it to my home email, and put the COO reply message into my culture folder and watched what happened. The next day it was gone too. I had previously emailed Farrell about some pollution controls at Dominion’s coal plants [an area where Dominion and Farrell are doing a fine job] but those messages were still there. What was going on I wondered?

Oh well, no big deal [I guess]. It’s not like I was complaining about safety at some coal mine in West Virginia.

Safety Minded Workers Were Terminated, Safety Minded Supervisors Were Eliminated

In March three workers in ORE were involuntarily terminated, and two department supervisors who had “stood up for safety” were reassigned.

One worker had been working hard to make more managers to go out and do more inspections to improve safety and quality [most sites do much more of this than Millstone] this worker was laid off.

One of the workers had been complaining very vocally about the [double standard of] managers being exempt from the layoffs [this worker was laid off].

The third workers had been working very hard to get management [especially the training department which for some reason does a particularly bad job of this] to properly review and implement the recommendations of INPO most safety significant documents [called the periodic SOERs - significant operating event reports]. She would flag the deficiencies, I would follow up on them.

For example, one of the SOERs is on the lessons of Chernobyl. The training department is supposed to make sure all managers are trained on Chernobyl, what caused the event, what managers can do to make sure similar things do not occur at their plant.

Here is an email message I received from a Millstone trainer in February, about a month before this worker was terminated:

> *Dave,*
> *We have not done [Chernobyl training] in the last 3 years as part of the continuing training. The real question is where, who and how do we make these commitments, and put them into a system that makes people aware of them? To the best of my knowledge there appears to be no method, other than tribal knowledge, of these commitments and their recurrence.*
> *Any help in this area would be greatly appreciated.*
> *[Senior Millstone Trainer]*

I have no idea if this particular issue was ever properly addressed, but this is one example of the kind of things that Organizational Effectiveness does.

Another example of what Org Effectiveness does is to ensure that the site does proper evaluations of the INPO SEE-IN [significant event evaluation and information network] documents that help plants evaluate whether they are properly protected against significant events that have occurred in the US [and worldwide] nuclear industries.

I found that some people in the Millstone Operations department would do a very good job reviewing these documents, and others would do a terrible job. I discovered that the Dominion OE program did not include the proper INPO guidance for evaluating the "corrective actions" sections of the SEE-IN documents [which often accounts for about 50% of the review].

I contacted INPO and a performance improvement manager emailed me that, yes I was correct, Dominion should be performing these evaluations. I also received an email from INPO from a long time [I believe retired] Dominion employee [now working at INPO] saying: "the corrective actions section does not need to be reviewed, we have never done this at Dominion".

I would say if the entire Dominion NBU [nuclear business unit] has never done this, and the NBU is interested in optimal accident prevention, the NBU should go back and perform [and also document] this review [all plants, all applicable SEE-IN documents]. To do this properly, the NBU would need to go back and review what INPO has put out since 1980.

The Two Organizational Effectiveness Supervisors Who Had "Stood Up For Safety" Were Reassigned

Two [what I would call] "safety conscious supervisors" [unusually safety minded] were reassigned.

These supervisors had "pushed back" on some significant safety issues, and in March were reassigned out of the Org Effectiveness department. No supervisors were laid off, so they could not be terminated but they could be reassigned.

The issues they had "pushed back" on were configuration management problems [the kind of problems that caused the Millstone shutdown event] and corrective action problems [the kind of problems that led to the Davis Besse event].

Recall the safety Conscious Work Environment definition:

> *The Commission's policy statement describes SCWE as "a work environment where employees are encouraged to raise safety concerns and where concerns are:*
>
> - *Promptly reviewed,*
> - *Given the proper priority based on their potential safety significance, and*
> - *Appropriately resolved with timely feedback to the originator of the concerns*

The Fire Door Issue

When a fire door is found broken, most nuclear plants fix the door immediately, and while waiting for maintenance to come, someone stays at the door [called a "fire watch"] to make certain it closes properly. It costs money to have people standing at the doors, and it forces maintenance to fix the doors a little quicker than they might otherwise prefer [it interferes with other scheduled work].

The CNO gave Millstone management a "directive" to "get rid of these [expensive] fire watches" and fire protection engineering "got right on it". To accomplish this, FPE had to eliminate the requirement for fire doors to "automatically close and latch".

The site fire marshal [the fire marshals at the Virginia plants, a local town fire marshal who worked at Millstone, and a state of CT fire marshal] didn't like it. They all felt that a fundamental rule was being violated, and that fire doors needed to "automatically close and latch".

I had identified three NRC guidelines that appeared to me [an engineer, but not a "fire protection" engineer] were being violated. I copied the specific paragraphs and highlighted the specific words in three NRC fire protection guidance documents and emailed the text with my concerns to the fire protection supervisor [and the responsible manager, director, and Dominion Chief Nuclear Officer].

No one ever responded [definition of responsible: response-able] and explained to me specifically how Millstone was in compliance with these three NRC guidance documents.

The CNO emailed me back saying that he "didn't intend that Millstone should violate NRC guidelines to accomplish this" but he never instructed the leadership team to respond to my compliance questions, and no one ever did.

Seeing numerous repeated objections from some fire marshals, one of the Organizational Effectiveness supervisors wrote an email to management [I was copied] suggesting that fire protection engineering may be moving too fast, and pushing the change through without carefully considering the concerns of employees or the fire code.

In spite of this, the change was pushed through over the continuing objections of some employees. The change saves Millstone about 50K a year, an amount equivalent to about a half hour of on-line production. What this change cost in terms of lost [employee and stakeholder] trust is more difficult to calculate.

Loss Of Configuration Control – The Issue That Led To The 1996 Millstone Shutdown

Poor configuration control [caused by a weak safety culture] was the reason NRC shut down Millstone in 1996. For over a decade the NRC had been asking NU [Northeast Utilities] to address large backlogs of document updates. NU had cut staff and did not have the resources to address it, and instead of hiring staff [which NU refused to do until the NRC shut down all four CT plants] NU just kept promising to "get to it as soon as possible".

The same supervisor who had written an email to management on the fire doors, now wrote another one complaining that CRT [condition report team] managers were "not showing up" to analyze equipment and configuration issues [I was copied]something INPO had complained about in 2006. Management inattention to configuration issues had led to the 1996 shutdowns.

The letter indicated it was not the first time that he had complained to management about this issue. After sending out the letter this supervisor said to me: "I am not going back to 1996 without at least complaining about it."

The other ORE supervisor had discovered that this same group of [CRT] managers had been downgrading the [safety?] significance of condition reports without discussing it with the employees who had initiated the report. He told the group they must stop this (highly unethical) practice, and threaten to resign the group unless they stopped it.

In March, both of these supervisors were reassigned in March. Will the CRT managers resume these [unethical unsafe] practices? There is a lot of time and money to be saved if they do. The way it works it this. The issues and concerns that employees report in the CR [condition report] process are given a "we will do as soon as possible" priority, meaning as soon as the resources become available we will address this.

Then Management resources the departments at barely [sometimes below] what it needed to get the core work done. So the employee issues reported in the CR process are never actually addressed.

What should be happening is "safety conscious" supervisors willing to "stand up for safety" should be moved up, and managers not willing to do so should be moved out. What is happening is employees who push back do not become managers, and managers who [continue to] push back are sidelined, held back or reassigned.

Other Examples Of Understaffing And More About Worker Eliminations

Millstone has been perennially understaffed in the electrical maintenance area and this causes various problems during outages. Understaffing in Electrical Maintenance precipitated the 2009 arcing event, and another event during the fall 2009 Millstone 2 outage that I have not yet mentioned.

Because of inadequate electrical maintenance test resources to do what is called "redlining" [verifying wiring after an electrical design modification] a motor that Operations dept needed that was holding up outage work. The wiring changes had not been "redlined" [verified] and Operations asked the engineering manager if he could release the motor for operation regardless.

The design [electrical modification] supervisor heard about the request before it traveled to the design [electrical engineering] supervisor for approval [the elec eng supervisor is the same

supervisor who had approved the modification that violated switchyard work procedures and led the arcing event].

The modification supervisor got to the engineering supervisor before the engineering manager, and implored him "not to cave". He implored the engineering supervisor to "stand up for following procedures and just say no".

Instead, the engineering supervisor "caved" and allowed the motor to be released for operation [after checking that there was a replacement motor in the warehouse in case the motor "blew up"]. What happened was that the motor was miswired and when operated ran backwards. It cold have "blown up" or tripped a circuit breaker, or it could have been wired without proper [personnel safety] ground protection, or it could have been wired [unlikely but possible] so the shell of the motor was energized and it could have become a worker electrocution hazard.

When the modification supervisor found out that the engineering supervisor had released the work [against his specific advice] he was quite angry. I said to him: "do you think the engineering supervisor has a problem pushing back to management, a problem standing up for safe work practices?" He said: "not just a problem, a BIG TIME problem". He had [I believe] other examples that relating to this engineering supervisor.

People who "push" or "push back" for safety at Millstone do not get promoted, and if they keep pushing back, they somehow get eliminated. NRC knew in 1996 this was a widespread practice at Millstone [about 14 reports said this] so why anyone would think this would simply go away without institutionalizing [again as many experts recommended] robust safety culture management is what is sometimes called "magical [or wishful] thinking".

I had a [well deserved] reputation for "pushing back" at Haddam. I was terminated in 1994 [I believe it was for "pushing back"] and I filed a worker discrimination complaint identifying two managers that I felt had taken unethical [unsafe] actions and discriminatory actions against me.

During the 1996-1998 Millstone recovery, both of these managers were themselves terminated for [unrelated] unethical [unsafe] actions and I was rehired. I worked in Engineering for a couple years, then Oversight, then back to Engineering again. When I went back to engineering, I reported to the "never push back" engineering supervisor mentioned above [not because he hired me, but because my rotational assignment in Oversight had ended]. This was not a very "good fit".

Something a "never push back" supervisor does not want is a "push back whenever appropriate" employee working for him or her. When the old NU pay grades were being converted to new Dominion pay grades, this supervisor [ignoring a Dominion executive level memo] converted me to a lower pay grade.

I complained to HR who said they could correct it, but it was up to my supervisor. He said "don't worry about it, promotions can come at any time" by this I believed he meant he would soon be promoting me to the correct level.

For a while he implied if I worked hard I would soon be promoted. Then I "pushed back" on a piece of the reactor head project. During recovery [to appear as "safety minded" as possible and secure restart] Millstone had promised NRC to redesign reactor temperature instrumentation on the reactor so it would be less likely to fail in the event of an accident.

After restart, Millstone said "we don't want to do this, too much work, too much radiation exposure" and the NRC said OK, forget it".

Then while designing the new reactor head instrumentation I came across the initial promise to NRC and said to my supervisor: "you know, there is no radiation exposure from a new reactor head, and we can are doing a complete wiring redesign anyway, we can do the wiring piece no exposure no extra expense, it improves safety, and I think we should do it".

My supervisor knew the NRC would want this done, so he agreed. The wiring was no extra money, but the software change [alone] was 300K, and it required a lot of [safety analysis report and design document and training document configuration] changes.

After this, my supervisor seemed to look for excuses to criticize my work. He told me I would probably never be promoted, and suggested that I could be a "star" in other departments. Why would he say I would likely "never be promoted" [for years he had been giving me the highest possible "safety" ratings, that indicates what a safety attitude gets you] why would he say I could be a "star" in another department but not engineering? I mentioned this to a friend who used to be a Millstone manager. He said: "I think he [your supervisor] tipped his hand".

I had been similarly held back at Haddam and it appeared that I was now making less money than any other engineer at Millstone with my education, experience and record of performance [a history of large complex engineering projects being run well and completed on time].

So I took a job in Organizational Effectiveness where the hiring supervisor said he could not understand why I had not already been promoted, but would work to promote me ASAP. Then when he was putting together the paperwork, he said I needed two good performance evaluation in a row, but my previous supervisor [perhaps to justify why I had not already been promoted] had told him [verbally] I was late on some assignments.

I checked with the designer with whom I had worked all my projects that period, no assignments had been late assignments, in fact they all had all been issued on time or ahead of schedule. I told my ORE supervisor the lateness was a [complete] fabrication, but he said sorry, he could not promote me, and did not want to get into any arguments with my former supervisor.

The ORE supervisor then took another position [entered operator training school to be groomed for a manager position]. Although the newest member of the group, due to my experience and demonstrated abilities I was made the acting ORE supervisor for the first quarter of 2009 until a new supervisor was hired, whom I then helped to train.

I let the new supervisor get settled for about a month then asked him to promote me. He said "well, you have to give me evidence of exceptional performance".

I said: "I have been an ORE INPO coordinator for over a year now and [using Dominion's own quality metrics] am currently ranked #1 in the industry by INPO and have been for most of my time in this position [but he still did never did "get around" to promoting me].

When the ORE manager discriminated against me last spring [told me I was not allowed to call NRC during business hours, implied the CNO was angered by my previous call to NRC] the ECP manager asked about other issued that bothered me and offered to have my "continuing non-promotion" issue investigated, and I accepted.

Millstone then hired an ECP expert from Texas to interview a bunch of people. He told me that it was a great compliment to me that everyone he had interviewed said: "Dave is a great guy, a great engineer and a great guy to work with".

This expert from Texas found that yes, it appeared I had been promoted less [and was being paid less] than any other engineers at Millstone who were doing similar work, but that the opinion of a supervisor is a powerful thing. The ECP expert said: "if you could just give me one thing, one concrete example where you were discriminated against".

I said: "what about my supervisor saying I was late on my projects, you can check the issue dates against the project schedules, you can interview the designer with whom I worked who should be able to verify all the projects I worked on during this period came in ahead of schedule, this will verify that what the engineering supervisor told the ORE supervisor was a complete fabrication".

The "ECP expert" then said: "Well, I would need more than just that, a lot of things go into what a supervisor looks at, to argue against the opinion of a supervisor you need more than that".

Then I said: "you know, it doesn't matter what I say. It is like the parable of the elephant. You refuse to see the wider picture and see the elephant standing in the middle of the room. I describe a leg, you say it might be a leg or it might be a tree. I describe the tail, you say it might be a tail or it might be a rope. I can't make you see what you are unwilling to see."

He then appeared offended and said: "I have been doing this for forty years, I am a professional and have to make my decision on facts, and I can't go on opinions alone, but I see no reason why you shouldn't be promoted right now".

And that is how we left it in mid 2009, but as I said, Millstone management "never got around to it" and I retired in March 2010. I now have to live on a pension significantly lower than any other "engineering specialist". I think to make me "whole" my pension should be calculated using a salary value equivalent to the highest paid engineering specialist at Millstone [my actual pension would then be about a third of that amount, instead of being calculated from a salary less than any engineer retiring from Millstone in March].

Another Example Of "Raise Safety Issues And Face Elimination"

When I was initially rehired, before I left engineering and went to Oversight I was assigned to a supervisor who was not merely uncomfortable with knowing I was an engineer who had "pushed back" at Haddam. He was a "golf buddy" who periodically played in foursomes with the two managers I had named in my complaint [who, as you might imagine, were not "great fans" of mine].

This supervisor did not just dislike me, this supervisor hated me.

He assigned me a project to replace some reactor protection system cables, with a schedule that no [responsible] engineer could possibly meet. I said: "no one can meet that schedule". He said: "I would like to try to meet an aggressive schedule, and I think we can if we do not make a 'science project' of out this."

I said I need more time. He said "how much more time?" I told him and he said OK.

Then I completed the project [within the time I had said I needed] and he wrote in my performance evaluation that the project was late. I complained, and I said I thought we had discussed this. He said "I don't recall that". I complained to the manager of engineering [now the engineering director at Millstone] and he just said "it is just your word against your supervisor, there is really nothing I can do, sorry". I mentioned what had happened to a coworker, who said he had also brought a similar issue to [this manager]. He told me: "save your breath, there is nothing you can do".

At this same time NU was in the process of selling Millstone to Dominion. I had raised an issue about a [early retirement pension benefit] that NU had and that Dominion did not want to pick up. A lot of employees wanted to keep this benefit, and I raised this issue [in an open forum at an "all hands" meeting] with the [Dilbert Catbert] HR specialist that NU hired to handle the transition. He responded: "read my lips, you are not getting the "rule of 85".

So I cofounded an employee organization called MSEA [Millstone Station Employee Association].

300 employees [including many in management] contributed $300 each [creating a 90K dollar slush fund] which I used to hire actuaries and pension experts to represent the interests of employees. The [really nice ethical] long time Millstone HR manager also contributed [but said he would not be attending the MSEA meetings because… well you know…].

We also formed a state of CT senate subcommittee. NU then asked me to join the divestiture team and sit in on meetings as the "employee representative". Eventually Dominion created a special "Millstone supplement" to their pension plan, protecting the "rule of 85". This was a great benefit to Millstone in the recent staff reductions, as it allowed many more people [such as myself] to accept the early retirement package.

Back to the supervisor who did not like me, part way through my performance period this supervisor created a sample performance review and showed it to me. It had my performance being rated very poorly because [it said] I had been spending a lot of time on pension issues.

The supervisor then suggested [as an alternative to a second consecutive poor performance review which, you know, could be used as grounds for dismissal] that I accept a [year long] rotational assignment to Oversight.

I said: "I will think about it". The supervisor then said: No, you are not hearing what I am saying, now listen carefully this time: "I THINK … YOU SHOULD CONSIDER … ACCEPTING… A ROTATIONAL ASSIGNMENT … TO OVERSIGHT". I said: "on second thought, that does sounds like a pretty good idea, I think I will do that".

And I did, and it turned out to be a wonderful experience. I still have many friends in Oversight, and when I retired, I was invited to attend the Oversight retirement party [in addition to the ORE retirement party] as an "honorary Oversight retiree".

The Oversight department actually acts functions like a mini "NRC" or "INPO". When I would talk about the need for safety culture quality management, almost everyone in Oversight would understand [and concur with] pretty much everything I was talking about.

There are people in Millstone Oversight right now [I have been told] who would love to take my [highly developed] culture management tool and use it to "clean up the town" at Millstone [to ensure "leadership professionalism" vertically and horizontally throughout the organization].

This is something that NRC might consider directing Millstone to do as a potential longer term "culture fix".

The "Vigilance Complacency Event" Cycle [ViCE Cycle]

There are an unusual [I hope this is unusual in the nuclear industry] large number of managers at Millstone today who are not willing to "push back", not willing to make an ethical stand, not willing to "stand up for safety". Some reasons are:

- members of the historically bad 1996 management team have been promoted to positions of greater authority at Millstone
- after restart in 1998 the NRC never established [required, institutionalized] the methods experts say are needed to maintain a healthy culture
- the ViCE cycle factor [time dependant loss of safety vigilance, loss of organizational knowledge]

With regard to the "ViCE cycle; unless robust culture [training qualification assessment management regulation] is institutionalized, it takes around 17 years [give or take, sometimes sooner] from the time a significant event occurs for an org to lose it's "safety vigilance" and open the door to another [often similar] event.

Examples:

- The NASA challenger accident occurred in 1986, 17 years later the Challenger accident occurred in 2003.
- An event foreshadowing TMI occurred at Davis Besse in 1977, and 17 years later in 2002 the acid hole event occurred.

ViCE Cycle - What About Chernobyl?

In 1975 there was a partial meltdown in Leningrad reactor Unit 1 [a design identical to Chernobyl] that released 1.5 MCi into the environment, then the Chernobyl event occurred in 1985 just 10 years later. However, a "post glasnost" book by a soviet engineer indicates there may have been as many as 10 serious Soviet accidents in the 19 years before Chernobyl that were "covered up".

Unger 1994 "Controlling Technology – Ethics And The Responsible Engineer":

An even more basic factor is the secrecy and the restrictions on dissent that characterized Soviet society prior to the Gorbachev era, which commenced just before the Chernobyl disaster. Information about previous accidents at Soviet nuclear power plants had been almost totally suppressed, becoming available in bits and pieces only after the advent of *glasnost*. Not only was the general public not informed but even technical people in the industry were kept in ignorance. The government claimed a virtually perfect safety record in the nuclear power field. The falsity of that claim is exposed in a recent book about Chernobyl by Grigori Medvedev, a senior Soviet nuclear engineer. He summarizes 10 serious accidents between 1966 and 1985 and states that they represent just the tip of the iceberg. Included is a 1975 partial meltdown in a Leningrad RBMK reactor that released 1.5 MCi into the environment, an incident at the Chernobyl No. 1 reactor in 1982 in the course of which repair workers were exposed to severe radiation and radioactive material was released near Pripyat, and a relief valve failure at the Balakovo pressurized water reactor that took the lives of 14 people in 1985.

Related to this is the 1957 disaster at Kyshtym in the Ural Mountains. A major explosion (chemical or steam) occurred at a site used for the disposal of nuclear wastes resulting from atomic bomb production. It distributed tens of millions of curies of strontium-90 and other radioactive materials that necessitated the abandonment of some 1000 km^2 of land in the area, and the

ViCE Cycle - What About Millstone?

At Millstone in 1993 a "Davis Besse like" event occurred that was close to becoming a "minor TMI like" event, 16 years later in 2009 a similar [but much more minor] event occurred.

In this case it was not a leaking CRD causing a hole in the reactor, but a leaking reactor coolant valve. Instead of shutting down and fixing the problem, to keep the plant running Millstone management kept tightening valve bolts, drilling holes in the valve [to inject sealant] and "peening"[hitting it over and over again with a pneumatic hammer]. Like at Davis Besse, workers reported a suspected "through wall leak" to management [which would have required an immediate plant shut down] but management was "locked on" to fixing the leak, and the process continued until a bolt snapped off.

Had the valve integrity failed during this process [a very real concern] it is probably that local workers would have lost their lives, and the plant would have experienced a LOCA [an "unisolable" loss of coolant accident] or a minor TMI type event. It is likely Millstone would have been able shut down the plant without suffering serious core damage, and after a long shutdown, some significant cleanup efforts [and significant loss of public trust] would have been able to restart.

So Millstone 2 had this event in 1993, and the lesson Millstone was supposed to learn was:

> "*…not to emphasizing production over nuclear safety. A key lesson was the importance of senior nuclear managers periodically emphasizing to personnel that nuclear safety considerations always take priority over production goals"*

Then last fall in 2009 Millstone leadership repeated the same kind of [management] error that precipitated the 1993 event. To save a little production time, managers violated switchyard work procedures [emphasized production over nuclear and personnel safety] and scheduled maintenance electricians to work on a live [345,000 volt] switch outside of the refueling outage window [more on this later].

The Serious Nuclear Event That No One Outside Of Ohio Knows About

What the ORE supervisors were trying to get the Millstone org to address were the same kind of MO [managerial organizational] deficiencies that led to the Davis Besse event.

Everyone in Ohio knows about the Davis Besse event, but it happened within 6 months of the terrorist attack on the World Trade Centers and so was bumped off most media headlines by the continuing 9/11 coverage. This is why there is a more positive public perception of the nuclear industry country-wide than there is in some localized areas [such as Ohio].

A system engineer had made multiple requests for management to approve the installation of access holes so the top of the reactor could be properly cleaned and inspected. The holes were not approved and the reactor could not be properly inspected. Over the years an [undetected] reactor coolant leak ate through six inches of carbon steel making a "football sized" hole in the top of the reactor leaving a thin [about the thickness of a quarter] stainless steel liner [bulging from the 2000 psi reactor pressure] ready to burst at any moment.

Some experts at NRC feel Davis Besse may have been a few months away from a TMI type accident or worse. UCS Lochbaum feels if the liner had burst, it could have stopped the control rods from dropping resulted in a large [Chernobyl-type?] release of radiation. If there were no [other] system problems and cover-ups I believe the accident would probably not have exceeded TMI, which did

not kill anyone or [as far as anyone knows] harm anyone or the environment. This cannot be said for coal power, but that is not the subject of this paper.

The point is, to save money and to keep operating, management covered up and ignored safety issues raised by workers, and this is what precipitated the 2002 Davis Besse event [more on this later].

How Well Has Nuclear Historically Been Managed In Connecticut?

INPO is a secretive organization, so people in CT might be surprised to learn that three of the 24 US nuclear "events that shaped the industry" occurred here in CT. Some of these 24 were very close to becoming a TMI type accident themselves [one was the 1993 event at Millstone].

Actually, there were four of these events in CT, but NRC covered up what was probably the most significant one. As far as I know, the groundwater event at Haddam was the most significant uncontrolled undocumented releases of radiation to the environment that has occurred at any US nuclear plant.

You can read about it here.

> http://www.nytimes.com/1997/09/17/nyregion/hartford-says-utility-hid-nuclear-contamination.html?pagewanted=1

As the Haddam plant was being decommissioned, and the unreported contamination was discovered, NRC did not pursue criminal charges [did not prosecute any NU management] I think for a very pragmatic reason: the NRC resident had also "looked the other way" for many years.

The political cover up was a good deal for NU managers, who were able to move on to managing at Millstone, instead of being banned from the industry and facing criminal prosecution.

Here is what the NRC task force investigation reported:

> *The violations associated with the November 1996 contamination event, which are described in the Notice, created a substantial potential for exposures in excess of regulatory limits. Therefore, these violations are classified in the aggregate as a Severity Level III problem in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions" (Enforcement Policy), NUREG-1600. In accordance with the Enforcement Policy, a civil penalty is normally considered for a Severity Level III violation or problem.*
>
> *However, I have decided, after consultation with the Director, Office of Enforcement, to exercise enforcement discretion in accordance with Section VII.B.6 of the Enforcement Policy and not propose a civil penalty for the violations associated with the contamination event. The decision to exercise discretion was made given that (1) the violations occurred prior to the decision, in December 1996, to permanently shutdown the Haddam Neck facility; and (2) you were issued a $650,000 civil penalty on May 12, 1997, to address the performance problems that existed prior to the decision to permanently shutdown the facility, and which indicated generally poor performance over a period of time.*

So the NRC slapped NU with a penalty of less than one day's revenue at the average nuclear plant, and said that since the plant is shut down anyway, no harm no foul.

What had happened [which is common with significant events] is that a combination of smaller events had aligned. Poor foreign material control during refueling had allowed metal shavings to fall into the reactor. Over the 18 month operating cycle the shavings had chewed holes in the cladding of 85% of the fuel rods, causing massive contamination of the reactor coolant [creating what one might call PU soup – "plutonium uranium" soup].

The reactor piping and reactor containment boundaries were both still intact, so the public was adequately protected from radiation, right?

Well, not exactly. Remember Dave Lochbaum's comment:

> *It seems only a matter of time before the initiating event wheel, the equipment wheel, and the human performance wheel stop in a combination that produces another accident.*

Many years ago tritium had contaminated a couple of Haddam potable water wells, indicating a large plume of groundwater contamination was coming from somewhere, probably a spent fuel pool or refueling water tank leak.

Not a really big deal until you combine it with the [1989] worst fuel damage event in the history of the industry. You put the PU soup into the [leaking] spent fuel pool, the PU soup leaks into the ground, the plume eventually reaches the discharge canal [and the CT and Salmon rivers].

So Haddam managers immediately reported this to NRC, shut down the plant, and called in the big construction equipment to fix it, right?

Well, not exactly.

It would have been nice if the cognizant Haddam managers had [at minimum] halted the [common] practice of allowing fishermen to come onto plant property and fish from the discharge canal. The below guidance on chemicals [can build to thousands of times higher in fish] I believe applies to radiation as well. My understanding is that as many as 15 soil or groundwater radionuclides were found at levels 10 – 20 times federal limits in wells near the discharge canal.

If fisherman did take any bass, carp or catfish from the canal [or the CT river or the adjacent Salmon river] hopefully they did not feed them to small children [or pregnant women].

You can access the CT "safe fishing guide" here:

http://www.soundkeeper.org/uploads/fishweb02.pdf

> ***How Do These Contaminants Get Into Fish?***
> *Mercury and PCBs can build up in fish to levels that are thousands of times higher than in the water. These contaminants enter the water from [chemical spills or mercury]. You are in the High Risk Group if you are a pregnant woman, a woman planning to become pregnant within 1 year, or a child under the age of 6. If you are in the High Risk Group, you should not eat certain fish at all*

Since the radiation exceeded derived concentration guideline levels (DCGLs) for 15 soil or groundwater radionuclides, this triggered an EPA "superfund" site evaluation which was performed at Haddam in 2004.

Due to the severity of the soil and groundwater contamination [and the unpredictable potential of it leeching into the CT and Salmon rivers] the NRC task force [working with EPA] recommended continuing radiation monitoring for the Haddam site. However, this task force recommendation was dismissed by the NRC commissioners.

The commission also deleted [from the draft 2006 abnormal report to Congress] the task force conclusions that "unplanned and unmonitored radioactive releases could [continue to] migrate off site … without detection."

Here are changes the NRC commission made before the report went to Congress:

> *The report's most significant conclusion was that, although there had been industry events where radioactive liquid was released to the environment in an unplanned and unmonitored fashion, there were no instances identified where the release had an adverse impact on public health and safety. ~~The task force also concluded that under the existing regulatory requirements, the potential exists for unplanned and unmonitored releases of radioactive liquids to migrate off site and into the public domain without detection.~~*
>
> *Indeed, the maximum potential dose in all of these incidents, a dose unlikely to have been received by any person outside the plants' boundaries,* ***was less than the dose*** *an average individual in the United States receives in one day during the course of routine activities from naturally occurring radiation sources (such as the radium-226 in the building materials of the Capitol) and was well below the regulatory limit for planned releases.*

The NRC commission's claim that the radiation exposure from the groundwater event at Haddam was less than spending one day at the capitol is false. This argument comes from what is called "junk science", you can read more about it here:

http://mediamatters.org/research/200508120001

> *In an appearance on Fox News' Special Report with Brit Hume, Cato Institute adjunct scholar Steven Milloy cited his study of radiation levels at the U.S. Capitol Building to argue that the health safety standards recently imposed on the proposed Yucca Mountain, Nevada, nuclear waste repository are unduly stringent. But Milloy's findings -- that the radiation exposure at the Capitol is far higher than it would be at the Yucca Mountain facility under Environmental Protection Agency (EPA) limits -- were debunked shortly after he published them in 2001. Milloy has a long history of conducting scientific studies that benefit powerful corporate lobbies -- a strategy described as "sound science." The practice has been described in the American Journal of Public Health as "sophisticated public relations campaigns controlled by industry executives and lawyers whose aim is to manipulate the standards of scientific proof to serve the corporate interests of their clients."*
>
> *Proponents of "sound science" purport to expose so-called "junk science," which Milloy has described as "faulty scientific data and analysis used to advance special and, often, hidden agendas" of personal injury lawyers, social activists****, government regulators*** *and the media."*
>
> *Milloy currently writes a regular "Junk Science" column for the Fox News website. In recent columns, he has argued that global warming represents "flawed science," that pesticide use in schools poses no threat to students, and that "radical environmentalists" are the "real energy problem."*

After I found these details about the Haddam contamination event [and the apparent "junk science" cover up by NRC] I discussed the events with two Millstone NRC resident inspectors.

As I was speaking one resident kept nodding his hear up and down as if to say "yup, that's what happened" after I finished speaking the other resident [the senior resident] said "you know, the Chairman is not NRC."

I said: "Excuse me, the NRC Chairman *is not NRC*?" He said: "The Chairman is not NRC, he is a political appointee." And that is apparently how NRC inspectors live with some of the "political" decisions that NRC makes at the top. I don't know what else an NRC inspector could do.

Haddam Knew About The Radioactive Plume Since The Mid 1970's

David Lochbaum's book "Fission Stories" is a frequently humorous [and occasionally sobering] short story collection of incidences at nuclear plants told in "fishing story" style.

One of the stories is the Haddam "magic skunk" story. The Haddam plant went on line in 1968 with a slightly leaking spent fuel pool. Some time later [months? years?] a large groundwater plume of radioactive tritium reached the wells from which potable water was being piped into the plant.

Going forward the site used bottled drinking water, but wanted to continue to use the [slightly] tritiated water for maintenance [and general] purposes. Not wanting to alarm the public by disclosing that the wells were contaminated [and not wanting employees or visitors to accidently ingest the water] a story was concocted that a skunk had fallen into the well and died, thereby polluting the well.

Large warning signs were posted by the water faucets saying "SKUNK WATER". When I first visited Haddam [not noticing the very large sign] I filled a Styrofoam cup with "skunk water" and was about to drink it, but a technician stopped me and pointed to the sign [and told me the story].

Since multiple wells were contaminated, Lochbaum calls it the "magic skunk theory" as the skunk must have died, come back to life, crawled out and fell and died in the next well [this completely ignores the very credible "multiple skunk" theory] and may be why Lochbaum removed this story from later versions of his [really excellent] book.

During the 1996 safety scrub at Haddam [which like Millstone had been shut down by NRC] it was found a pipe that supplied cooling water to the reactor in an emergency was undersized. Apparently NU engineers had faked a number in a calculation to avoid the expense of installing a new [larger] pipe.

NU management pointed to this and said: "the new pipe will cost at least 100M to replace, so we have decided to permanently decommission the plant". The Millstone 2 reactor head replacement [I was one of the two project engineers] only cost 60M. I have never heard of a pipe costing 100M.

I discussed this [at the time] with the Haddam mechanical engineer who estimated the pipe replacement. He said: "that is way more than I estimated, I don't know where they are getting their numbers". It was not until within the last year that I pieced together what I think may have happened.

I think the "safety scrub" discovered the groundwater plume, and that is what really precipitated the Haddam decommissioning decision, but that this was too big [and alarming and embarrassing]

an issue for NRC to disclose to the public, so NRC allied with NU to concoct the story that the ECCS piping was the reason.

After thousands of cubic feet of radioactive soil was excavated, the groundwater contamination dropped to less disturbing levels. My understanding is they were unable to get the levels below federal EPA guidelines, and so NRC [did NRC work with EPA?] developed a "compromise" allowing soil and groundwater contamination to remain whatever it was, as long as radiation exposure at the surface was < 25mR per year.

From what I know of the history of contamination at Haddam, I am not sure [in this case] that I fully trust NRC or NU to "do the right things". As part of the LTP [license termination plan] I would want to see a detailed EPA evaluation of the final site with concurrance signed off by a responsible member of local or state government [such as someone from CT DEP].

This is what NRC told EPA superfund director Michael Cook in March 2004:

> *Since the Haddam Neck site already has an approved LTP, the general time period for having a Level 1 consultation has passed. However, the approved LTP for this site contains derived concentration guideline levels (DCGLs) for 20 radionuclides, which are provided in the enclosed table. The DCGLs for 15 of these radionuclides exceed the MOU trigger values for soil [i.e.,tritium (H-3), niobium-94, cesium-137 (Cs-137), europium-152 (Eu-152), and Eu-154];and/or groundwater [H-3, carbon-14, manganese-54, iron-55, cobalt-60, nickel-63, strontium-90, technetium-99, Cs-134, Cs-137, Eu-152, Eu-154, Eu-155, and plutonium-241)]. Before the NRC license is terminated the doses to the average member of the critical group at the Haddam Neck site will be in compliance with NRC's criteria in Part 20 Subpart E that provides all-pathways dose criteria of 0.25 millisieverts per year (25 millirem per year) plus as low as reasonably achievable (ALARA), to an average member of the critical group. The dose criteria in Part 20 Subpart E are fully protective of the public health and safety, and were the result of a comprehensive rulemaking, including an accompanying generic environmental impact statement.*

I would want to see signed off documents of [exactly] what happened to all that [tens of thousands of cubic feet] of contaminated soil. I would want details of the exact quantity removed, and papers showing that same exact quantity properly disposed of. If large quantities of radioactive soil was left on the property and merely covered over with 4 feet of dirt, what is the assurance that the radioactive groundwater plume will not return [for example, if we get a lot of rain in the area like in CT this March].

There should be continuing monitoring [probably by DEP] at Haddam, and the canal and nearby rivers [CT and Salmon] should be posted with clearly visible, weatherproof signs saying: "tritium and strontium contamination, trout fishing area only".

In 2004 disposal cost for a cubic foot of low level waste exceeded $400 a cubic foot. This creates a huge economic incentive to do something else with [some of] the soil, such as [for example] burying it deeper on the Haddam property [turning Haddam into a low level waste repository] or dumping it into the CT river. Of course, there is no reason to believe that people at NRC or the Haddam plant would be irresponsible with the management of contaminated soil, right?

Well, not exactly. You can read about it here [excerpt]:

> *http://video.wtnh.com/news/1997/111397.html*

New Concerns About Contaminated Soil

(WTNH) _ Concerns about contaminated soil have spread from Haddam to Waterford. Many Connecticut residents are wondering if we're walking on some very "dangerous ground."

A few months ago, radioactive soil was discovered at the Connecticut Yankee plant in Haddam Neck, and at a nearby day care center. Now there are concerns about soil at some ball fields in Waterford, which is home to the Millstone power plant.

RICH GALLAGHER / NU: "We found no contamination [at Millstone] no excess levels of radioactivity or anything..." Despite that, more tests will be conducted here. Largely because of what's happened at NU's other nuclear power plant: 'Connecticut Yankee' in Haddam Neck.

Recently, tests revealed low levels of radiation on and off the site, at among other places, a nearby day care center. Apparently, the center had used contaminated soil in its playground area.

In October 2005 Haddam finally reported to NRC the spent fuel pool leak that should have been reported about 30 years ago. You can read about it here:

http://www.NRC.gov/reading-rm/doc-collections/event-status/event/2005/20051101en.html

OFFSITE NOTIFICATION

Haddam Neck uncovered evidence of Spent Fuel Pool leakage below ground. The leakage was discovered when removing soil east of the Spent Fuel Building. Consequently, the site notified the Connecticut Department of Environmental Protection. The quantity of water leaked is unknown. Estimates based on historic Spent Fuel Pool evaporation data indicate that the leak was small - on the order of a few gallons per day. Based on readings from down-gradient monitoring wells, there is no travel beyond the property line.

No groundwater contamination beyond the property line, because the aquifer funnels the groundwater into the discharge canal, which discharges into the CT river next to the Salmon river. Over 30 years, the effect was equivalent to dumping the entire contents of the spent fuel pool [Olympic size, but more than twice as deep] into the CT river.

Any Public Health Effects?

I don't know, but the point is the Haddam managers and the NRC residents at the time didn't know either. They were not qualified to ignore government reporting regulations [to ignore the "law"] and make a judgment call that there was no public health impact, and that this did not need to be reported.

Allowing a radioactive groundwater plume to spread for 30 years [which after the 1989 fuel damage event greatly intensified in radiation] caused the Haddam decommissioning to be more costly than was initially planned for. The weak NU and NRC reporting of events has allowed this cost not to be incurred by NU, but passed on to the consumer [the ratepayer]:

[AP November 2005] CT DPUC Condemns Handling of Haddam Neck Decommissioning.

> *CT Department of Public Utility Control (DPUC) commissioner Anne George has accused Connecticut Yankee Power Company of mismanaging the decommissioning of the Haddam Neck Nuclear Power Plant to the detriment of power company customers. George maintains that Connecticut Yankee's fumbling is responsible for more than one-quarter of the $831-million rate increase instituted by the company, raising customer costs by one dollar per month for the next five years.*

If I were the CT governor, I would want to find out exactly what the Haddam managers did [what did they do, when did they do it] what they knew [what did they know, when did they know it] and I would want to find out if any Haddam managers who "looked the other way" are managing at Millstone today [and if they should keep their current positions].

More On The Organizational-Managerial-Political Influences That Led To Davis Besse

At Davis Besse in 2002, they found a big scary hole in the top of the reactor, the NRC blamed the system engineer for not fully cleaning and inspecting the reactor head, criminally charged him, and banned him from the industry for five years.

In previous years he had petitioned plant managers [three times] to approve installation of inspection openings he argued were needed for a "thorough inspection and cleaning of the head" here is the text of one of the modification requests:

> *MOD 94-0025 (May 27, 1994): "Initiated MOD 94-0025 to install service structure inspection openings. Reasons for the modification include ongoing industry concern involving corrosion of the Inconel 600 reactor vessel nozzles. There is no access to the reactor vessel head or the CRDM reactor vessel nozzles without the installation of the modification. Inspection of the reactor vessel head for boric acid corrosion following an operating cycle is difficult and not always adequate. Video inspections of the head for the CRDM nozzle issue and as follow-up to the CRDM flange inspection do not encompass a 100% inspection of the vessel head. Cleaning of excessive boric acid residue from the reactor vessel head also does not encompass 100%. Installation of these inspection openings would allow a thorough inspection and cleaning of the head. All B&W plants with the exception of Davis-Besse and ANO-1 have installed this modification.*

NRC does not require this, NRC regulations are typically generic, not specific to individual plant designs, so something like this depends on the professionalism of the leadership team to "do the right thing", but Davis Besse management would not approve and [in effect] permanently deferred the modification requests.

In April 2000 [about two years before the hole was discovered] the system engineer wrote a condition report that indicated one of the CRDs [control rod drives] was cracked and leaking boric acid:

> *"…there is a high probability that G9 is a leaking CRD. No reasonable assurance exists that the leak will not propagate."*

If true, this required an immediate shut down of the reactor [the plant]. The system engineer also brought 9 unusual digital photos of the side of the reactor vessel to the NRC resident inspector, showing where many large streaks of red rust-colored liquid had run down from the top to the bottom of the reactor, asking [in effect]:

"Is this normal? Has NRC seen anything like this before?"

The resident ignored the request, perhaps because his job description was to investigate regulatory violations, not to run down technical issues for a system engineer.

In other words: "not my job, man".

After being notified of a probable primary boundary leak, and looking for any excuse to not shut down the plant, a First Energy executive contacted the only NRC executive able to issue a "shut down order" [Sam Collins, Director of the Office of Nuclear Reactor Regulation (NRR)] and said [paraphrase]:

> *"We seem to have this tiny crack, we think it is really nothing serious and we feel can keep operating safety for a few more months. We would [really really really] like to stay on line until our scheduled refueling outage, if you can help us out we would sure appreciate it."*

Here is an excerpt from a February 2003 Ohio Blade article:

> *NRC staffers wanted the plant shut down no later than Dec. 31, 2001 because they feared its reactor-head nozzles were cracked and leaking. As it turned out, so much acid had gotten out of the reactor that the head nearly ruptured – a scenario that experts now say could have led to a Chernobyl-like meltdown if safety systems and the containment structure had, in turn, failed.*
>
> *According to a transcript of his second interview with the inspector general's office, Mr. Collins said he had intended to issue the shutdown order when he forwarded it up the chain-of-command on Nov. 16, 2001, to William Travers, NRC executive director of operations. Five days later, the order was passed along to the full NRC board.*
>
> *NRC staffers received a memo on Nov. 21, 2001, summarizing a meeting that day between Mr. Collins and Robert Saunders, president of FirstEnergy Nuclear Operating Co., the utility's nuclear subsidiary. The inspector general's office has claimed that meeting was pivotal to the decision Mr. Collins ultimately made – meeting the utility halfway and letting it keep operating Davis-Besse until Feb. 16, 2002, a date which skeptics have viewed as arbitrary … three months later than the shutdown date proposed by the NRC staff.*
>
> *"There was also feedback at one point from the Chairman at a very high level just indicating external interest in this and I indicated to him I'm aware of that," Mr. Collins was quoted as saying. An interviewer asked him to describe what he meant by [external interest]. "My impression, we were talking about elected officials," Mr. Collins said.*

Ohio Senator Voinovich? [I have no idea but it would probably need to be at that level]

So [of course] the NRC then said:

> *"Oops we really messed up, we should have followed up on those rust photos, we should not have allowed that plant to keep operating, we should not have blamed that system engineer, we should have investigated if there were other examples of 'minimal regulatory compliance' affecting safety systems at Davis Besse or elsewhere in the industry, we really need to get a better handle on assessing the event risk that managerial-organizational issues present [bad management, weak safety cultures] this has been a great lesson for us, we are going to learn from it, find a way to do better going forward, and make sure these kind of managerial-organizational events like Millstone and Davis Besse don't happen again in the US nuclear industry."*

Well, not exactly.

The NRC blamed the system engineer for not fully cleaning the head, criminally charged him and banned him from the industry for five years [effectively for life since no plant is ever going to hire him]. He lost his job and his house, he was criminally convicted, fined $4,500 and given three years probation.

His attorney wept at the injustice and later asked a juror: "how could you find him guilty?" The juror replied: "well, I didn't think he was personally responsible, but someone had to be held accountable." The NRC also applied enforcement actions to the First Energy Nuclear Operating Company [NRC EA-05-071]:

> *From at least May 18, 2000, to February 16, 2002, FENOC started up and operated the Davis-Besse Station in Modes 1 through 4 while being aware of the presence of significant boric acid deposits, on the reactor pressure vessel head, which were indicative of reactor coolant system leakage and which could not be justified as being caused by reactor coolant system non-pressure boundary leakage alone.*
>
> *The NRC determined that the licensee's failure to exercise adequate management oversight and controls, in its assessment of substantial recurring boric acid deposits on the reactor pressure vessel head during 12RFO and the build-up of boric acid deposits on other reactor containment equipment during plant operations, significantly contributed to the length of the Technical Specification violation and the significant reactor pressure vessel head degradation. The licensee's decision to return the unit to power on May 18, 2000, with ongoing reactor coolant system leakage, with significant boric acid deposits on the reactor pressure vessel head, which could not be associated with reactor coolant system non-pressure boundary leakage, and without conducting the reactor pressure vessel head cleaning and inspection required by the boric acid corrosion control procedure, is a serious safety and regulatory concern.*

The First Energy Operating Company [the subsidiary that operates the five First Energy nuclear plants] ultimately paid a record $28 million fine [what the FENOC nuclear plants make in about a week] on the condition that the Department of Justice not prosecute any First Energy managers:

> *Under the agreement, the Department of Justice will refrain from seeking an indictment or otherwise initiating criminal prosecution of FENOC for all conduct related to the reactor head issue, as long as FENOC remains in compliance with the agreement, which the company fully intends.*

A Major Problem: The NRC Safety Culture Root Cause Analysis At Davis Besse

Ted Kennedy was never pro-nuclear, not because he distrusted the technology [or the US plant designs] but because he did not trust people to operate them responsibly. I believe with enlightened and robust regulation, that people will operate nuclear plants responsibly enough to keep accident risk acceptably low, but we need to understand that while some people will always follow the "rules", it is probable that many [good] people will not.

For a moment consider how many people follow the posted speed limit on the road and how many people drive the speed that just seems appropriate to them [I certainly do]. The problem is, when the job involves a technology that [in extreme cases] can do something like Chernobyl, people cannot do the speed that "feels appropriate" you must do the speed specified by the experts. If you notice drivers [for example on the highway] sometimes doing things [let's say you feel are] not "optimally safe", then you see the problem.

Even if you believe you understand the risk [probability times consequences] of exceeding the legal speed limit for the specific conditions under which you are currently operating your car, one must not [should not anyway] do this with nuclear technology. The amounts of energy are unfathomable, and even if you think you well understand the risk of deviating from established regulations and procedures [the "risk" presented by your "wheel"] you really don't, because there is no way to know how the other wheels are currently lining up with yours in a way that greatly amplifies the risk.

Recall Lochbaum's cautionary and [as it turned out] prescient article:

> *It seems only a matter of time before the initiating event wheel, the equipment wheel, and the human performance wheel stop in a combination that produces another accident.*

One of my friends at Millstone oversees a very important function, in my view one the more important managerial organization functions. It has [on occasion] very significant safety management implications, it is the site "root cause analysis" process, or how the site "identifies and corrects" it's problems.

One time I heard him say: “when I am driving my motorcycle at night, and it is 3AM in the morning, do you think I stop at every red light? No way. I know when I can go through the red lights and when I can’t, and it is the same thing with the root cause evaluation process”.

I am trained in root cause analysis, I am no expert, but I don’t think this is how it works. I think you select an appropriate approach, and then you need to follow the rules and go wherever the evaluation takes you, no short cuts, no running lights.

One of the problems at Millstone right now is that the site cannot perform effective root cause evaluations. The same kind of problems keep repeating over and over again. Right now, for some reason Millstone is having trouble getting to the root of it’s problems.

So what does this have to do with NRC’s root cause evaluation at Davis Besse?

Plain Dealer 2006 *Four To Be Banned From Nuclear Industry*

> *U.S. Rep. Dennis Kucinich, a Lakewood Democrat, said Wednesday night that the action against the four is "shameful," because it overlooks the utility's failure to nurture a culture of safety at the plant and masks the NRC's failure as a strong regulator. "The NRC is going to have to purchase a new gallon of white paint for this whitewash," he said.*
>
> *At issue is whether Davis-Besse managers and top FirstEnergy nuclear division officers knew the reactor's lid was corroded in the fall of 2001 and then lied to get out of the NRC's request for a quick shutdown and emergency inspection.*

The NRC covered up [whitewashed] their failures [and FENOCs] and proceeded to pin an unreasonable [inordinate] amount of the blame on the system engineer for reporting that the head had been cleaned.

What was the system engineer supposed to report? Maybe something like this:

> “The head has now been cleaned and inspected as good as it can be cleaned and inspected, considering that my management will not fund my repeated requests to cut access holes like every other plant of this design has already done so the head can be properly cleaned and inspected”.

With regard to FENOC failures to ensure a culture of safety, here is what a 2004 GAO report found:

> *For over a decade, FirstEnergy had delayed plant modifications to its service structure platform, primarily because of cost. These modifications would have improved its ability to inspect the reactor vessel head nozzles. As a result, FirstEnergy could conduct only limited visual inspections and cleaning of the reactor pressure vessel head through the small “mouse-holes” that perforated the service structure.*

With regard to NRC’s failure as a strong regulator, this is what the same GAO report found:

> *NRC has the authority to shut down a plant when it is clear that the plant is in violation of important safety requirements, and it is clear that the plant poses a risk to public health and safety.27 Thus, if a licensee is not complying with technical specifications, such as those for no allowable reactor vessel pressure boundary leakage, NRC can order a plant to shut down.*

However, NRC decided that it could not require Davis-Besse to shut down on the basis of … a manager's acknowledgement of a probable leak. Instead, it believed it needed more direct, or absolute, proof of a leak to order a shutdown.

This standard of proof has been questioned. According to the Union of Concerned Scientists,28 for example, if NRC needed irrefutable proof in every case of suspected problems, the agency would probably never issue a shutdown order.

In effect, in this case NRC created a Catch-22: It needed irrefutable proof to order a shutdown but could not get this proof without shutting down the plant and requiring that the reactor be inspected.

Despite NRC's responsibility for ensuring that the public is adequately protected from accidents at commercial nuclear power plants, NRC does not have specific guidance for shutting down a plant when the plant may pose a risk to public health and safety, even though it may be complying with NRC requirements.

Here is what the GAO report found with regard to other regulatory failures:

NRC should have but did not identify or prevent the vessel head corrosion at Davis-Besse because both its inspections at the plant and its assessments of the operator's performance yielded inaccurate and incomplete information on plant safety conditions.

NRC inspectors … did not fully communicate their observations to other NRC staff, some of whom might have recognized the significance of the problem. NRC's assessments of Davis-Besse did not provide complete and accurate information on FirstEnergy's performance.

NRC had been aware for several years that corrosion and cracking were issues that could possibly affect safety, but did not view them as immediate safety concerns and therefore had not fully incorporated them into its oversight process.

NRC's process for deciding whether Davis-Besse could delay its shutdown to inspect for nozzle cracking lacks credibility because the guidance NRC used was not intended for making such a decision and the basis for the decision was not fully documented.

NRC initially decided that several safety factors were not met and considered issuing a shutdown order. Regardless, the agency allowed FirstEnergy to delay its shutdown, even though it is not clear whether— and if so, how—the safety factors were subsequently met. Further, NRC did not provide a rationale for its decision for more than a year.

Here is what the GAO report concluded:

These factors include NRC's failure to keep abreast of safety significant issues by collecting information on operating experiences at plants, assessing their relative safety significance, and effectively communicating information within the agency to ensure that oversight is fully informed.

Because the Davis-Besse task force did not address NRC's unwillingness to directly assess licensee safety culture, we are concerned that NRC's oversight will continue to be reactive rather than proactive.

NRC's oversight can result in NRC making a determination that a licensee's performance is good one day, yet the next day NRC discovers the performance to be unacceptably risky to public health and safety. Such a situation does not occur overnight: Long-standing action or inaction on the part of the licensee causes unacceptably risky and degraded conditions. NRC needs better information to preclude such conditions.

Given the complexity of nuclear power plants, the number of physical structures, systems, and components, and the manner in which NRC inspectors must sample to assess whether licensees are complying with NRC requirements and license specifications, it is possible that NRC will not identify licensees that value production over safety. While we recognize the difficulty in assessing licensee safety culture, we believe it is sufficiently important to develop a means to do so.

The above regulatory weaknesses identified in the GAO report and are the reason why the NRC [alone] is currently unable to detect the kind of issues identified in this paper, is why no members of the public showed up at the yearly NRC Millstone public meeting in Waterford CT in April to question the NRC, and why you see media articles like the one below:

New London Day [March 9, 2010] *NRC says 2009 was a safe year at Millstone*

The NRC issued a letter Wednesday to Millstone owner Dominion of Virginia saying the two reactors' daily operations "preserved public health and safety" for the past year, meeting all operations objectives.

If a friend of yours is a chain smoker, and your friend's health was not afflicted by a serious disease in 2009, you might say that your friend's health was "preserved", but if you said that your friend's safety was preserved, you would be mistaken.

My Initial Experience With NRC And The Allegations In This Paper

I have to admit [considering the GAO report and my own personal experiences] I must admit that right now, I do not have high confidence that NRC will address the allegations in this document [effectively or robustly].

For example, in April [last month] I attended the yearly NRC public meeting on Millstone at the CT Waterford town hall. No members of the public attended, and this gave me ample time to talk with NRC about some of these issues. I had [what I thought] was a nice informative conversation with branch chief Jackson on how well the NRC ROP is able to assess safety culture. He felt it did a good job, I felt it needed to be "beefed up" in some important areas, that it was far too easy for managers to cover up [hide] issues from the NRC "radar".

After I left, a New London Day reporter asked Jackson some specific questions on the veracity of the information in this paper. This is what the article said:

Day April 23, 2010 ***Disruptive Millstone incident disputed***

Don Jackson, an NRC supervisor for Millstone's three on-site NRC inspectors, said after the night meeting that Collins' details were incorrect.

The plant did not automatically shut down but was manually shut down, and there was no visible arcing, Jackson said.

"The way (the paper) portrayed it did not happen," Jackson, the Region 1 Branch 5 chief, said. "I physically saw it with my own eyes."

I sent the article to Lochbaum, who sent this note to Jackson:

Dear Mr. Jackson:

I read your comments in the April 23, 2010, article by Pat Daddona in The Day that there was no visible arcing at Millstone Unit 2 during the event last October that resulted in the reactor entering its refueling outage early.

Attached is the report submitted by the licensee to the NRC about operation at Millstone Unit 2 last October. This report stated that "The Unit 2 Main Transformer 345kV motor operated disconnect began arcing on the "A" phase conductor...".

I'm assuming that the licensee did not report "invisible" arcing, such that the arcing they reported was arcing that occurred and was visible.

If your statement in The Day is correct about it not arcing, then it appears that the licensee provided material false statements to the NRC with its Operating Data Report for last October. So, did it arc or not?

If it did not arc, has the licensee violated 10 CFR 50.9 by stating, on the record, that it did arc? If it did arc, the NRC's website as a "For The Record" section allowing media reports to be corrected/clarified.

Thanks, David Lochbaum
Director, Nuclear Safety Project
Union of Concerned Scientists

Jackson then contacted the Day and a correction was published:

Day April 30, 2010 ***NRC corrects remarks about Millstone electrical incident***

And after that meeting, Jackson claimed a 36-page paper, which is critical of Dominion's and the NRC's safety culture, incorrectly stated that arcing occurred and endangered workers. Retired Millstone worker David Collins of Old Lyme submitted the paper to the NRC at the NEAC meeting.

But arcing did occur, although there were no injuries, according to a report filed by Millstone owner Dominion with the NRC and located by David Lochbaum, director of the nuclear safety project for the Union of Concerned Scientists, after reading The Day article.

Reached later this week, Jackson clarified that he was in the control room during the shutdown, not during the incident, as he implied last week when he said he was there.

"When I said there was no visible arcing, that was based on what my senior inspector reported after the actual incident with the workers," he said. "But at some time, an arc did occur. I apologize for the lack of clarity."

Jackson also said he did not mean to be dismissive of Collins' paper. "We are taking that very seriously," he said. "It's not sitting idle on a shelf; it is being actively worked on as we speak."

Collins, who is pro-nuclear, said events like the arcing will happen, but when they do Dominion and the NRC "have to honestly admit mistakes, so management at Millstone can learn from them and the industry at large can learn from them."

"If we made a mistake we would admit a mistake," Jackson responded. "We are not operating the plant; we are assessing the owner's operation of it."

Dominion spokesman Ken Holt added, "We admit that the mistake (with the arcing) was made, we've learned from it and we've taken precautions to ensure that type of work never goes on again when the unit's online."

There Is A Larger Message For NRC Behind The Allegations In This Document

I am concerned that people [the Day, NRC, Millstone] are still not "getting it". I am not especially concerned about the safety impact assessments of specific allegations in this document. Events like the arcing will happen, that is not [at all] what I am concerned about, not what I am talking about here. I am not trying to say that the NRC made some kind of "mistake" in their reporting or assessment of the [safety impact] of the arcing event, I concur from an ROP perspective the safety impact was low.

This is what I am saying.

Millstone wrote a root cause report that covered up this event and then directed me to write a similar operating experience report that covered up this event. Until I showed up with my paper at the town hall, the NRC did not know:

- That Millstone had violated procedures or anything about the [culturally very significant] "money over safety" and "never push back" culture issues that led to ignoring switchyard work procedures,
- Nothing on the [culturally very significant] "cover up culture" issues that kept details of the event [the work process violations] from regulators [NRC and INPO]
- That this "cover-up" also kept Millstone managers [and the industry] from learning some important ["safety first" management culture] lessons from this event.

NRC focused exclusively on the safety impact of the trip on the plant, no focus on the many safety culture deficiencies that led to this event, no focus on ensuring culture corrective actions are implemented to keep these kind of events from recurring going forward.

This event was [in many ways] a "mini repeat" of the 442 valve event. This is the way the NRC [and Millstone] should be viewing this event:

"Does this mean Millstone could someday have a repeat of the 442 event? What can we learn from this event to keep another 442 from happening?"

Why NRC Must Not Continue To Listen To ACRS On Managerial Organizational Issues

NRC sent a very good man to oversee the culture remediation at Davis Besse, his name was Jack Grobe. He did what Edgar Schein says is the [best and really only] way to understand an organizational culture, he "lived in it" for an extended period and observed everything that went on around him. These are some of the things Grobe reported [condensed excerpt] at a June 2003 ACRS meeting [where I also presented]:

My name is Jack Grobe. For the last 15 months or so, I've been deeply immersed in Davis-Besse. I've been serving as the chairman of the Davis-Besse Oversight Panel for the NRC. The NRC does not routinely inspect management or cultural issues. The focus of our inspection program is what we call performance based, we look for performance problems and then if they're risk significant, we further engage and drill down into those problems to find out what the root causes might be. Less significant performance problems are left to the licensee to address.

There is one significant regulation that could be used to address this area. It's Criterion XVI of Appendix B, Corrective Action. An effective Corrective Action Program is essential for sustained safe operation. And the foundation of an effective Corrective Action Program is the ability and willingness of the utility to identify all of the root causes of a problem. And those root causes should include cultural issues. The Lessons Learned Task Force presented to [ACRS] several months ago, they made approximately 50 recommendations in quite a few areas, both regulatory structure as well as inspection program and other 15 areas, research. They addressed quite a few areas.

They did not touch on this area, safety culture. I think this area is very critical. And Davis-Besse is not unique. Mr. Collins earlier suggested there might be other plants with equally challenged cultural aspects to their organizational effectiveness. There's a number of plants across the country that have had significant performance problems, Cooper, Point Beach right now, Indian Point and I believe there are many cultural attributes. We now use that word, cultural attributes, to characterize what we might have called something different a few years ago. So I don't believe Davis Besse is unique. And I think it's essential that we do something to address this issue.

[The Plant Manger of Millstone] suggested that each utility is evaluating and responding to safety culture issues. I think the empirical evidence might not support that, at least wouldn't support that they're effectively doing it because we continue to have performance problems, not necessarily as significant as at Davis-Besse, but still significant performance problems at various utilities. I believe that there's additional work that needs to be done in this area.

The current reactor oversight process regulatory intervention opportunities are two-fold. There's, of course, the action matrix which is a graded response, but that graded responses comes on risk-significant outcomes, so if there are safety culture concerns, it is a lagging response. Technical competence of the staff is just one attribute of safety culture. There's many other attributes and if there's a need for significant infrastructure to effectively assess training accreditation, one would think there would be need for substantial infrastructure to assess safety culture effectively also.

A couple other thoughts maybe to consider. The cross cutting areas defined in the ROP may not be sufficient. So it may be appropriate to revisit the cross cutting areas to see if they fully capture what we want to be assessing. In addition, the mechanism for regulatory engagement in those areas may be appropriate to evaluate that.

As I mentioned earlier, guidance and training for the staff and expanding their competencies beyond the technical realm of evaluating engineering quality and Corrective Action Programs and making sure that thorough root causes in the organizational effectiveness area may be an opportunity to further improve on a short term the effectiveness of the Agency.

It might be an appropriate time to revisit the inspection program, not only from a risk, but from a cultural perspective and see if there's a better way to integrated those attributes into the inspection program. Those are just some thoughts I had.

MEMBER APOSTOLAKIS: Very good. Thank you.

At this time ACRS members George Apostolakis and Mario Bonaca were sharing duties as chairman. This is [a condensed excerpt of] what ACRS Chairman Bonaca reported to the Commission after the meeting:

ACRSR-2042

Dear Chariman Diaz:

Although there are alternative definitions of safety culture, there is general agreement on the important attributes of safety culture.

We conclude that the regulatory framework for monitoring aspects of safety culture is largely in place. Broader evaluations of safety culture, such as management emphasis on safety and personnel attitudes, belong to the industry.

Sincerely,
ACRS Chairman Bonaca

Nothing that Grobe said "registered" with Bonaca [and very little of it registered with Apostolakis]. Engineers are not trained in "managerial-organizational issues" are not trained to see and understand the cultural "cause and effect" that Grobe was [and I and many others were] attempting to communicate to ACRS. This is the primary reason why a new advisory panel is now needed.

The New NRC Commissioners Must Reverse The Criminal Conviction Of The Davis Besse System Engineer

One of the first actions of the new NRC commissioners is that they must address this in some meaningful fashion. This was scapegoating, cover-ups and whitewashing by the NRC [along with bad safety culture management] on a major scale.

What the new commission does with this issue is going to set the tone for the "next generation" safety management in the US nuclear industry. If the new commission simply ignores this issue, the industry is likely never going to get to kind of managerial-organizational oversight and risk management that is needed in the industry.

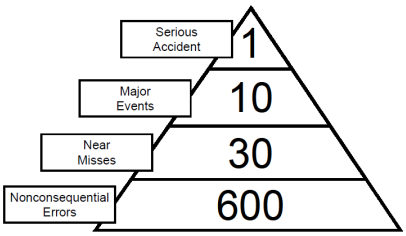
INPO Human Performance Fundamentals - *Leadership*

A Just Environment
An organization cannot consistently learn from error/failure and punish professional individuals at the same time. If a workforce believes errors will be punished, then information related to errors in the plant, if not self-revealing, will likely remain unknown. To an erring employee, knowing how one's manager will react to error is important to one's willingness to report the problem.In a just environment, the likelihood that a problem will be reported will increase. People want to be treated fairly, honestly, and with respect, and they want the same for others. High-performing organizations do not punish employees who make mistakes while trying to do the right thing. These organizations view error as an opportunity to learn.

When an event happens, the organization is culpable, not simply the individual. As illustrated, the "blame cycle" is urged on by the belief that human error occurs because people are not properly motivated. In reality, no matter how motivated an individual is, human error will

continue to occur, though at a slower rate. No amount of punishment, counseling, or training—in fact, nothing—will change a person's future fallibility. Events will continue as long as root cause analyses are stopped prematurely, before the real causes are identified. The true causes (typically organizational weaknesses) will not be discovered (will remain latent or hidden), and errors and events will persist.

Most errors do not result in events because of defenses-in-depth. The severity of an event is always a function of the type and number of defenses that failed, not the error itself (as illustrated by the severity pyramid at right).



However, the error that triggers a serious accident is often the error that has been happening for years at the non-consequential level. People have, more often than not, been disciplined for "honest" mistakes. Error is not a choice. Discipline or punishment does not influence future fallibility, but it should be used as a tool for behavior change if the person acted purposely, knowingly, or recklessly. In high-performing organizations, punishment is not used for restitution.

The Substitution Test

When potential discipline is considered, the substitution test provides a means of determining culpability. For a given set of circumstances in which an individual erred, perhaps triggering an event, mentally substitute several of the person's peers into the same situation.

If most of them could have done the same thing, then the individual passes the substitution test—it is a "blameless" error. However, if the individual has a history of error or unsafe acts, then the person probably does not have the aptitude for the job, or there may be extenuating circumstances.

The system engineer was blamed because of supposed "cover-ups" contained in Davis Besse condition report CR 2000-0782 and other documents. CR 2000-0782 identified potential CRD leakage, and since the system engineer was not expert as assessing leaks, and so he checked out the evidence of the leaks [as best they could be viewed through the "mouse holes"] with a CRD expert vendor [Framatome] who indicated that "the size and type of the leak was not unusual".

As the project engineer for the 2005 Millstone reactor head replacement [being replaced specifically because of lessons learned from the Davis Besse issue] I had to disposition 30 CRs on CRDs [control rod drives] the exact same piece of equipment. I am as "expert" as any industry plant engineer on CRD systems like the one at Davis Besse, and I can tell you [unequivocally] that none of the information I have seen regarding the actions of the system engineer indicate any intent [at all] to cover up the event, or to allow the event to progress uninvestigated.

The NRC should not [should never] have blamed the system engineer for the event, and did so I believe to make it appear as though the root cause was the system engineer's fault, and not NRC's inability to properly oversee and regulate poor managerial-organizational safety practices.

The actions of senior FENOC managers and the NRC [the NRC inspectors and NRR] did indicate intent to cover up the event, to cover up the leakage and to [inappropriately] allow the plant to stay on line and to keep making money in violation of safety technical specifications. It appears that NRC NRR may have been encouraged to take this action by a member of congress. If so, this action may have involved wrongdoing both at Congress and at top NRC levels.

This was a clear case of executive level "money first safety last", yet I do not see that any NRC or FENOC executives were banned from the industry, or criminally charged [and convicted]. The involved [executive level FENOC and at NRC] managers appear to be enjoying retirement or continuing employment in the nuclear industry.

Therefore I will make the new NRC commission the same deal that I made Dominion Millstone before authoring this paper.

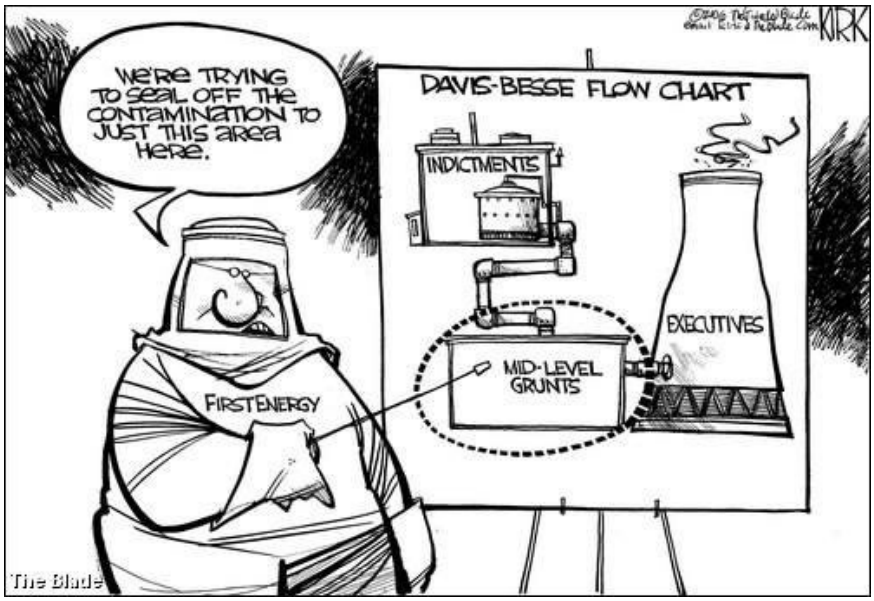
If NRC takes [or promises to take] immediate actions to investigate and [upon finding the above information accurate] reverse the conviction of Andrew Siemaszko, and to require FENOC to make him "whole", I will not join forces with David Lochbaum and pursue congressional approval for a special GAO investigation that may ultimately result in re-opening this case with the assignment of a special prosecutor.

I have already obtained [preliminary] support from one [NRC oversight committee chair] congressman for this kind of an action. I have yet to ask the support of others, but considering how NRC actions on Davis Besse are perceived by members of congress, I have little doubt that such an action would be supported by members of Congress.

[So here is the deal, and it is a very good one for NRC]

NRC sends Siemaszko a letter of apology, has his conviction dismissed and his record expunged. NRC tells FENOC to provide Siemaszko back pay [from his dismissal to now] calculated at the maximum pay scale for a FENOC system engineer. To make up for destroying his life [he lost his career, reputation, house, marriage damaged, criminally convicted] FENOC is to retire Siemaszko at full pay [maximum pay scale for a FENOC system engineer] for the remainder of his natural life.

Again, this is a critical [really central from a "proper safety management" perspective] issue. If the new commission simply ignores this issue, the nuclear industry is likely not [ever] going to get to the level of managerial organizational risk management that is needed going forward.



How Well Did Millstone Learn From the 1993 442 Valve Event? [The 2009 Arcing Event]

Here is what INPO says about the 24 "events that shaped the industry":

> *"The events were significant enough that to allow them to happen again for lack of response was unacceptable. Hence, remarkable actions were taken to prevent recurrence."*

The 1993 Millstone valve event was one of the "special 24". How "remarkable" were these "actions to prevent recurrence"? All industry managers were supposed to have learned not to repeat these events. So what about the actual plant that experienced the event? How well did Millstone 2 learn not to repeat it's own event?

What were the lessons from the 1993 Millstone event?

> *<u>How This Event Shaped the Nuclear Power Industry</u>*
> *This event brought into focus the dangers of emphasizing production over nuclear safety. A key lesson was the importance of senior nuclear managers periodically emphasizing to personnel that nuclear safety considerations always take priority over production goals*

Unfortunately, last fall Millstone leadership repeated the same kind of [management] error that precipitated the 1993 event.

Staffing of maintenance electricians is a little thin to optimally support outages, so electrical maintenance work is sheduled outside of outage windows whenever possible [and apparently occasionally even when it is impossible].

To save a little outage time, management violated switchyard work procedures [and put making money ahead of nuclear and personnel safety]. Millstone managers scheduled maintenance electricians to work a 345,000 volt switch on-line [live].

345,000V switches must not be worked live. A 120V wall switch should not be worked live. The work control procedure says:

> *"Every attempt must be made to plan, schedule, and perform work on critical transmission facilities when a unit is out of service. Unit refueling outages should provide adequate time for scheduling 345kV facility outages."*

About five managers ignored the procedure and signed off on the work. When the electricians started to disassemble the switch, it created an arc [on a sunny day] so bright that you could not look at it, showered the backs of the rapidly exiting electricians with bits of molten metal, and tripped the plant [because it disabled electrical safety systems]. This event could have easily killed or seriously harmed the workers.

So after this event, Millstone management called a safety "stand down" explained the mistakes that the leadership team made and turned it into a good lesson on maintaining leadership focus on safety, right?

Well, not exactly.

Like the NRC actions at Haddam, sometimes when things go bad in a big ugly way, there is a strong desire to cover it up [if you can get away with it] and the root cause team covered it up, arguing the procedure was missing instructions on how to safety disassemble a live 345KV switch [there are no procedures for safely disassembling a live 345KV switch, this should not be attempted].

As INPO coordinator it was my job to do a write-up of what happened for the INPO report. I wrote a draft of what really happened [managers emphasized production over safety and violated a "must do" switchyard work procedure] and submitted it to management for approval. The department manager called a meeting in his office to discuss my write-up.

During the discussion [on three occasions] I looked directly at the root cause author and said "WC12 says that every attempt must be made to schedule 345KV work during an outage, was every attempt made?" He simply stared back with no expression, no answer. I said: "was any attempt made?" He simply stared back, no expression, no answer.

The department manager told me [surprisingly in front of two other people at the table] "we can't say that, what if the public sees it?" I told the department manager that I stand by my write-up, but he is the department manager, and if he directs me to write it up to match the root cause evaluation I will.

He said: "write the OE to match the information in the root cause evaluation" and I did.

As I told my supervisor before we both went into the meeting, this was an organizational repeat of the 1993 "*emphasizing production over nuclear safety"* event, but management did not wish to acknowledge or entertain this.

How Well Did Millstone Learn From The 1989 Haddam FME Event? [The 2008 Millstone FME Event]

> *How This Event Shaped the Nuclear Power Industry*
> *The industry realized that current programs designed to preclude the introduction of foreign materials into the reactor vessel or spent fuel pool during maintenance activities were in need of significant improvements.*

At Millstone in April 2008, foreign material interfered with the function of a stop valve, creating a reactor coolant leak and requiring Millstone to declared an "Unusual Event" [the lowest level nuclear emergency] due to unidentified leakage greater than 10 gallons per minute.

The root cause evaluation [same author who wrote up the 345,000V switch] said:

> *Engineering failed to keep abreast of industry experience related to spiral wound gaskets and to make recommendations for design and procedure changes.*

I wrote the operating experience report from the root cause evaluation, and sent it to INPO. Later, an engineer came to me and said: "you know, that is not really what happened" and gave me a list that showed he had been in fact keeping abreast of industry experience and communicating it [as he should be] to maintenance.

He told me he strongly disagreed with the root cause evaluation conclusions, and had refused to sign off on the root cause evaluation. While he was on vacation his department manager had signed it off, so it had been completed processed and filed.

I called this manager and said: "why did you sign this off when you knew [the engineer] didn't agree with it?" He said: "sometimes you just have to move on."

Later I was told what really happened was [in an effort to save money] managers instructed supervisors to find some jobs that are not absolutely necessary and cancel them. Apparently the engineer's supervisor had [without notifying him] cancelled the paperwork that he had submitted to update maintenance procedures with the information that would have avoided the event.

Who had instructed the supervisor to find some unnecessary work and cancel it? Most likely the same manager who had signed off the root cause evaluation while the engineer was on vacation. Getting it closed out and filed away ASAP would have been a good move on his part.

Foreign material has been a continuing problem at Millstone, shortly before I retired I suggested to Training that they periodically review INPO foreign material guidance, and verify that it continuing to be properly represented in training plans. Training responded: "INPO does not say this is needed, so we are not doing it".

About a year ago the engineering manager who signed off the root cause took a job in Virginia, and was replaced by an engineering manager from Virginia. When you work at Millstone for a while you become acclimated to poor management, and after a while you cannot even "see it".

The Virginia manager immediately started going through the [very large] backlog of engineering work, saying [appropriately]: "we need to either do this stuff, or decide that we do not need to do this stuff, and cancel it." This was like a breath of fresh "good management" air. I sent an email to the CEO of generation recommending that this manager be promoted to Millstone engineering director.

There was a problem however.

One of the people in engineering told me that this action had uncovered a bunch of restart issues, safety improvement modifications that the 1996 "safety scrub" had flagged, that NU management had promised NRC to address.

NU had said: "Please let us restart now even though not all of the [safety cleanup] work is done, we promise we will fix these things ASAP". NRC said: "OK, we will allow you to restart now, but be certain you fix these things ASAP" and then NU sold the plants to Dominion.

But the NRC resident inspectors are there, and surely [to safeguard the public] they must be tracking these "restart items" and ensuring that they are all satisfactorily addressed?

Well, not exactly.

A few years ago I went to an industry conference and attended an NRC presentation. It showed how one of the major problems at NRC was the lack of a corrective actions process, the lack of any kind of a tracking system for ensuring that action items are tracked and closed.

When I returned to Millstone I asked the resident about this and he said: "oh yes, we should have a NRC tracking system very soon". Then I asked him to "please let me know when it is in place". He said: "I will".

I said: "you don't have a tracking system, so how will you remember to do this?" He said: "don't worry, I will remember".

He never got back to me.

How Do You Address These Kind Of Management Problems?

Last year NRC asked me [invited me as a member of the public] to join a "call in" discussion on their efforts to manage safety culture at new plants being built. I told my supervisor about it and called into the meeting, I was on the phone for about an hour.

The department manager found out about it and told my supervisor to inform me that I was not allowed to attend these kind of NRC meetings during company hours, that I would have to take a vacation day and do it from home. In my view, this was violation of 10CFR50.7 employee protection.

Every nuclear plant is required to post a large [poster size] copy of NRC form 3 which outlines certain responsibilities and rights of employers and employees. One of the employee rights is not to be harassed or discriminated against for taking part in an NRC proceeding [which I interpret as anything the NRC is trying to accomplish].

My supervisor told me that someone who attended the meeting had told the manager I had been misrepresented myself as speaking for Dominion [I had been attending these NRC safety culture discussion for years, the NRC me as, and knew I was speaking as, an independent "expert" member of the public].

The supervisor then told me the Chief Nuclear Officer of Dominion was upset [presumably about my actions]. I just happened to know the CNO very well [we had been discussion safety culture for years] about a week later we sat down to discuss culture and I told him about my supervisor's comment, and asked him what he was upset about. He said he wasn't upset, and didn't even know I had attended a meeting with NRC.

I had been in the group about a year, but the supervisor and manager had been in the group just a couple of months {the supervisor was recently hired and the manager had recently returned from a long assignment]. I think neither was aware that I knew the CNO, and they were telling me that he was angry [I am guessing] to intimidate me and "keep me in line."

I complained about this treatment to some coworkers. I discovered two other workers within sight of where I sat had in the past been harassed by the same manager [both had filed complaints]. As I had gone to the employee concerns program in the past [with unsatisfactory results] I did not go to ECP, but a coworker contacted the ECP manager, who asked me to meet with him.

I told him about the manager's actions he said "oh yes, we have known about that manager for a long time." I said: "really? well, what have you been doing about it?" He said: "we take some actions, you know those management changes that took place recently [about 6 managers had recently swapped positions] a number of those were due to employee concern issues."

I said: "if all you do is move managers to another department when there are problems, isn't that a bit like how the church deals with problem priests?" The ECP manager appeared offended and said: "we do a lot more than that." I said: "OK, what else do you do?" He said: "I can't tell you, it's confidential." I said: "whatever you are doing, it does not seem to be working."

Lee Olivier [now COO of Northeast Utilities] is widely considered one of the top culture managers in the industry, and was hired specifically [was hired away from the Pilgrim nuclear plant] by NU to

lead the 1996 – 1998 safety culture recovery at Millstone. By all accounts by the end of recovery Olivier had managed the culture to an impressively high level of excellence.

As I said, in 2003, a lot of Ohio reporters were doing stories on the Davis Besse event, and many of them attended the 2003 NRC workshop [I did a presentation on safety culture management]. After the workshop, I was interviewed for a half dozen Ohio newspaper articles as an "industry safety culture expert."

I suggested to one of the reporters that he interview Lee Olivier, this was Olivier's comment from the article:

> *If nuclear plant executives would concentrate on building trust with employees and helping them reach their highest potential, the NRC wouldn't have to worry about safety culture inspections, said Lee Olivier, who led the transition at Millstone and is now president and chief operating officer of Connecticut Light and Power Co. "The first thing you do is prove to people you care about excellence, and about them," said Olivier. "When you do these things, you build trust coupled with higher standards and expectations."*

A couple of years later I asked Olivier [basically] "what was your 'secret' for maintaining such a healthy safety culture at Millstone, what was the most important thing?"

Olivier replied:

> *"First you establish clear expectations for leadership behavior. Then there are always a few managers who 'just don't get it'. Now this is the most important thing [for senior managers to do to maintain a healthy safety culture] but it is the thing that most senior managers will not do. The managers who 'just don't get it' cannot remain on the leadership team."*

I recently told the CEO of Dominion generation that during recovery there is no way the manager that ECP "has known about for a long time" would have been allowed [by Olivier] to remain on the leadership team. Personally, I have a [somewhat] softer position.

I believe managers who continually fail to demonstrate the organizational-managerial behaviors [that INPO outlines] that are needed to promote a healthy safety culture [what INPO calls "leadership professionalism"] can remain on the leadership team, but are not qualified [cannot be permitted] to manage a safety related functional area.

Nuclear employees are qualified all the time for this and that safety function. As a design engineer I had a laundry list of qualifications that I needed to keep current. I have been proposing for some time now that managers need to be qualified to manage safety culture. This would involve a much more detailed and comprehensive training program that the current [SCWE] industry training provides. As a Washington attorney who does safety culture training told me: "it is surprising how very little industry managers know about safety culture."

I would recommend developing a NRC regulatory guide called "CARMA" [Culture Assessment and Regulation Management Approach]. That would establish requirements for training workers and managers in safety culture fundamentals and leadership behaviors that maintain a healthy culture, and requirements for periodically assuring that every member of the leadership team is adequately demonstrating these behaviors [in essence, establishing a quality management program for safety culture].

If a bus driver is texting while driving, the passengers must say something, and the behavior of the driver must be evaluated. Perhaps the person needs more training, or perhaps the person should not be a bus driver. Behaviors like this exist for safety culture management, and employees at Millstone [workers and supervisors] frequently complain about managers that exhibit these kind of behaviors. These complaints are typically either ignored, or handled ineffectively by ECP.

For this reason a method of screening leadership behavior and "listening to workers" [without the intimidating presence of management] needs to be institutionalized at Millstone. There is nothing new or unusual about this, most culture experts [Schein, Carroll, Reason] recommend doing something like this periodically to maintain a healthy culture. Shortly after the 1998 recovery restart, John Beck recommended that Millstone leadership institutionalize something like this. I myself have recommended this to Millstone management nine times [about every year] since recovery. Last year I sent the CEO of Dominion generation the below image of what a healthy management team should look like [what the management team at Millstone should look like].

Industry managers really don't want any part of this. Industry managers would like to maintain the status quo, which is "authority without accountability." The fundamental post-deregulation managerial philosophy of "minimal regulatory compliance" would be threatened if managers were required to "behave properly" and to "listen carefully and responsibly" and address "leadership professionalism" and other managerial organizational process concerns.

The industry lobby group NEI complains loudly if the NRC even hints at starting to develop something that oversees and regulates management. To get the NRC to back off, NEI argues: "the licensee is primarily responsible for safety management, not the NRC, so NRC should stay out of management" [and historically the NRC has backed off].

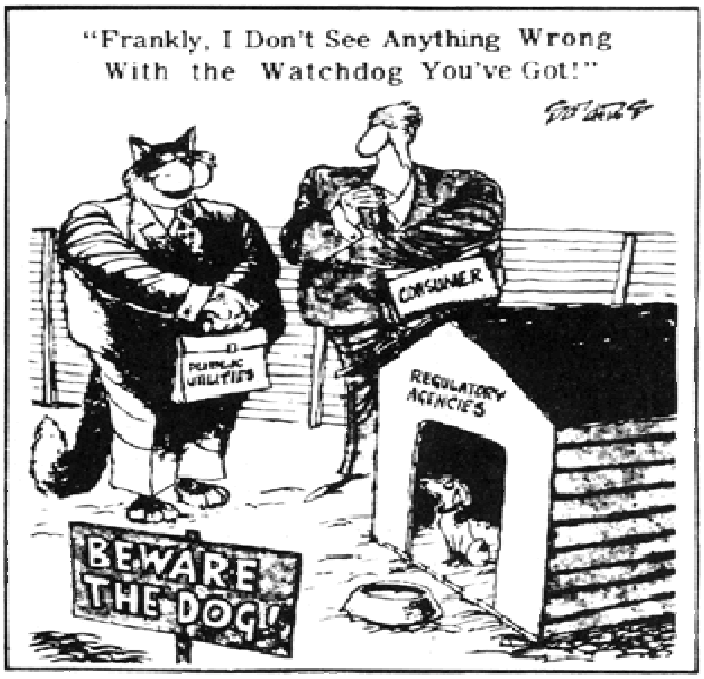
As commissioner Apostolakis [then ACRS chairman] said to the Plain Dealer in 2002:

> *"For the last 20 to 25 years," Apostolakis said, "this agency has started research projects on organizational-managerial issues that were abruptly and rudely stopped because, if you do that the argument goes, regulations follow. So we don't understand these issues because we never really studied them. It's a major failure of the system, in my view."*

Going forward, what the [new NRC commission] needs to do is to say: "yes, the licensee is responsible for managing safety, but the NRC *is responsible for ensuring that safety is properly managed*" and give licensees notice that the days of "authority without accountability" [of texting while driving] and of "low levels of leadership professionalism" are over.

What NRC Needs to Do Next

NRC needs to ignore the industry lobby and wrap both of it's hands firmly around the safety culture issue. For the past 30 years, every time NRC has tried to study how to better regulate safety culture [how to safeguard the industry from "bad management"] lobbyists have complained that NRC needs to "stay out of management". NRC has acted more like an industry lapdog that a watchdog on this issue, and the Ohio reporters covering Davis Besse understood this. This editorial cartoon was published in the Plain Dealer in 2002 after the Davis Besse event.



There is no reason for NRC to continue to be a "lapdog" on the issue of regulating professional [ethical effective] leadership [management] behavior. Management affects safety, and NRC needs to look at what management is doing [carefully and closely]. If NRC continues to be a "lapdog" on this issue, NRC is [clearly] not doing it's job.

So What Regulates [Monitors, Controls] Safety At Millstone Today?

In 1996 the Millstone were shut down for two years while an unprecedented safety scrub was performed. It was not the NRC that initiated the shutdowns, it was the media. It was a front page Time magazine article [by Eric Pooley] that precipitated the shutdowns by challenging the credibility of the NRC, thereby causing the NRC to assume to role of a significantly more robust regulator.

After the Millstone event, reports indicated that for [at least] ten years prior the NRC had not been monitoring and regulating safety very robustly at Millstone. After the event, the state of CT established NEAC [the Nuclear Energy Advisory Council] to monitor safety problems at Millstone and alert the governor if problems arose that significantly impacting safety, and that NRC did not appear to be addressing in a [sufficiently] robust and effective fashion.

It has been 14 years since the 1996 shutdown event, and there is considerable evidence that another safety intervention may be needed. The NRC resident inspectors have for a very long time now been grumbling about some organizational-managerial problems, but NRC does not [yet] have [as Davis Besse indicated] regulatory tools that are sufficiently robust to identify correct [regulate] these kind of problems.

It may [again] be left to worker complaints [articles like this one] and the media to foment and secure whatever corrective actions may be needed at Millstone.

Short Term - What [Exactly] Needs To Happen At Millstone?

What has to change is cost management pressure from above [Dominion executives] needs to be reduced and safety management pressure from below [workers, managers, Millstone Oversight dept] needs to be increased [more "bottom up" authority needs to be institutionalized]. Millstone and Davis Besse and other events continue to show that the NRC ROP crosscutting assessments are not [yet] adequate to ensure healthy [low risk] licensee cultures or management.

Therefore, NEAC must not wait for [must not rely on] the NRC to declare Millstone management "unfit" and managerial actions "unsafe", but should make an independent assessment and advise the CT governor on whether Millstone is "safe enough".

The first thing that should happen is for the state of CT to apply an existing state law established during the Millstone event that says if [upon a prima facie review by CT DPUC] there is a reasonable complaint that worker terminations have affected safety, that Millstone is required to rehire the workers until the events are fully investigated.

I would recommend that NEAC [through the office of the CT attorney general] pursue implementation of the "rehire law", and advise the Governor to disallow the restart of Millstone 3 [planned for mid-May] until the staffing safety issue [and other safety issues identified in this paper] are fully investigated and addressed to the satisfaction of:

- NRC resident inspectors
- INPO representatives
- Millstone Oversight department
- Millstone managers
- Millstone workers
- The CT Attorney General's office

Long Term - The Nuclear Power Industry

The long term solution is for NRC to develop better understanding of MO deficiency accident root cause; and to require all industry licensees to institutionalize [careful responsible proactive] listening to employee safety concerns, to [fully and appropriately] address any of these concerns that represent a significant event risk.

The NRC has yet to develop effective approaches to regulate safety culture. Earlier this year [for the first time in 30 years] NRC launched a [public workshop] effort to define exactly what is meant by the term "safety culture" and to identify appropriate attributes to help NRC properly assess the culture.

NRC is at the beginning [fledgling] stages of developing effective assessments for [and regulation of] "bad management". As one of the 19 members of the "expert panel" at this point I have to say the "public advisory" path does not look very hopeful.

Why not?

NRC is taking advice and input from a large group of stakeholders, all of whom work in organizations that require a well-functioning safety culture. This is like gathering a large group of people who all live inside a human body [one that requires a well-functioning heart] and asking them: "how would you define the heart, and what are the attributes of a healthy heart?"

Most of us have studied how the heart works [at least in a high school biology class] and so we have some knowledge of what it is, how it is constructed and how it works. But without being told this by people who did biopsies and studied the heart and circulatory systems [for many many years] would we really have any idea?

For centuries ancient people believed the heart was the seat of human wisdom and personality. Without being told what the heart does or exactly how it works [without yourself doing biopsies and studying it and the circulatory system for many years] do you think you would be able to produce anything close to the below definition?

> **Heart From Wikipedia, the free encyclopedia**
> The **heart** is a muscular organ found in all animals with a circulatory system (including all vertebrates), that is responsible for pumping blood throughout the blood vessels by repeated, rhythmic contractions.

Only recently have long term studies by specialized groups of experts been able to identify the attributes of heart health [what keeps a heart healthy]. Without being told what they were, just from observing how your heart seems to be reacting to the things you have been doing, do you think would you have been be able to come up with the following attributes?

What Keeps A Heart Healthy:

- Don't smoke
- Exercise a lot
- Keep weight under control [avoid fatty foods and salt]
- Control stress

As I said at the beginning, NRC has a safety advisory committee of "top engineering experts" who have studied [nuclear] engineering safeguards for many years, and are very good at advising on the "engineering" part of safety management.

The longer term solution is for NRC to establish another advisory committee of "top safety culture experts" who have studied "managerial organizational" safeguards for many years, and [will be] very good at advising on the "managerial organizational" part of safety management.

This second advisory group could be called ACMOS [Advisory Committee Managerial Organizational Safeguards].

Such as advisory group requires expertise in three main areas:

1. HRO accident [event] managerial-organizational root cause analysis
2. HRO safety culture assessment and management dynamics
3. HRO safety culture oversight [internal, communitarian, governmental]

What about INPO's Expertise?

INPO uses Edgar Schein as their major advisor for safety culture. Schein is an expert in organizational culture [assessment and management dynamics] but is not an expert in HRO safety culture [such as nuclear, not an expert in area two above]. I discussed this with an INPO manager who looks at managerial-organizational issues. He agreed that Schein is a little "off the mark" when analyzing nuclear safety culture dynamics.

Schein is like your family doctor, he can only make a general diagnosis and is not expert in any of the above areas. One of Schein's contemporaries at MIT [John Carroll] is expert in the second area. He wrote and excellent paper on the Millstone recovery and was a member of the Columbia accident investigation. I am also a HRO [nuclear] safety culture expert in assessment and management dynamics, but like Carroll I am not expert in areas one or three.

Dr. Bill Corcoran [a root cause expert in CT] and Canadian David Mosey [author of "Reactor Accidents"] and UCS David Lochbaum [author of "Fission Stories'] are experts in area one.

Virginia Tech Professor Dr. Joe Rees [author of the definitive history of INPO "Hostages of Each Other" and a book on OSHA safety culture regulation "Reforming the Workplace"] is an expert in area 3 as is John Nance [author of "Why Hospitals Should Fly, The Ultimate Flight Plan to Patient Safety and Quality Care"].

In 2004 INPO published a widely used document called "Principles for a Strong Nuclear Safety Culture". Since 2004 "Principles" has been the primary guide for safety culture management in the nuclear industry.

"Principles" was written [primarily] by a group of 15 industry VPs with a representative from the NRC and a representative from the industry lobby group NEI. Be aware that for some 30 years now, NEI has fought against NRC looking closely and carefully at how industry managers are managing safety[has fought against effective safety culture regulations].

Also be aware that none of the "Principles" authors were "students" of safety culture. None had expertise in any of the three areas identified above. None had any particular interest in encouraging NRC or INPO to take a [close careful] look at how well management is managing safety. All had some personal or professional interest in avoiding managerial NRC [and INPO] scrutiny.

As a result, much of the info in "Principles" is inaccurate and misleading. I was amused by looking at the list of authors and noting how many companies that had loaned people to INPO to develop "Principles" also have plants that are perennially found at the bottom of INPO rankings.

A Word About US Nuclear Plants

US nuclear plants are designed very [very] safe. They can withstand a lot of [very] poor management and still operate safely. My family and I live inside the Millstone evacuation zone, I am not worried, I not going anywhere.

Millstone and US nuclear plants are not like Chernobyl. Even the Russian plants are not [today] designed like Chernobyl. Chernobyl had a very serious design flaw that [the organizational-managerial system] knew about but did not address [covered up] which allowed Chernobyl to continue to operate, with disastrous results.

The reason I have been beating up on NRC for a very long time now [and in this article I "beat up" on Millstone a little] is that people who live near nukes have a right to know what is going on in their back yard, and also that we need better safety management and NRC needs to become a better regulator. NRC needs to go back and learn the lessons of Millstone [correctly this time].

Another reason we need nukes to operate more safely is that we need more of them. Believe it or not, nukes are a much better [healthier more environmentally responsible] way to generate [baseload] electric power than is coal.

Note that I say [baseload] this is very important to understand. The wind does not always blow, the sun does not always shine [for example, often does not shine at night] so until [and unless] an incredibly enormous "magic battery" is somehow invented [and right now there is nothing on the horizon giving even a remote indication that this can someday happen] only nuclear can replace coal.

Due to the work of energy industry lobbyists, old dirty coal plants built before the mid 1970s continue to operate without modern pollution controls. The result is [since TMI] hundreds of thousands of early deaths and millions upon millions of cases of chronic asthma and respiratory disease have occurred that could have been avoided if [after TMI] the US had stayed with it's planned nuclear expansion policy[as for example France did].

What is killing and harming the health a surprising number of [mostly very old and very young] people is something called "particulate pollution." It is only over the past decade that this has been clearly understood. One of the largest contributors is coal soot in the air [breathing soot in the air is equivalent to breathing second hand cigarette smoke].

You think you don't smoke? Think again. You can read about it here:

http://www.americanheart.org/presenter.jhtml?identifier=4419

Additional scary accidents like TMI or Davis Besse [even if no one gets hurt] will likely end the needed expansion of the industry. So we need more nukes, but we need them to operate more safely, and we need to encourage the industry regulators to do everything necessary to make this happen.

A Final Word

Safety culture is really a type of business ethic that ensures business actions do not harm people. Even if safety were not being under-resourced at Millstone, worker terminations that occur in the middle of a string of windfall profits should be taken as a clue that the leadership of Dominion / Millstone are willing to put profits ahead of the welfare of people.

When a business with public safety responsibilities takes actions to make money that either harm or increase the risk of harm people, these kind of action needs to be perceived [by regulators and people in government and the public and shareholders other stakeholders] as a warning flag, as an indicator of a potentially poor safety culture.

Managers who do not understand this should perhaps not be managing in a public safety industry. Regulators and government officials who do not understand this should perhaps not be overseeing public safety. The first lesson that Millstone should have learned from the 1996 shutdowns is that maintaining the trust of all stakeholders is essential.

[End of article]

Information On David Collins

Dave Collins has a MS in Executive Management and Leadership. With the endorsement of NRC safety culture expert John Sorensen, in 2000 he completed a highly successful study of a "state of the art" safety culture CARMA [culture assessment regulation management approach] study at Millstone. Many safety culture experts support his [integrated] culture assessment and management method. In 2003 he wrote a master's thesis on safety culture management. In 2004 he assisted MIT Dr. Michael Golay with an EPRI safety culture modeling project, and has helped develop and test industry safety culture training software. He is currently a member of an NRC expert panel to improve safety culture definition, assessment and regulation. After working as a Design Project Engineer, Oversight Assessor, Human Performance Supervisor, and INPO Coordinator, he retired from Millstone in March of 2009. He continues to work to improve safety management in the nuclear power industry [and beyond] and be supported by leading academics and authors. David lives in the New London county with his wife Kathy.

Dr. Jonathan Wert, Nuclear Industry Safety Culture Consultant:

> *"David, I consider you to be much more qualified than any of the academicians, psychologists or navy nukes that I know or have read about. You have actual experience with nuclear safety culture where the 'rubber hits the road' ground zero on the firing lines."*

Lee Olivier, COO Northeast Utilities [former NU CNO]:

> *"David, good to see you using our experience at Millstone as a model of how to successfully make change. You can treat people with a deep rooted respect and care and still make the hard business decisions…it's how it's communicated, it's the level of trust in the organization etc. Really centering around the issues you identified. Again, your paper was extremely thoughtful and well written. Good luck with it." - Lee*

David Christian [CEO Dominion Generation]:

> *"I think [David] is among the finest intellects and communicators in the area of safety culture."*