

CMRBurns Resource

From: Samuel Miranda <sm973@caa.columbia.edu>
Sent: Thursday, May 31, 2018 11:36 AM
To: Vietti-Cook, Annette; McGovern, Denise
Cc: Bell, Hubert; CMRBurns Resource; cmrsvinicki@nrc.gov; CMRBARAN Resource; CMRCaputo Resource; CMRWright Resource; Veil, Andrea
Subject: [External_Sender] Appeal of the EDO's de facto Backfit Order
Attachments: AppealofBackfit2.docx

Dear Commissioners:

On September 15, 2016, when the Executive Director for Operations (EDO) granted Exelon's appeal of NRR's backfit order of October 9, 2015, he went beyond a simple reversal of NRR's backfit order. In his appeal decision, the EDO established several new NRC positions, and the assembly of these new NRC positions constitute a new, *de facto* backfit order. Furthermore, he did this without a backfit evaluation, or a scintilla of input from the public.

Some of these new NRC positions are problematic, and even untenable.

According to Section III of Management Directive 8.4, the EDO is responsible for reviewing and modifying, "any proposed facility-specific backfitting action on his or her own initiative or at the appeal of the affected licensee or stakeholders." As a member of the public, and one of the two co-authors of NRR's backfit order, I hereby appeal the EDO's *de facto* backfit order .

I am directing this appeal to the Commissioners; not to the EDO, because the EDO has a fundamental conflict of interest, and pronounced bias in this matter. The pattern of evidence is extensive, and well-documented in ADAMS. This appeal ought to be evaluated by a truly separate; independent party. Perhaps the ACRS could do this, since its members' function is to review the reviewers.

The details of this appeal are attached.

Please
read the attachment, and
contact me

for additional details.

If you prefer, you could contact me to arrange a meeting.

Samuel Miranda, PE

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31 May 2018

On September 15, 2016, when the Executive Director for Operations (EDO) granted Exelon's appeal [1] of NRR's backfit order of October 9, 2015 [2], he went beyond a simple reversal of NRR's backfit order. He established several new NRC positions, and these new NRC positions constitute a new backfit order. Furthermore, he did this without a backfit evaluation, or even a scintilla of input from the public. Some of these new NRC positions are problematic.

According to Section III of Management Directive (MD) 8.4, the EDO is responsible for reviewing and modifying, "any proposed facility-specific backfitting action on his or her own initiative or at the appeal of the affected licensee or stakeholders." As a stakeholder, I hereby appeal the EDO's backfit order.

Stakeholder standing:

Recall that, "The NRC's primary responsibility is to ensure that workers and the public are protected from unnecessary or excessive exposure to radiation and that nuclear facilities, including power plants, are constructed to high quality standards and operated in a safe and secure manner. The NRC does this by establishing requirements in Title 10 of the Code of Federal Regulations (10 CFR) and in licenses issued to nuclear users."

With respect to the NRC's responsibility, consider that:

- (1) I am one of 319 million Americans whose health and safety the NRC is obliged to protect from unnecessary or excessive exposure to radiation, and
- (2) I have the NRC's assurance that nuclear facilities, including power plants, are constructed to high quality standards and operated in a safe and secure manner, and
- (3) I have the First Amendment right to petition the government for a redress of grievances (i.e., the NRC's failure to protect the public health and safety), and
- (4) I am one of the two co-authors of NRR's backfit order of October 9, 2015 [2].

This appeal is addressed to the Commissioners:

I am directing this appeal to the Commissioners; not to the EDO, because the EDO has a fundamental conflict of interest, and a pronounced bias in this matter. The pattern of evidence is extensive, and well-documented in ADAMS (e.g., see [3]). For the purpose of this appeal, I will characterize the EDO's perspective with two simple, easily verified facts: (1) the EDO overturned, in less than four months, a backfit order that had taken NRR almost two years to write, review, edit, and issue, and (2) the EDO overturned a backfit order that had been affirmed on appeal, twice, by NRR.

Review of this appeal:

This appeal must be evaluated by a truly separate, independent party. Perhaps the ACRS could do this, since its members' function is to review the reviewers.

Please inform me of your selection in time to avoid any further conflicts of interest. This request is informed by the precedent that has been established by the EDO's telephone conversation of June 30,

2016 with Bradley Fewell (Senior Vice-President and General Counsel of Exelon Generation Company). [4]

Timeliness of appeal:

The EDO's *de facto* backfit order has not been declared, as such. Therefore, the interval that is allowed for a backfit appeal is not defined. In fact, this backfit order is not even complete, since it's missing the required backfit evaluation. Consequently, an appeal may be filed at any time. I chose to wait until the day that the NRC's full complement of five Commissioners was in office. That day was yesterday.

So, this appeal of the EDO's *de facto* backfit order is filed in a timely manner.

Introduction

This appeal is not necessarily a rebuttal of the EDO's backfit appeal decision, nor is it an allegation. This appeal identifies the new positions that are contained in the EDO's backfit appeal decision, and explains why they're new, and problematic.

According to 10 CFR §50.109 (Backfitting), "(a)(1) Backfitting is defined as the modification of or addition to systems, structures, components, or design of a facility; or the design approval or manufacturing license for a facility; or the procedures or organization required to design, construct or operate a facility; any of which may result from a new or amended provision in the Commission rules or the imposition of a regulatory staff position interpreting the Commission rules that is either new or different from a previously applicable staff position." Some of the new positions, of the EDO's backfit order, are significant, since they undermine the principles of nuclear safety and licensing, and could pose a threat to the public health and safety. Some even defy the laws of nature (e.g., critical flow), and the rules of logic (e.g., circular reasoning).

Furthermore, the EDO's backfit order benefits Exelon, at the expense of the public health and safety. It allows Exelon to operate four large plants without demonstrating compliance with several requirements of its operating license. Since these plants' licenses have been renewed, this situation will continue for the next twenty years. The EDO's *de facto* backfit order is exactly the action one would expect from a captured regulatory agency! [5]

Regulatory Basis for Appeal

10 CFR §50.109 also states, "... the Commission shall require the backfitting of a facility only when it determines ... that there is a substantial increase in the overall protection of the public health and safety ... to be derived from the backfit and that the direct and indirect costs of implementation for that facility are justified in view of this increased protection." The EDO's backfit order does not increase the overall protection of the public health and safety. On the contrary, it decreases the protection of the public health and safety. The EDO's backfit is a negative backfit. Consequently, it must be justified by an offsetting or compensatory measure that will somehow enhance the public health and safety. This has not been done.

In his appeal decision letter [1], the EDO states, "In the absence of an assumed failure of the pressurizer safety valve to reseal, the concerns articulated in the backfit related to event classification, event escalation, and compliance with 10 CFR 50.34(b) and General Design Criteria 15, 21, and 29 are no

longer at issue.” Thus, the EDO’s appeal decision imposes regulatory staff positions interpreting the Commission rules that are new or different from previously applicable staff positions. The new positions set aside requirements concerning event classification, event escalation, and compliance with 10 CFR 50.34(b) and General Design Criteria 15, 21, and 29, all of which are based upon the sole assumption that PSVs will not fail to reseal after relieving water.

The EDO uses the “absence of an assumed failure of the pressurizer safety valve to reseal” to establish several new, broad NRC positions regarding event classification, event escalation, and compliance with 10 CFR 50.34(b) and General Design Criteria (GDCs) 15, 21, and 29.

GDCs 15, and 29:

GDC 15, “Reactor coolant system design” states that, “The reactor coolant system and associated auxiliary, control, and protection systems shall be designed with sufficient margin to assure that the design conditions of the reactor coolant pressure boundary are not exceeded during any condition of normal operation, including anticipated operational occurrences.”

GDC 29, “Protection against anticipated operational occurrences” states that, “The protection and reactivity control systems shall be designed to assure an extremely high probability of accomplishing their safety functions in the event of anticipated operational occurrences.”

Both of these GDCs concern conditions of normal reactor operations (i.e., when nuclear fuel sustains a fission chain reaction or criticality), and AOOs. (10 CFR §50, Appendix A defines AOOs as, “those conditions of normal operation which are expected to occur one or more times during the life of the nuclear power unit.”) GDCs 15, and 29 do not apply to emergency conditions (i.e., conditions “that have caused plant parameters to exceed reactor protection system set points.”) [6]

For a Westinghouse plant (e.g., Byron or Braidwood), conditions of normal reactor operations end at 2,400 psia (i.e., the pressure at which the reactor is automatically shut down). If, during an event, the pressure continues to increase beyond 2,400 psia, despite the reactor shutdown, then that event is known to be more serious than an AOO.

Since PSVs cannot open at any pressures below 2,500 psia, they cannot operate during any condition of normal operation, including anticipated operational occurrences. The EDO’s underlying premise, that NRR’s concerns, regarding GDCs 15, and 29, are not an issue due to “the absence of an assumed failure of the pressurizer safety valve to reseal”, is not relevant. That is, PSVs that do not open cannot be assumed to reseal properly.

Therefore, the basis for the EDO’s backfit appeal decision cannot be used to set aside any of NRR’s concerns that pertain to the requirements of GDCs 15, and 29. Dismissing NRR’s concerns, without reason, establishes several new NRC positions, which must be implemented either by a backfit order, or by rulemaking.

GDC 21:

GDC 21, “Protection system reliability and testability”, states that, “The protection system shall be designed for high functional reliability ... commensurate with the safety functions to be performed. Redundancy and independence designed into the protection system shall be sufficient to assure that ...

no single failure results in loss of the protection function.” In other words, GDC 21 recognizes that Murphy’s Law applies everywhere, even in high-quality protection systems.

GDC 21 applies directly to the PSVs, since they are a protection system. The PSVs are designed to provide last-resort reactor coolant system (RCS) overpressure protection. The protection function is fulfilled when the PSVs open, relieve steam, and prevent the RCS pressure from exceeding its pressure safety limit (110% of RCS design pressure, or 2,750 psia). The PSVs are not required to relieve water or close. This is evident in analyses of Condition IV events (e.g., the feedline break analyses in Chapter 15.2.8). Failure of a PSV to close is not considered in any of the Condition IV event analyses. The assumption is not necessary, or even relevant! The only concern that applies, is the PSVs’ ability to prevent overpressurization, regardless of the quality of the fluid they discharge.

So, the absence of an assumed failure of the pressurizer safety valve to reseal has no effect, whatsoever, upon NRR’s concerns regarding the design requirements of GDC 21. The EDO’s premise, “the absence of an assumed failure of the pressurizer safety valve to reseal” cannot be used to set aside any of NRR’s concerns that pertain to the requirements of GDC 21. Therefore, the EDO’s dismissal of NRR’s concerns, without reason, establishes several new NRC positions, which must be implemented either by a backfit order, or possibly by rulemaking.

Event classification, and event escalation

Next, consider “the concerns articulated in the backfit related to event classification, and event escalation. Most of these concerns are unrelated to the operation of PSVs, or even to their existence. They’re related to compliance with design requirements, the content of plants’ licensing bases, and licensee’s commitments. Design requirements, the content of plants’ licensing bases, and licensee’s commitments are not so easily set aside by new or modified NRC positions.

The non-escalation design requirement

The non-escalation design requirement prohibits a Condition II or III event from developing into a more serious, Condition III or IV event, without the concurrent incidence of another, independent fault.

The NRC’s old position (i.e., before NRR issued its backfit order [2]) required licensees to demonstrate their plants’ compliance with the non-escalation design requirement.

The NRC’s new position (i.e., after the EDO rendered his backfit appeal decision [1]) shifted the “fundamental issue” from compliance with the non-escalation design requirement to “the appropriate standard for PSV water discharge.”

The standard for PSV water discharge is irrelevant. This is evident from the preceding discussion, and also from the following review of the role of PSVs during Condition I, II, III, and IV events.

Condition I, and II events are conditions of normal operation, and AOOs. The RCS pressures that are maintained during conditions of normal operation, and during AOOs are too low to cause the PSVs to open.

During Condition III events, the PSVs might open and relieve steam, and possibly also water. If an open PSV fails to reseal, for any reason, then the result would be equivalent to a two-inch hot leg loss of

coolant accident (LOCA), which is a Condition III event. If all three PSVs were to fail open, then the result would be worse. It would be equivalent to a 3.7-inch hot leg LOCA; but still a Condition III event. Therefore, a Condition III event that causes a PSV to fail open would result in another Condition III event. There is no escalation of the event. Furthermore, the quality of the relief flow, whether it be water or steam, or a mixture, would not affect this result.

During Condition IV events, the PSVs might open and relieve steam, and probably also water. A Condition IV event that causes a PSV to open, and fail open would add a Condition III event to the originating Condition IV event. So, in Condition IV, there is (1) no escalation of the event, and (2) no requirement to prevent escalation of the event. In this case, too, the relief of water or steam, or a mixture, would not affect this result.

So, the fundamental issue remains the non-escalation design requirement. There is no support for the EDO's appeal review panel's assertion that this is not the fundamental issue. The EDO's shift, from non-escalation to PSV performance, creates a new NRC position that requires a backfit order, or maybe a rulemaking. That is, any position that is based upon "the appropriate standard for PSV water discharge" is a new position, unless it relates, directly, to the PSVs' designated safety function (i.e., to prevent RCS pressure from exceeding its safety limit). Furthermore, the non-escalation design requirement is a design requirement, and design requirements cannot be set aside, even by the EDO, without adequate, technical justification; subject to the appropriate regulatory procedure (e.g., by backfit or by rulemaking, both of which provide for public participation).

PSV reliability

The NRC's old position (i.e., before NRR issued its backfit order [2]) was that, "failures of PSVs need not be assumed to occur following water discharge if the likelihood is sufficiently small, based on well-informed staff engineering judgment." [7] (This is the position that is identified by the EDO's backfit appeal review panel. It seems that the EDO's backfit appeal review panel has taken a creative interpretation, here. I think Ira Gershwin would have said, "It ain't necessarily so.") There are those who think, as I do, that PSVs must necessarily be assumed to fail open, in conservative accident analyses, after having relieved water. This practice is supported by NRC Information Notice No. 89-90, "Pressurizer Safety Valve Lift Setpoint Shift", which states that, "Repetitive or frequent challenges to the pressurizer safety valves (PSVs) may prevent the PSVs from reseating with a potential for an unisolable small-break loss-of-coolant accident (LOCA)." [8]

The NRC's new position (i.e., after the EDO rendered his backfit appeal decision [1]) eliminated the possibility PSV failures due to discharge of water. The NRC's new position conferred the attribute of infallibility, or absolute reliability upon the PSVs, which conflicts with GDC 21 (and Murphy's Law). The Byron/Braidwood Updated Final Safety Analysis Report (UFSAR), Section 5.4.13.3, states that PORVs limit "undesirable" opening of the spring-loaded safety valves. If there is no possibility of failure, then why would the opening of PSVs be undesirable?

Incredibly, the NRC believes that the PSVs will not ever fail, even after they're operated beyond their design capabilities (i.e., under water relief conditions). According to the NRC's new position, there is no longer a "potential for an unisolable small-break loss-of-coolant accident (LOCA)".

This is a new, non-conservative NRC position that requires a backfit order, or maybe a rulemaking.

Definition of leakage

The NRC's old position (i.e., before NRR issued its backfit order [2]) was silent regarding Exelon's assertion that all three PSVs may lift; but will reclose, and that any leakage would be bounded by the predicted consequences of the Inadvertent Opening of a PSRV (IOPSRV) event (i.e., one fully open PSV).

The NRC's new position (i.e., after the EDO rendered his backfit appeal decision [1]) shifted from tacit acceptance to active support of Exelon's claim. The shift occurred when the EDO rejected NRR's concerns regarding Exelon's comparisons to the IOPRSV. The PSV, as modeled in the IOPRSV event analysis that is reported in the UFSAR, relieves steam at 2,250 psia. However, leakage from three seated PSVs would be subcooled water, at 2,500 psia.

The PSVs are Crosby Model HP-BP-86, size 6M6 (6-inch) spring-loaded valves, each with a throat area of 3.6 sq-in. This is the area of a 2.14-inch diameter hole. The NRC's new position accepts PSV leakage that exceeds the break flow that is predicted for a two-inch hot leg LOCA (a Condition III event). UFSAR Chapter 15.6.5 (Table 15.6-1b, and Figure 15.6-15g) predicts this leakage will (initially) exceed 2.5 million lbs/hr. [9]

So, the NRC's new position accepts the consequences of a Condition III event for a Condition II event. The NRC's new position is based upon a false equivalency (i.e., an invalid comparison) that was submitted by Exelon, under oath and affirmation. The NRC's acceptance of a two-inch LOCA, occurring with frequency of an AOO (i.e., as often as several times per year of reactor operation), is dangerous, inconsistent with the basic principles of nuclear safety analyses, and ultimately unsuitable for licensing purposes.

For information, the IOPRSV event is not really an AOO, since there is no operator error or spurious electrical signal that can cause a spring-loaded PSV to open. That would require a mechanical fault, like the breaking of a spring, which would make this a Condition III event. The IOPRSV event is evaluated, in the UFSAR, as an AOO, just to verify that the reactor protection system is capable of tripping the reactor before any fuel clad damage can occur. The "spurious" opening of a PSV is added, as an AOO, simply because the PSV is about twice as large as PORV. That is, if an open PSV won't cause core damage, then an open PORV certainly won't. This is a conservatism that exists only in the world of licensing. There are a number of examples of other such artificial, even inconsistent assumptions that apply only in the world of licensing (e.g., using very negative moderator temperature coefficients under beginning-of-core-life conditions).

Yet, Exelon used the IOPRSV event, which is conservatively analyzed in the UFSAR solely for the purpose of demonstrating that there is adequate core thermal margin, prior to reactor trip, to claim that PSV water leakage will not exceed the steam flow through an open PSV. However, this flow is really water, and it's equivalent to the break flow from a two-inch LOCA.

This is represented as an acceptable outcome for an AOO. It's a false equivalency, and the NRC now accepts it. In 1709, Alexander Pope wrote that, "A little learning is a dangerous thing". It seems that still applies in 2018. It applies to much of the NRC staff, and the EDO, as well as to Exelon.

In the real world, there have been at least three incidents wherein hot leg LOCAs have occurred. These were stuck-open PORVs, which means that each of these LOCAs was about half the size of a two-inch LOCA.

In 1974, a turbine tripped at Beznau, Unit 1 (a Westinghouse-designed, two-loop plant in Switzerland) [10]. This did not cause an immediate reactor trip. Feedwater flow, steam flow and steam generator level decreased, and pressurizer pressure rose rapidly. This caused both PORVs to open. When pressurizer pressure consequently decreased below the PORV closing setpoint, one of the PORVs did not reseal. So, a Condition II turbine trip progressed to a Condition III LOCA. The open PORV had broken. The operators isolated it.

In 1977, feedwater flow to the steam generators at Davis Besse, Unit 1 [11] was stopped. In this incident, the plant was operating at a power level of only about nine percent. The resulting increase in RCS pressure caused a PORV to open, and stick open. So, a Condition II loss of feedwater progressed to a Condition III LOCA. This condition was also remedied by the operators.

In 1979, there was a loss of feedwater flow incident at Three Mile Island, Unit 2 [11]. The plant was operating at almost full power. The resulting increase in RCS pressure caused a PORV to open, and stick open. Again, a Condition II loss of feedwater progressed to a Condition III LOCA. Unlike the Beznau and Davis Besse incidents, the operators failed to take adequate corrective action. The Three Mile Island LOCA resulted in a partial core meltdown.

There were also incidents (e.g., Salem, in 1994; and Millstone, in 2005), wherein PORVs opened, relieved water, and then resealed. Sometimes, the resealed PORVs leaked; but all were isolable. (PSVs are not isolable.) In all of these cases, AOOs caused the PORVs to open, not the PSVs, relieve steam, and sometimes, relieve water.

It is not known how Exelon's Byron and Braidwood plants' PORVs would respond to similar circumstances. Those analyses don't exist in Exelon's licensing bases. The NRC's new position doesn't require Exelon to perform any such analyses. The EDO's *de facto* backfit order can prevent the NRC staff from compelling Exelon, and other licensees, to remedy omissions of this type.

Normal makeup systems, and critical flow

The NRC's old position (i.e., before NRR issued its backfit order [2]) was silent regarding Exelon's assertion that the flow through a stuck-open PSV would be a minor RCS leak. Exelon stated, "American Nuclear Society standard 51.1/N18.2-1973 ... describes ... a condition II event as a "minor reactor coolant system leak which would not prevent orderly reactor shutdown and cooldown assuming makeup is provided by normal makeup systems only." ... normal makeup systems are defined as those systems normally used to maintain reactor coolant inventory under respective conditions of startup, hot standby, power operation, or cooldown, using onsite power. Since the cause of the water relief is the ECCS flow, the magnitude of the leak will be less than or equivalent to that of the ECCS (i.e., operation of the ECCS maintains RCS inventory during the postulated event and establishes the magnitude of the subject leak)." NRR's backfit order expressed concerns regarding (1) Exelon's definition of a minor reactor coolant system leak, and (2) Exelon's failure to consider two-phase critical flow in its analyses.

For the record, the ECCS does not maintain RCS inventory during the postulated event and establish the magnitude of the leak. It floods the core, pressurizes the RCS, and fills the pressurizer. The resulting water relief, through the PORVs, could cause one or all of them to stick open, which would create a hot leg LOCA. The PORV relief rate is determined by critical two-phase flow, not by the ECCS delivery rate.

The NRC's new position (i.e., after the EDO rendered his backfit appeal decision [1]) accepts Exelon's claims. It is now the NRC's position that the ECCS is a normal makeup system that can compensate for the flow through an open PSV (i.e., a two-inch diameter hole), at 2,500 psia. It is necessary to classify the ECCS as a normal makeup system in order to downgrade the flow from seated PSVs, from LOCA break flow to leakage.

The NRC's new position also contradicts Exelon's UFSAR (Chapter 15.6.2.1), which states that, "A makeup flow rate from one centrifugal charging pump is adequate to sustain pressurizer level and a pressure of 2,250 psia for a break through a 0.375-inch diameter hole." The new NRC position essentially redefines the ECCS. The ECCS, which is designed to flood the core after a LOCA (see Chapter 6 of the UFSAR, and 10 CFR §50.46), is now a normal makeup system.

The new NRC position also neglects the effects of critical two-phase flow. For the record, at high RCS pressures, the rate of critical (choked) water flow, through a PSV, will be much greater than the maximum flow that could be delivered by both charging pumps.

A new design requirement

When Exelon repurposed its PSVs, for use during AOOs, it became necessary to address the possibility of a PSV failing to close. According to Exelon's new design, the requirements of GDC 21 would apply to closure of PSVs as well as opening of PSVs. GDC 21 requires that, "redundancy and independence designed into the protection system shall be sufficient to assure that ... no single failure results in loss of the protection function". Since the three PSVs are connected in parallel, they cannot possibly meet the requirements of GDC 21 when they're all required to close. One failed-open PSV would create a Condition III LOCA, and that violates the non-escalation requirement.

Unlike the Crosby Model HP-BP-86, size 6M6 (6-inch) spring-loaded PSVs that are commonly installed in other Westinghouse-designed four loop PWRs, Exelon's Byron and Braidwood PSVs are required to reseal after having relieved water. This is a new design requirement that has not been reviewed by the NRC (e.g., as part of a license amendment request), nor by Exelon (e.g., in a 10 CFR §50.59). It is a design requirement that is implicit in Exelon's PSV water relief strategy. This design requirement became a new NRC position when the EDO accepted Exelon's PSV water relief strategy. Since Exelon had not addressed this issue, it became necessary for the EDO to do so. The EDO dismissed the problem by setting aside GDC 21, for Exelon's application. This is a new position that was taken without an evaluation, and accepted by the NRC without an opportunity for public to comment.

Compliance with 10 CFR 50.34(b)

Next, consider "the concerns articulated in the backfit related to ... compliance with 10 CFR 50.34(b)". Section (b) of 10 CFR 50.34, "Contents of applications; technical information", specifies the contents of the final safety analysis reports. The NRC's guidance for 10 CFR 50.34(b) is provided in Regulatory Guide 1.70 (RG 1.70), "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants". [12]

Chemical and Volume Control System (CVCS) malfunction events

RG 1.70 specifies two CVCS malfunctions. One malfunction (i.e., the boron dilution) is to be evaluated as a reactivity anomaly, and the other is to be evaluated as a mass addition event. Both events are to be reported in separate chapters of the UFSAR. Exelon's UFSAR claims that the mass addition version of

this event is bounded by the reactivity anomaly version (i.e., the boron dilution). Hence, the mass addition version of the CVCS malfunction event is not evaluated or reported in the UFSAR. Before NRR issued its backfit order [2], the NRC had tacitly accepted Exelon's omission. This issue became one of NRR's concerns in its backfit order. The EDO's backfit appeal decision [1] dismissed this concern, based upon an "absence of an assumed failure of the pressurizer safety valve to reseat".

However, the operation of PSVs have no effect, whatsoever, in analyses of reactivity anomalies. The CVCS malfunction mass addition event cannot be compared to the CVCS malfunction reactivity anomaly (i.e., the boron dilution event). The two events are analyzed for different purposes, according to different acceptance criteria, and using different analysis methods. Assumptions, and input values that are conservative for one analysis would not necessarily be conservative for the other analysis. In the boron dilution event analyses, for example, the pressurizer is not even modeled, since analyses of reactivity anomalies are basically evaluations of potential core reactivity excursions, not of RCS pressure transients.

Consequently, Exelon's licensing bases are missing these mass addition event evaluations. The backfit order establishes a new NRC position, which accepts this omission, and this new position is based upon Exelon's false equivalency.

Inadvertent opening of a power-operated relief valve (IOPORV)

Before NRR issued its backfit order [2], the NRC had not addressed the lack of a UFSAR analysis of the IOPORV, as a mass addition event. The NRC had requested other licensees, in other reviews, to supply IOPORV case analyses; but not yet for Byron and Braidwood. The missing IOPORV case analysis would extend long enough into the transient to demonstrate that the event will not transition from a Condition II event to a Condition III event, and thereby demonstrate compliance with the Condition II non-escalation design requirement. Exelon's IOPORV event had been analyzed only for its potential to cause fuel clad damage. NRR's backfit order expressed this concern; but it was set aside by the EDO's *de facto* backfit order, which was based upon an "absence of an assumed failure of the pressurizer safety valve to reseat".

The operation or performance of PSVs have no effect, whatsoever, in the analysis of any IOPORV case. The NRC's new position allows Exelon to forgo a demonstration of compliance with a written license commitment, to the detriment of the public health and safety.

Begging the question

Exelon's UFSAR Chapter 15.5.1, "Inadvertent Operation of Emergency Core Cooling System during Power Operation", presents an analysis that does not account for the opening of any PORVs. Only the PSVs are assumed to operate. In this case, the Licensee's assumption that the PORVs do not open is not conservative. The conclusion, that no PORVs fail open, is also the initial assumption. That's the definition of "begging the question". Valves that do not open cannot fail open.

Exelon's use of PSVs, in lieu of PORVs, also begs the question by operating equipment that does not become available until after the non-escalation design requirement is already violated. That is, Exelon cannot meet the non-escalation design requirement except by violating it.

It is the PORVs not the PSVs that are designed to deal with AOOs. In an automotive analogy, the PORVs would be seat belts, and PSVs would be air bags. PORVs, like seat belts, are used often, to protect the driver during abrupt stops and occasional fender benders. PORVs, like seat belts, can be engaged, disengaged, and disconnected. They can be used relatively often. On the other hand, PSVs, like air bags, are used once (maybe) in a car's lifetime, to protect the driver during a head-on collision. Exelon's licensing basis does not present an analysis that accounts for the operation (and possible failure) of PORVs, and the EDO's *de facto* backfit order relieves Exelon of the requirement to do so. One could say that the EDO bought a car without seat belts!

The NRC's new position accepts circular reasoning as a licensing rationale, and relieves Exelon from the requirement to demonstrate compliance with a key written license commitment (i.e., the non-escalation design requirement) that underlies the event categorization scheme.

Statement of Consideration

Exelon appealed NRR's backfit order [2], which was based upon the Compliance Exception of the Backfit Rule (10 CFR §50.109). Exelon's appeals cited the backfit rule's Statement of Consideration (SOC) [13], which indicates that, "the compliance exception is intended to address situations in which the licensee has failed to meet known and established standards of the Commission because of omission or mistake of fact." The SOC did not go on to define known and established standards. This caused some difficulties during the NRC's reviews of Exelon's appeals. The EDO's review panel took notice of this when it stated that, "the Commission has not established a more detailed or prescriptive standard." [7] If the NRC will not define known and established standards, then others will. So, Exelon rendered a definition that favored its appeal.

The SOC term, "known and established" standard, can allow the staff to adopt or develop a new position or standard, provided it's adequately known and established. Then the new or informal standard could be used, when justified, in addition to, or in lieu of industry standards. For example, the new or informal position or standard could have its origin in a regulatory position that is developed by the NRC staff in the course of a review of a license amendment request (LAR). If the new position modifies, re-interprets, or supersedes a prior position, then its implementation would have to meet the requirements of the Backfit Rule.

It seems that it would be much harder for a new position to modify, re-interpret, or supersede a regulation. That would have to be implemented via a rulemaking procedure. The EDO's *de facto* backfit order supersedes 10 CFR §50.34(b), and three General Design Criteria (10 CFR §50, Appendix A). The introduction of every publication, in the NRC's NUREG series (e.g., the SOC), states, "Legally binding regulatory requirements are stated only in laws; NRC regulations; licenses, including technical specifications; or orders, not in NUREG-series publications." So, EDO's *de facto* backfit order accepts Exelon's appeal argument, which defines PSV water relief performance as the "known and established" position (an erstwhile undefined term from the SOC), and then uses this to override 10 CFR §50.34(b), and three General Design Criteria. I don't agree that anyone on the NRC staff, even the EDO, can elevate a regulatory position, which is formulated by staff, to the status of a regulation, which is promulgated by rulemaking. It seems the EDO's *de facto* backfit order has done this. Furthermore, this artifice has been used to undermine the event categorization scheme, which has been in use since 1973, and thereby jeopardize the public health and safety.

Summary and Conclusion

When the EDO granted Exelon's appeal of NRR's backfit order, he established several new NRC positions. These new NRC positions constitute a new backfit order that was issued without a backfit evaluation, or input from the public.

Any review of this appeal must not be conducted by the EDO. He has a demonstrable conflict of interest.

Some of these new NRC positions are clearly problematic. The most egregious of these positions is the "absence of an assumed failure of the pressurizer safety valve to reseal". Pressurizer safety valve performance bears no relationship, whatsoever, to NRR's backfit concerns regarding event classification, event escalation, and compliance with 10 CFR 50.34(b) and GDCs 15, 21, and 29. Therefore, allowing that the PSVs will not fail to reseal after having relieved water, would have no effect upon any of these concerns. The concerns remain; but now they are elevated to "known and established" positions by the EDO's *de facto* backfit order. Errors that are identified in NRR's concerns are now essentially irreversible (e.g., omissions in the Byron and Braidwood licensing bases cannot now be filled in).

Some of the NRC's new positions are also untenable. This will become apparent as dozens of licensees, all operators of plants that are equipped with Crosby Model HP-BP-86 spring-loaded valves, begin to submit LARs, that exploit the broad positions of the EDO's *de facto* backfit order, which stems from Exelon's successful appeal. Will the NRC staff be obliged to repeat its errors, and approve these LARs?

Furthermore, the EDO, and his staff have been informed, repeatedly, that their reliance upon this irrelevant PSV performance standard leads to a large number of falsehoods. Each of them is documented in ADAMS. Indeed, the ADAMS record is rife with verifiable falsehoods, some layered upon others. They're capped by the EDO's appeal review panel's assertion that the NRR staff did not make a mistake. [7] This clearly indicates the presence of intent; and intent transforms falsehoods into lies.

Therefore, EDO's *de facto* backfit order, which is based upon lies, fails to protect the public health and safety. Instead, it protects Exelon's bottom line. The EDO's *de facto* backfit order is a classic example of "regulatory capture"—in which an industry gains control of an agency meant to regulate it. [5]

Recordkeeping

Please note that the EDO's office is responsible for recording and tracking this appeal to its backfitting action, in accordance with NUREG-0910, "NRC Comprehensive Records Disposition Schedule." I expect that this message, along with related documents and correspondence will be entered into ADAMS, and made available to the public.

Please contact me for additional details. If you prefer, you could contact me to arrange a meeting.

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REFERENCES

- [1] Result of Appeal to the Executive Director for Operations of Backfit Imposed on Byron and Braidwood Stations Regarding Compliance with 10 CFR 50.34(b), GDC 15, GDC 21, GDC 29, and the Licensing Basis, USNRC, September 15, 2016, (ADAMS Nos. ML16246A247, ML16236A202, ML16246A247, ML16243A067, ML16246A150, and ML16236A208)
- [2] Braidwood Station, Units 1 and 2, and Byron Station, Unit Nos. 1 and 2 –Backfit Imposition Regarding Compliance with 10 CFR 50.34(b), GDC 15, GDC 21, GDC 29, and Licensing Basis, USNRC, October 9, 2015 (ADAMS No. ML14225A871)
- [3] 2.206 Petition Supplemental Information Provided by the Petitioner as the Response to the Closure Letter, February 13, 2018 (ADAMS No. ML17268A208)
- [4] USNRC, Response to Freedom of Information Act (FOIA) Request, FOIA/PA-2017-0292, Stephanie Blaney, dated August 21, 2017
- [5] LTR 14-0269, Transactions of the Korean Nuclear Society Spring Meeting, Taebaek, Korea, May 26-27, 2011, “Development of Checklist for Self-Assessment of Regulatory Capture in Nuclear Safety Regulation”, K.S.Choi, Y.E.Lee, H.S.Chang, S.J.Jung, Korea Institute of Nuclear Safety (ADAMS No. ML14128A431)
- [6] USNRC, NUREG-0899, Guidelines for the Preparation of Emergency Operating Procedures, Resolution of Comments on NUREG-0799, dated August 1982 (ADAMS No. ML102560007)
- [7] USNRC, Report of the Backfit Appeal Review Panel Chartered by the Executive Director for Operations to Evaluate the June 2016 Exelon Backfit Appeal, August 23, 2016, (ADAMS No. ML16236A208)
- [8] December 28, 1989, NRC Information Notice No. 89-90: “Pressurizer Safety Valve Lift Setpoint Shift”, (ADAMS Accession No. ML031190006)
- [9] Exelon Generation Company, LLC, “Byron/Braidwood Nuclear Stations Updated Final Safety Analysis Report (UFSAR),” Revision 15, dated December 2014 (ADAMS No. ML14363A393)
- [10] Transmittal of Reports Regarding Foreign Reactor Operating Experiences, September 25, 1979 USNRC, (ADAMS No. ML031320181 and Generic Letter (GL) 79-45)
- [11] Kemeny, J.G., Report of the President’s Commission on the Accident at Three Mile Island, October 30, 1979, (See pages 29 – 30 for mention of the Davis Besse incident)
- [12] Regulatory Guide 1.70, Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants, Rev 0, February 1972 (ADAMS No. ML11255A151)
- [13] USNRC, NUREG-1409, Backfitting Guidelines, dated July 1990. (ADAMS No. ML032230247)