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January 16, 2002

Mr. David L. Meyer  
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Mailstop T-6 D59  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

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Dear Mr. Meyer,

These are my comments on the License Amendment Requests (LARs) submitted to the USNRC by the Tennessee Valley Authority regarding the production of tritium at Watts Bar Unit 1 and Sequoyah Units 1 and 2 (*Federal Register*, December 17, 2001, p. 65005 ff.). Except as noted, all comments apply to all three reactors at the two sites, since the reactors are so similar and the proposed changes are so similar.

My comments on these LARs are motivated largely by my knowledge of the risk profiles of these three plants gained through many years of NRC-funded research at Sandia National Laboratories. I retired from Sandia in 1999 after 25 years, most of which was devoted to research on nuclear reactor safety and tritium production technology. When I retired I was the manager of the group that produced and maintained most of the NRC's computer simulation codes for severe accidents.

My comments can be grouped into the following principal points:

1. I recommend that in its ongoing review of these LARs, the NRC staff exercise its authority to bring a risk-informed perspective to its assessment. The principal impact of the proposed changes on public health is through their effects on the probability and consequences of severe accidents, which as far as I can tell are not discussed in the LAR documents at all. Only through risk-informed review of these LAR can the real safety impact of the proposed changes be evaluated.
2. Above and beyond the risk-informed decisionmaking issue, I recommend these requests be denied because the proposed changes in mission, plant, and procedures decrease existing safety margins, increase the likelihood of a serious accident, increase the rate of release of radioactive isotopes into the Tennessee River and in general increase the health hazards to the surrounding populations. These deleterious effects are not offset by benefits to the licensee within the domain of activities covered by the operating license.
3. The time frame for needing a new tritium supply within the next decade has been exaggerated by the Departments of Energy and Defense, probably in order to maintain pressure on the NRC's licensing process. Current administration plans for the level of the nuclear arsenal imply that the nation will not need new tritium supplies for at least 20 years.

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Add - M. Padovan (LMP)  
B. Clayton (BAC2)

4. A number of existing problems with the ice condenser containments should be addressed before the NRC considers allowing the proposed modifications to the plants. These long-standing defects have been brought to the attention of the licensee and the NRC but their correction has been avoided or postponed for too long a time.
5. I recommend that the advice of the Advisory Committee on Reactor Safeguards be sought in regard to the reasonableness of these LARs. This would be in keeping with the role the ACRS has played in pivotal Commission decisions for over more than four decades (for both the Atomic Energy Commission and the Nuclear Regulatory Commission).
6. The Department of Energy has, in a report to Congress, falsified NRC's participation and concurrence in an interagency review on the policy concerning the production of nuclear weapons material in commercial reactors. Before review of these LARs is completed, the Commission should set the record straight on this issue in order to dispel the current atmosphere that suggests high level NRC approval of the use of commercial plants for weapons production.
7. Under current law, the NRC does not have the authority to extend these operating licenses to cover defense activities of the Department of Energy. Expenditure of funds by NRC staff to review these LARs is of questionable legality and should not be continued unless appropriate legislation removing the former legal proscription is passed into law.
8. The time frame for public comment should be extended, to allow broader public input.

Below, I will present details supporting these recommendations, organized in outline form to facilitate cross-referencing.

**1. The NRC should invoke risk-informed evaluation processes in its consideration of these License Amendment Requests.**

The NRC's own guidelines on the use of risk-informed evaluation are contained in the document RIS-2001-02, "Guidance on Risk-Informed Decisionmaking in License Amendment Reviews." A set of criteria for invoking risk-informed decisionmaking when the licensee does not initiate it is presented there. In my opinion, these LARs fully satisfy the criteria.

In September of this year, I sent a letter to Dr. Brian Sheron of the NRC, laying out what I consider to be the compelling logic behind NRC's use of risk-informed assessment for these LARs. That letter is attached, and I request that you treat it as part of my comments on the two LARs. Following that letter, I met with a number of NRC staff at Dr. Sheron's invitation in a meeting at White Flint on November 7, 2001, where I had the opportunity to explain my concerns in more detail. The key points to my argument are as follows:

- 1a) Many different NRC studies, the most recent of which (NUREG/CR-6427) I co-authored, have demonstrated that the performance of ice condenser containments in severe accidents is marginal. It is well understood in the reactor safety community that design basis accidents are, for ice condensers, a completely inadequate surrogate for the types of accidents that pose significant risk to the public, which is to say severe accidents. For example, the aforementioned Sandia study estimated that the Conditional Containment Failure Probability (CCFP) for Sequoyah in a Station Blackout accident was 0.97. The Watts Bar figure was not presented in that study, but it was also close to 1, meaning the probability that the containment would fail if all AC electric power was lost to the plant was nearly certain. This abysmal figure of merit has strong consequences on any changes in the plants that might lead to increases in core damage frequency (CDF). For robust

containments (with CCFPs less than 0.01) small increases in CDF do not translate into significant increases in the Large Early Release Frequency (LERF, which is the product of CDF and CCFP). But with CCFPs near unity for some sequences, any changes in the CDF show up as very significant changes in LERF.

- 1b) The 2001-02 criterion, "significantly changes...the probability of the initiating event," is applicable to accidents initiated by sabotage, because prior to these changes the two plants are on a par with all other U.S. nuclear plants in terms of their attractiveness as targets for terrorist attacks, while after the changes they will effectively be the least defended of all facilities in the Nuclear Weapons Complex and by any standard of analysis will be more likely targets.
- 1c) Because of (1a) and (1b) it is highly likely that these changes will create, to quote RIS-2001-02 "'special circumstances' under which compliance with existing regulation may not produce the intended or expected level of safety and plant operation may pose an undue risk to public health and safety." This is also one of the criteria for using risk-informed decision-making. Either this criterion or the one cited in (1b) is sufficient to justify risk-informed analysis of these LARs. Further discussion of why 'special circumstances' apply here can be found in the attached letter to Dr. Sheron.
- 1d) There are specific vulnerabilities of these plants to terrorist attacks, which means that not only are they more likely to be attacked, but also that certain types of attack would be more successful than they would be at other plants. I went into some details on such vulnerabilities at my closed meeting with NRC on November 7. I said at that time and I reiterate here that I believe those details do not belong in the public record, for national security reasons. However, there were about twenty cognizant NRC staff at that meeting and I believe that you are aware of the specifics I am discussing. I would expect the NRC to address those and other plant-specific external event vulnerabilities as a part of your licensing review. At the meeting, a specialist in safeguards pointed out that the NRC has not in the past evaluated the probability of various types of sabotage. My response was that the nuclear weapons complex is well versed in such analyses and the NRC (or the licensee) should utilize those capabilities as part of the LAR assessment. I read recently that Sandia National Laboratories has made its threat assessment methodology and software available to other agencies and organizations. If you are interested in pursuing this line of study, the point of contact at Sandia would be Dr. Rudolph Matallucci.
- 1e) The LAR greatly underestimates increases in the safeguards and security burden that would be required as a result of these plant changes. According to the submittals, the only changes in procedures will be the presence of armed guards during the period between delivery of fresh TPBARs and installation of the reactor head after refueling, and during the corresponding interval after the irradiation is complete and the head is removed. The licensee says, "No security measures, in excess of those normally in place, are required while the assemblies are being irradiated." The report then delegates further security responsibility to DOE. I say that is not acceptable, and that NRC bears the responsibility to evaluate the need for additional safeguards and security, especially during the irradiation period.
- 1f) Another reason for an increase in the likelihood of a severe reactor accident is institutional in nature. Because of its history and unique half-federal, half-commercial-utility nature, the Tennessee Valley Authority has proved to be one of the least capable managers of nuclear power plant construction and operation. After decades of intrusive oversight by the NRC, the TVA is finally showing a safety record that is in the same ballpark as other reactor operators. However, adding another mission (tritium) and another customer (the Department

of Energy) will likely have the effect of reducing the commitment to safety at the top levels of TVA management. Following the Millstone scandal, the NRC has brought heightened attention to management processes and management commitment to safety. The potential for deterioration of management commitment to safety should be evaluated as part of NRC's overall review of these LARs. TVA's motivation for cooperating with DOE in this partnership is troubling. Most knowledgeable observers believe that TVA is cooperating only because by becoming effectively a part of the nuclear weapons complex the agency will be less vulnerable to those in Congress who for years have been trying to disband and privatize it. The conflicted motivational situation at the highest management level does not bode well for maintaining an adequate safety culture at the plants.

- 1g) The fact that some aspects of the tritium operation are classified introduces another institutional problem that is likely to increase the probability of accidents. The history of classified nuclear operations both in the U.S. and elsewhere illustrates that there is an inevitable tension between the need to protect classified information and material and the need to protect the public and the environment. It is not possible to optimize one without compromising the other. That is one reason that all DOE nuclear production facilities have been sited at extremely remote sites and protected by extraordinary levels of physical security. Both precautions are absent here, and the introduction of activities that are classified at the national security level are highly likely to increase the likelihood of dangerous reactor accidents.

**2. Both License Amendment Requests should be denied because the proposed plant changes will increase the hazards to the public, and the corresponding benefit to the licensee does not justify these increases.**

- 2a) Part of the philosophy behind NRC's approach to license amendment requests is that some erosion of safety margins can be allowed if (a.) the erosion is not great, (b.) adequate margin remains, and (c.) the benefit to the licensee justifies the slight erosion. These balances come under the interpretation of the word 'significant' in the language of the Federal Register notice, for example, and also appear in NRC's guidance on the use of risk-informed decisionmaking. The changes proposed in these LARs will not benefit the licensee at all within the scope of the licensed activities. The benefits involve activities of another federal agency operating outside the scope of the NRC-licensed activity. I believe the NRC does not have the legal authority to balance such benefits against reduced safety margins at the licensed plant (see item 7). Therefore, the balancing is of a number of specific decrements in public safety against nothing, and the NRC should on that basis reject the requests.

My point may sound highly abstract, so I'd like to present some hypothetical examples where I think the NRC would invoke this same logic. Suppose a large multi-national, multi-industry corporation owned a nuclear power plant, and corporate headquarters wanted to explore technologies for irradiating food for sale overseas. Suppose the reactor operator then proposed a license amendment whereby a pilot automated irradiation facility would be set up that used the spent fuel pool at its plant. The licensee would be motivated by the corporate profits that might some day accrue from this new market, but I doubt the NRC would consider such a request.

Similarly, suppose a licensee requested a change that would allow irradiation of targets in the core to produce the Mo99 isotope for medical procedures. I doubt if NRC would consider the request—which is why so much effort has been expended by DOE to find alternative ways to produce Mo99.

It is unlikely that the NRC would see requests like this, because they represent dramatic

diversification of the licensed mission, and it is hard to imagine a licensee wanting to make such changes. The motivation of TVA to avoid privatization by becoming a de facto part of the nuclear weapons complex is what makes the current case different. But I believe that the NRC has no right to expand the scope of a nuclear electricity-producing license to cover other industrial processes without a much more dramatic review of pros and cons than a simple application of NUREG-0800 to the existing license.

- 2b) There are many ways that safety margins will be eroded by the proposed changes, some of which are quantified in the licensee's submittal and some of which are not. Clearly, the spent fuel pools will have a reduced margin in the time to boil following loss of cooling, as well as a reduced time to uncover the fuel. Clearly, the expected concentration of tritium in the circulating coolant in both the primary and secondary systems will go up. Similarly, releases of tritium into the river can be expected to increase. On-site worker exposure is likely to go up, partly because of the tritium leakage issues, but also because of the increased monitoring requirements. The TPBAR consolidation activities represent a whole new class of worker exposure that is likely to be measurable and significant. The licensee can argue that these detrimental effects are small, but I argue that when you balance them against the zero benefit within the scope of the licensed activity, you must reject the request.
- 2c) I believe it is poor neutronics practice to increase the overall level of poisoning in the core (consisting of the increased number of burnable absorber rods as well as the added boration in the accumulators) and at the same time increase the fuel enrichment to compensate. It is akin to driving with one foot on the brake and the other on the accelerator. One of the chief safety features of U.S. LWR designs is that negative Doppler and void coefficients guarantee that the system is at a local maximum of reactivity while it is operating at full power. With the exception of some ATWS events, the core is thus protected in a passive way from the worst kind of nuclear reactor accident—reactivity excursions. Throwing excess reactivity into the system and balancing it with compensating neutron sinks compromises the robustness of this safety principle.
- 2d) If despite the above argument the decision is made to add compensating sources and sinks of neutrons, a thorough study should be made of the potential ways that these changes might introduce reactivity injections under accident conditions. In the early 1990s, DOE worked with industry to design a New Production Reactor for tritium production that was based on the heavy water reactors at Savannah River. Argonne National Laboratory was charged with the responsibility to investigate the potential for reactivity injection due to movement of lithium targets relative to the uranium fuel. Their work was important in assisting the reactor designer, Ebasco, to anticipate energetic neutronic excursions and to design around them. No comparable effort has been expended for the CLWR design concept. Has anyone studied the question whether overheating of the TPBARs might force tritium gas out of solution, causing pressurization within the assembly at the same time that a lubricating layer is created within the concentric cylinders? Has anyone asked what the neutronic impact would be both locally and globally if one or more lithium rods were ejected as a result? I was heavily involved in DOE's safety assessments of their proposed production reactors in those years, and I must say that DOE's attitudes towards ensuring a safe design have changed dramatically in the intervening decade. Maybe TVA or NRC should ask Argonne to evaluate such fuel-target separation accidents.
- 2e) I am aware that DOE's topical report on the Tritium Producing Core (NDP-98-181 Rev. 1) addressed some of the TBBAR failure issues mentioned above, but the analysis was cursory and much of the essential information was deleted for either proprietary or security reasons (the report doesn't indicate what the reasons are except to say the information is

'sensitive'). This is the kind of compromise to safety that happens when reactor safety comes into conflict with the need for secrecy (see item (1g)).

- 2f) I do not believe that the licensee has adequately addressed a new accident sequence. This is an accident in which all or most of the TPBARs are dropped during the TPBAR consolidation process. I disagree that this accident is in the same class as the drop of a fuel assembly, since the causes of the accident and its consequences are entirely different. The fact that the event would likely occur when the plant is at full power implies that procedures must be in place to deal with the accident either without a scram or with a scram. Either way, there are important implications for public and worker safety.

**3. The need for tritium for the nuclear weapons arsenal within the next decade is artificial, and not driven by the actual needs of the stockpile.**

In 1994 the Department of Defense took account of the warhead reductions called for in the START-II treaty and concluded that new tritium supplies would not be needed until the year 2011. (For example, see the 1995 Environmental Impact Statement for the DOE's tritium program, DOE/EIS-0161.) The date was revised downward in 1996 because the Russian Duma had not passed START-II (arms reductions stretch the schedule out for when tritium is needed because the surplus warheads can be 'mined' for tritium that can be used to recharge the warheads still in the arsenal). In 1999 START-II was ratified by the Duma. The nuclear weapons program has not, however, corrected the date back to 2011, probably because of a political decision to complete the TVA license amendment process before reassessing the tritium schedule. Moreover, the 2011 date includes a five year reserve, meaning that new tritium will not be needed until at least 2016, assuming START-II levels. The recent Nuclear Posture Review reduces the size of the active strategic arsenal even further, implying the need for tritium will be slipped out to at least 2019, including the reserve, or 2024, not including the reserve. This all means that the license amendment requests are driven by an artificially inflated need. The relevance to NRC's actions is this: if, contrary to my arguments in item 2, the 'benefit' side of NRC's assessment is extended beyond the benefits to the licensee within the scope of the current license, so that benefits to national security are also considered, those benefits are nil, since they are artificial.

**4. There are a number of unresolved safety issues concerning these nuclear power plants that should be dealt with adequately before changes in the plant configurations are allowed.**

- 4a) The extraordinary inadequacy of ice condenser containments for some accident conditions, such as Station Blackout (SBO), has not been adequately addressed by the NRC, though the NRC Director of Research Ashok Thadani called attention to this vulnerability in a recent letter to Sam Collins, Director of NRR (letter dated June 22, 2000). The vulnerability of these containments in SBO conditions is due primarily to the fact that AC power is required for both the igniters and the air return fans, both of which are needed to prevent large hydrogen combustion events during a core melt accident. For this important class of accidents, the containment provides essentially no 'defense in depth.' It is highly inappropriate to use plants of this type for a new multi-mission activity before the vulnerabilities are corrected.
- 4b) Even for accidents other than SBO, the performance of the containment system in mitigating accidents is questionable. One concern is faulty operation of the lower compartment doors into the ice chests. Over the years, swelling of the concrete floor at both Sequoyah units and at the Watts Bar unit has compromised the correct operation of these doors. That is to say, the pressure drop required to open the doors is uncertain and greater than the design value. The current program to remedy these defects will take many years, so the plants continue to operate in a compromised state. It is inadequate to argue that ice condenser performance will be adequate as long as some but not all of the doors operate

correctly. If some of the doors open, the pressure drop on the others will decrease, ensuring that for the remainder of the accident the stuck doors will remain stuck. This configuration will lead to uneven ice melting in the ice chests. Uneven ice melting will result in channeling, which, if it reaches to the top of the ice chest, will create a low-resistance steam flow path into the upper containment long before the full ice inventory is melted. In other words, stuck doors can have the effect of reducing the effective ice inventory by a significant fraction, severely compromising the effectiveness of the ice condensers for both design basis accidents and severe accidents. This is an unreviewed safety question that should be addressed prior to granting these license amendment requests.

- 4c) In 1996 a TVA employee named Curtis Overall found evidence in the form of broken and loose screws that the ice baskets in the Watts Bar plant might not be adequately secured within the ice chests. TVA management at that time did not investigate the possible safety problem, nor did they report Overall's concerns to the NRC. Instead, they acted to remove Overall from his position as lead person on the ice condenser system. Not long afterward he was laid off. Claiming retaliation for protected activity, Overall took TVA to court and won his case and also won the appeal. This summer the NRC took action against TVA because of their harassment of Curtis Overall, but the safety issues he raised were never fully explored. At the time Overall identified the safety concern it would have been possible to ascertain the fraction of defective screw positions in the ice chests because the ice was new. Because of TVA's obfuscation and suppression of information, the ice chest is now well laden with frost, making inspection more difficult. However, the NRC should insist that such inspections take place, not only because there is a safety issue involved, but also because a licensee should not benefit from suppressing safety information and creating an atmosphere in the workplace that is not conducive to a safety culture. The fine NRC has imposed in this case is meaningless to a federal agency that has a \$26 Billion debt.

**5. The Advisory Committee on Reactor Safeguards should be consulted on these License Amendment Requests.**

Over the history of the U.S. nuclear program it has been customary for the ACRS to provide their independent viewpoints about significant reactor safety issues or decisions. The position articulated by NRC at the October 3, 2001 public meeting was that the ACRS wouldn't normally concern itself with (apparently) minor license amendments like these. I find that position highly disingenuous. This license amendment is a watershed in many ways—it is the first that would diversify an operating license to authorize multiple industrial processes in a nuclear power plant; it is the first time that nuclear weapons material would be produced in a commercial reactor; it is the first time that an NRC license would be extended to cover activities of the Department of Energy's weapons program. I could go on. To exclude the ACRS from this momentous decision would either be a trivialization of the Committee's role, or an intentional effort on the part of NRR to avoid controversy at the expense of public safety, or both.

**6. Irregularities in the 'dual use' policy review should be reconciled before the license amendment review is completed.**

In 1997 Congress was concerned about ambiguities in U.S. policy regarding the use of commercial nuclear reactors for the purpose of producing nuclear weapons material, so it ordered the Department of Energy to lead a high-level multi-agency policy review to address past practice and to recommend any legislation needed to clarify the policy. DOE produced such a report in June 1998, concluding that there were no important non-proliferation policy barriers to producing tritium in commercial reactors. The report claimed to be the product of a task force of senior officials from many federal agencies, including the Nuclear Regulatory Commission. However, Freedom of Information Act

queries have subsequently shown that the NRC's participation in this 'task force' was falsified by the DOE, as was the participation of the White House Office of Science and Technology Policy. The participation of other federal agencies is unclear because of their non-response to FOIA requests. Details of this issue are available in an article I wrote in *The Bulletin of the Atomic Scientists*, March/April 2001, entitled "While No One Was Looking." This willful deception on the part of the DOE has clouded the policy issue and created a false atmosphere that the policy issue has been cleared at the highest level of the Nuclear Regulatory Commission. I have informed the NRC's Office of the Inspector General of these facts and it is my understanding that there is an open investigation of the issue. I believe that before these license amendment reviews are finalized, the Commission should take action to clarify its non-concurrence (or at least non-involvement) in DOE's dual use policy study.

**7. The NRC lacks the authority to extend these operating licenses to cover nuclear weapons production activities.**

Current law (42 U.S.C. 7272) forbids NRC from expending public funds for the purpose of licensing defense activities of the Department of Energy. The TPBARs to be installed in the TVA reactors under the proposed license amendments will belong to the U.S. Department of Energy and will be used in the nuclear weapons program. The salaries of all personnel involved in the license amendment process are paid from the defense programs budget of the DOE. This includes the TVA personnel, the NRC personnel, and other personnel contracted to the DOE to support TVA's license request. These activities are illegitimate under current federal law.

**8. Additional time should be offered to public commentators beyond the routine 30 days following the FR notice.**

In my opinion there have been a number of irregularities regarding the timing of some elements of the LAR process. For example, more than half of the supporting analysis was provided by TVA to the NRC in May, 2001, but the public was not notified of the availability of this information until the remainder of the TVA submittal arrived in August. Also, some people in the community near the two plants complained about not having adequate advance notice of the meeting that occurred at the beginning of October. Finally, the Federal Register notice came out right at the beginning of the holiday season (Mr. Padovan of the NRC was kind enough to inform me of the notice on December 19 but other interested parties were not fortunate in that way.) The overall impact of these factors tends to create the impression that NRC is trying to minimize public input. I don't necessarily subscribe to that perception, but I think it is in everyone's best interest to grant additional time for comments. As for myself, I only became aware of the availability of information on the current administration's Nuclear Posture Review the day before comments on these LARs were due. I would like to have the opportunity to comment on the relevance of the new policies on nuclear weapons with regard to these amendments, but will not have time to do so before the deadline.

I would like to reserve the right to provide additional comments if the NRC agrees to extend the comment period beyond January 16. Naturally, I would be glad to answer any questions you might have about these concerns.

Sincerely,

Kenneth D. Bergeron

Attachment

Attachment:

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September 13, 2001

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Dear Dr. Sheron,

I am writing to you about the ongoing staff review of TVA's License Amendment Request that would allow production of tritium at the Watts Bar plant. I have a specific suggestion in that regard, but before getting into it, I'd like to re-introduce myself to you. In the late 1980s, I worked for you as a manager of one of the groups at Sandia doing research on severe accidents. My group's principal focus was the CONTAIN code and performing studies with it for NRC. I remember a number of very stimulating meetings with you after you took over the severe accident program for RES. Around 1989, not long after you moved into RES, I got out of NRC work in order to manage Sandia's support to DOE's New Production Reactor, which was intended to replace Savannah River's K reactor as the source of tritium for the US nuclear arsenal. For a containment specialist like me, this was a very exciting time, because the government and its industry partners on the Heavy Water design were committed to building the most severe-accident-proof containment in history. I had the job of coordinating severe-accident-related work at Sandia, Argonne, Brookhaven and Savannah River, and it was very satisfying to be able to apply some of the lessons from TMI to the design of a reactor that was actually going to be built (or so we thought).

All that changed in 1992 when progress on nuclear arms reductions allowed President Bush to defer the tritium production program (the reason being that the tritium from decommissioned weapons could be used to replenish the weapons that remained in the arsenal). I then found other work at Sandia in international programs, but in 1994 Nestor Ortiz asked me to return to his program and manage all NRC work on severe accident computer codes. So I was responsible for not only CONTAIN, but also MELCOR, VICTORIA, IFCI, RADTRAD (actually an NRR project) and a number of analysis projects for RES and NRR. I continued in that role until I retired in 1999 after 25 years at Sandia.

This little biography is relevant to the Watts Bar LAR because it shows that I'm pretty knowledgeable about tritium production and severe reactor accidents, particularly from the perspective of containment. It turns out, too, that I know quite a bit about TVA's ice

condenser plants, since they were a big focus for the CONTAIN project during the Containment Performance Improvements program in the '80s, and since one of the last projects I worked on at Sandia was the project to resolve DCH for Ice Condensers. In that project I found myself in the unusual position of actually doing the CONTAIN calculations for the project leader, Marty Pilch. This is because most of the people who knew how to run CONTAIN had left the program or retired.

My professional experience with ice condensers and tritium production lead me to have grave misgivings about DOE's plans to obtain weapons tritium by having TVA produce it in the normal course of electricity production at their Watts Bar and Sequoyah plants. I believe that the modifications to the reactor and the added mission for the nuclear management team at TVA will add significantly to the already serious safety problems with these plants. I will, of course, detail the reasons for my concerns in my comments to the licensing Project Manager, Mark Padovan. What I want to ask you is on a higher level than such details. I want to encourage you to insist that the powerful new tools of Risk-Informed Regulation be brought to bear fully on this license amendment.

I was alarmed to see the schedule Mr. Padovan distributed at the August 20 meeting at White Flint. He showed the NRC review process being complete by early March 2002. Such a compressed schedule is completely inconsistent with a thorough assessment even if no element of Reg Guide 1.174 is brought to the review. As an aside, if the schedule is said to have actually begun in April 2001 well I have to cry "foul," since in May I asked NRC by e-mail when the LAR was expected and was informed that it would not be until late summer. I had asked to be kept informed about this and received no notification until Padovan e-mailed me on August 13 about the August 20 meeting.

In other recent public information, NRC has indicated they were planning for a yearlong review, so perhaps I should not focus too much on Padovan's handout. But what that document suggests to me is that the staff is assuming that this license amendment will be reviewed only via deterministic methods, with no additional insight brought in from risk methods.

For this LAR, I strongly encourage you to take full advantage of the authority the Commission has given your staff to use probabilistic methods to supplement the incomplete picture that traditional analysis provides. There are many important reasons:

1. For most containment types, Design Basis analysis is not a bad surrogate for assessing the overall level of protection that the containment adds to the safety of the plant. For ice condensers, the DBA is almost irrelevant as a test for robustness. The ice does a great job with a DEGB LOCA, if you ever were to have one, but it has the effect of increasing hydrogen concentrations in more risk-significant accidents, making the real safety problems worse. Put simply, it is impossible to gauge the effectiveness of the ice condenser containment system with traditional deterministic analysis.
2. It is also impossible to evaluate the true effect of the core modifications on the safety of the plant via deterministic analysis. It is my guess that the principal effect will be on the complexity of fuel handling, and that new event pathways will be important contributors to increased risk. I also think that the likelihood of accidents induced by sabotage may be increased because of the plant's

new defense mission. Obviously, only level II PRA can address such effects.

3. A significant source of added risk is the burden that this new military mission places on the overall management of the plant. There will be many new ways that management commitment to a safety culture at the plant could be compromised. A top-rung utility might be able to rise to such challenges and ensure that the commitment to safety remains the highest priority, but TVA has shown itself not to be in this class. Moreover, TVA's motivation for cooperating with DOE in this partnership is troubling. Most knowledgeable observers believe that TVA is cooperating only because by becoming effectively a part of the nuclear weapons complex the agency will be less vulnerable to those in Congress who for years have been trying to disband and privatize it. The conflicted motivational situation at the highest management level does not bode well for maintaining an adequate safety culture at the plant. It may be difficult to assess the subtle effects of compromised management commitment, but we all know that such effects are real and can be large. It is incumbent upon the NRC to address the issue, and it is only through risk methods that this can be done.
4. Normally, the staff might hesitate to apply risk methods when the licensee doesn't volunteer such analyses, because the NRC has a responsibility to avoid imposing unnecessary burdens on the licensee. The streamlining of many processes and regulations in recent years has been motivated by this philosophy because of the concern that over-regulation might threaten the viability of the nuclear industry itself. Such reasoning is irrelevant in this case. The nuclear industry gets no benefit from these changes (in fact, I believe it will be damaged by it in the long run because of public concerns about mixing military and civilian missions). The cost of the LAR and its review is not coming from ratepayers but from the DOE, which is saving billions by not having to build a dedicated production facility.
5. Time is not of the essence. DOE's schedule for producing tritium by 2005 is a ridiculous exaggeration. It ignores the arms reductions dictated by START-II, which has been ratified by both Russia and the US. The respected physicist Frank von Hippel (former Assistant Director for National Security at OSTP) estimates that we won't really need new tritium until 2029 or later.
6. This is an extraordinarily sensitive Federal interagency issue. Never before have two giant agencies, each with complex agendas quite different from NRC's, joined forces to demand concurrence from your licensing organization on an operating license change. All possible resources should be made available to your reviewers, and the overall process should come under the most intense scrutiny by senior management and the Commission itself. I believe firmly that this license amendment request satisfies the criterion cited in RIS 2001-02, that the change "could create 'special circumstances' under which compliance with existing regulations may not produce the intended or expected level of safety and plant operation may pose an undue risk to public health and safety." Therefore use of risk-informed methods is appropriate. I would go farther and say that not to use the much-vaunted RG-1.174 methods in these extraordinary circumstances would be irresponsible in the highest degree. It would certainly strengthen the case of critics who see risk-informed regulation as nothing but a way for licensees to be relieved of any safety requirements they dislike.

I recognize that the NRC is in a very uncomfortable position because of this License Amendment Request. But the recent, terrible events of this week show only too clearly that the price of regulatory complacency can be incalculably high. I suggest to you that the only rational way for you to proceed is cautiously, using the best scientific tools available.

I would be glad to discuss this matter with you or your staff further, if you so desire.

I have taken the liberty of sharing this letter with some of my former colleagues who are members of

the ACRS.

Sincerely,

Kenneth Bergeron

Copies to:

D. Powers

T. Kress

G. Apostolakis