DOCKET NUMBER
PROPOSED RULE PR 52
(70FR 20062)

(1)

DOCKETED
USNRC

June 30, 2005 (3:45pm)

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

Secretary
US Nuclear Regulatory Commission
Washington DC 20555-0001
Attn.: Rulemakings and Adjudication Staff

June 30, 2005

Re: "Environmental Assessment for AP1000 and Finding of No Significant Impact" Docket No. 52-006

RIN 3150AH56

Comments: Liz Cullington, 390 Rocky Hills Road, Pittsboro NC 27312

1. Generic resolution of Serious Accident Mitigation Design Alternatives (SAMDAs)

As defined on p.7-8, 'severe accident' is an event that is beyond the substantial coverage of design-basis events, including events where there is substantial damage to the reactor core (whether or not there are serious offsite consequences).

The NRC states that SAMDAs are supposed to be considered on a plant design and site-specific basis, but that *"as a matter of discretion, the Commission has determined that considering SAMDAs concomitant with the rulemaking is consistent with the intent of 10CFR Part 52 for early resolution of issues, finality of resolved design issues, and achieving the benefits of standardization." (EA pp. 8-9)*

Not only is the NRC apparently violating its own rules and a court opinion, but it is creating a "finality of resolved design issues" on the basis of flawed analyses (see below) and flawed rationalization.

On page 9 of the EA NRC states that even though the Court of Appeals third circuit opined that it was difficult to evaluate SAMDAs for NEPA purposes on a generic basis, the NRC says they can, because the AP1000 is a "low risk design" and has site parameters (i.e. requirements). However, it should be noted that in the certification rule for the AP1000, it states that if a site fails one or more of these parameters, an applicant can apply for an exemption!

The proposed rule states that if the *"proposed site has characteristics that exceed one or more of the site parameters in DCD, then it would be unacceptable for this design unless the applicant seeks an exemption under Section VIII of this appendix and provides adequate justification...."*

2. Some issues have been raised as SAMDAs and considered resolved for future plants, although they are environmental impacts and should not be considered resolved at this stage, since they were in fact resolved by ruling that they are not SAMDAs.

(p.4) NRC finds "reasonable assurance that there no additional SAMDAs beyond those currently incorporated into the AP1000 which are cost beneficial." And that during the licensing of a future facility where the plant is located on a site that meets the parameters in Appendix 1B of the AP1000 design control document (DCD) these issues are considered resolved for the AP1000 design.

"Those portions of the AP1000 design included in the scope of certification rulemaking would not be subject to further regulatory review or approval in a COL proceeding. In addition, the design certification rule would eliminate the need to consider SAMDAs for any future facility that references the certified AP1000 design." (EA p.5)

Template = SECY-067

SECY-02

(p.11) The applicant itself (Westinghouse) identified 14 SAMDAs for further consideration, yet the NRC considered only two worthy of further rationalization, and has ruled that none of the proposed improvements to the design need to be implemented.

There are three issues considered resolved as SAMDAs even though in resolving them the NRC so much as says they are not in fact SAMDAs because resolving them or not does not affect the likelihood of an accident. Two of these issues concern filtering of containment vents: SAMDAs 2 and 9. One concerns self-actuating containment isolation valves (CIVs): SAMDA 3.

All three proposed SAMDAs would significantly affect potential exposures to the public, and to air, water, local fauna, local crops, livestock, milk etc. and are unresolved environmental impacts that this EA does not and cannot address on a generic basis, on a cost-benefit level.

All three of these safety issues would need to be addressed in a site specific and design specific EIS. However, it is obvious that an EIS done for a plant without such filters or CIVs should find a greater impact than for one with them for a plant at the same site. Yet the NRC is trying to put put these issues off-limits to the EIS for a proposed plant.

One SAMDA issue raised by Westinghouse and dismissed in the NRC's EA (SAMDA 5) includes the inappropriate statement that "this design alternative is not consistent with the AP1000 design objectives. The AP1000 would change from from a plant with passive systems to a plant with passive and active systems." (EA p.13)

What is particularly remarkable is that this particular potential improvement to the AP1000 involves an "Active high-pressure safety injection (HPSI) system ... that would be capable of preventing a core melt for all events except the large break [loss of coolant accident (LOCA)] and [anticipated transient without scram (ATWS)]."

This appears to be a marketing not a safety analysis, suggesting the plant is to be operated with few to no skilled operators, which is again a marketing plus unrelated to improved safety. The fact is that reliance on passive systems is not a good selling point for potential nuclear plant neighbors. While we appreciate what the concept is, even that of an idiot-proof plant, it's far from reassuring that the idiots won't be able to activate an emergency water supply if other systems fail.

3. Security

The EA contains no assessment of the impact of an accidental or deliberate external rupture of the AP1000's unreinforced containment structure.(Even the potential of internal rupture, while considered by Westinghouse is not to be prevented by a "high-pressure containment design" (SAMDA 3, EA p. 15). Sabotage is one of the many areas in which the NRC admits that PRA modeling and data are "sparse or even non-existent" (EA p.27).

The ACRS has characterized this aspect of another proposed design, the modular pebble-bed reactor, as "a major safety trade-off" designed to lower the cost of the plant. [Cited in 2001 UCS testimony to US Senate.]

4. Lack of concrete basis for EA and no demonstration plant

How can anyone do a "Environmental Assessment" or a FSER on a plant design that exists only on paper and that has never been constructed completely to scale and operated anywhere in the world? As UCS stated regarding the pebble bed design,

"It cannot be overemphasized that a facility like the proposed pebble-bed modular reactor has never

been constructed or operated in the world. Consequently, its expected performance characteristics are highly speculative. It would not be prudent at this time to place undue reliance on a risky technology with unproven safety performance. Nuclear experiments belong in the laboratory, not within the US electricity marketplace." (Union of Concerned Scientists, *Advanced Reactor Study,* prepared by MHB Technical Associates, Cambridge, MA: UCS, July 1990.)

5. Over-reliance on passive systems

IEER stated in 2001 "Karlheinz Orth, an official of the nuclear division of Siemens AG, for example, has said that the contrast between the effects of the Three Mile Island and Chernobyl accidents proved the basic soundness of the pressurized light water reactor. But at the same time Orth criticizes some of the new designs for an over-reliance on passive systems. As he told an international safety conference in 1988:

"The importance of passivity is overestimated. Every reactor concept is based on certain inherent safety features and also depends on active and passive engineered safety features.... Where reliance is placed solely on inherent safety features or on purely passive engineered safety features, it would not be possible for an operator to select or even influence the final condition of the plant.... There is no reason to leave today's mature LWR technology only in order to experiment with ... half-developed but 'alternative' concepts. Preferences established by publicity can be no substitute for operational experience." (As quoted in *Nucleonics Week: "Outlook on Advanced Reactors"* March 30, 1989, pp. 1-20.)"*

IEER has raised another serious concern in the approval and deployment of so-called advanced reactor designs: "the possibility that in designing to eliminate certain now-commonly recognized accident possibilities, new accident scenarios will be unwittingly introduced. As a survey of advanced designs by Britain's Atomic Energy Agency concluded:

"*Safety arguments, in many cases, are very underdeveloped, making it difficult to gauge if the reactor is any safer than traditional systems. [Advanced reactor] designers tend to concentrate... on one particular aspect such as a [loss-of-coolant accident], and replace all the systems for dealing with that with passive ones. In so doing, they ignore other known transients or transients possibly novel to their design."* (As quoted in *Nucleonics Week: "Outlook on Advanced Reactors"* March 30, 1989, pp. 1-20.)"*

The EA admits on pp. 22-23 that

"The applicant's estimates of risk do not account for uncertainties in the CDF [core damage frequency] or in the offsite radiation exposures resulting from a core damage event. The uncertainties in both of these key elements are fairly large because key safety features of the AP1000 design are unique and their reliability has been evaluated through analysis and testing programs rather than operating experience. In addition, the estimates of CDF and offsite exposures do not account for the added risk from earthquakes."

6. The AP1000 is an unnecessary and unsafe variation on the AP600

Westinghouse states on its web site for the AP1000 that

"The primary purpose of developing the AP1000 was to retain the AP600 design objectives, design details and licensing basis, while optimizing the power output, thereby reducing the resulting electric generation costs."

Yet the smaller, more tolerant AP600 was developed with extensive industry input to meet cost and

timeline goals. The applicant's web site for the AP600 states that the Advanced Light Water Reactor (ALWR) Utility Requirements Document (URD) was developed by both US and international utilities, and covered all the following areas:

* Safety
* Design Margin
* Simplification
* Field-Proven Technology
* Human Factors
* Design Basis vs Safety Margin
* Operation and Maintenance
* Reliability and Availability
* Constructibility
* Standardization
* Regulatory Stabilization
* Quality Assurance
* Sabotage Protection
* Good Neighbor Policy

If these utilities had really needed a larger unit, they should have specified so at the beginning. If the approx. 600 MGW output of the AP600 is the maximum output of a plant design meeting the safety, QA, and other goals, then safety should not be sacrificed by the approval of a design for which there is a greater possibility of failure. Particularly if this is to comprise the bulk of likely first orders. Proponents of "newer, safer nuclear plants" would be well advised to ensure that the first plants built are the safest of all possible alternatives.

Approving the AP1000 in this last step is to accept a downgrading of safety margins in favor of US utilities' obsession with the 1000 MGW figure.

7. Re-engineering to utility spec size compromises safety

On page 16 the EA states that *"The NRC notes that the AP1000 design is less tolerant of equipment failures than the AP600 because the large LOCA [loss of coolant] success criterion for the AP1000 requires operation of two of two accumulators whereas only one of two accumulators is required for the AP600, and because the LOCA success criterion of the AP1000 requires operation of three of four automatic depressurization (ADS) stage 4 valves whereas only two of four ADS stage 4 valves are required for the AP600."*

NRC did request that Westinghouse perform an evaluation of "the two additional design alternatives," larger accumulators or larger pipes and valves.

"For both of these alternatives, Westinghouse estimated that the redesign and reanalysis cost of the changes would be significantly greater than the benefits of completely eliminating all severe accident risk for the AP1000. Therefore, these design changes were not pursued further." (EA p.17)

This conclusion and the entire SAMDA analysis by NRC has to be vigorously questioned for many reasons:

(a) Westinghouse officials have stated that they are already working on a COL for the AP1000, and it's well known that DOE is going to subsidize "first of a kind engineering" (FOAKE) costs for the first plants constructed of each of the new NRC approved designs, so that the applicant is not going to have to bear all costs (vs. hypothetical benefit);

(b) secondly, because there seems no inclusion in this cost/benefit argument of the "benefit" of a plant which has little or no "severe accident risk" not only for the public in general, but for the applicant, Westinghouse, which surely stands to gain significantly if the AP1000 is "as safe" as the AP600 is supposed to be;

(c) the methodology of the cost-benefit analyses is totally faulty, both for costs, and benefits, and ought to be redone for all identified SAMDAs. (See below)

It would appear that Westinghouse has already promised or been asked to guarantee certain construction costs caps for the AP1000, and that Westinghouse and the NRC are being pressured to speed up approval of this redesigned version of the AP600 in spite of significant degradation of safety margins.

8. The method used in the cost-benefit analysis was an incorrect one and overstated costs of additional safety features

On pages 19 and 21 of the EA it is revealed that replacement power costs were included in the hypothetical costs of adding each of the 14 SAMDAs to the AP1000 design, and that the applicant used "the cost benefit methodology of NUREG/BR-0184." But this methodology and this rule apply only to a back fit situation, not to the cost of implementing a safety feature, at the design stage, on which much of the engineering and analysis has already been done, as part of analyzing how to address a severe accident risk, within the specific design parameters of this plant

In addition DOE is going to subsidize up to 50% of FOAKE costs for the first plants of each design, which should reduce any additional "engineering and reanalysis" costs for SAMDA implementation.

Did the applicant's analysis include the cost of the actual component? That would not be appropriate, but would be part of a back fit rule.

Thus the engineering, "reanalysis" etc. costs cited by Westinghouse are possibly overstated, but the addition of replacement power costs is simply unforgivable, and the entire list of 14 SAMDA issues should be recosted and final certification acceptance delayed.

9. Replacement power and repair cost not included in "benefit"

Curiously replacement power, which currently is added incorrectly to the cost of adding a SAMDA fix to the AP1000 design, is omitted from the other side of the equation where it belongs.

In analyzing the "benefit" of any given fix (in terms of accident avoidance) the benefit seems to be limited to hypothetical exposure to the public, not to damage to the plant, repairs, outage time, and, replacement power. Pages 19 and 21 of the EA spell out that the benefit or risk reduction of each SAMDA considered was solely based on person-rem exposure, with no other costs included!

This in spite of the fact that NRC expressly states the importance of avoiding the significant costs of serious accidents, fuel damage, etc., saying that

"The results of the analysis indicated that design alternatives which prevent accidents (i.e., reduce the accident frequency to zero) are much more cost-effective than design alternatives which reduce or eliminate offsite releases, but have no effect on accident frequency. This is because of the fairly large benefits of averting onsite cleanup and decontamination costs and avoiding replacement energy costs." (EA pp.23-24)

Yet the "benefit" of "averting onsite cleanup and decontamination costs and ... replacement energy costs" is not calculated as an offset against the cost of implementing a design improvement (SAMDA).

By this completely faulty method, the applicant estimates that "the present worth of eliminating all risk to be $21,000." I would have thought that it would be worth that amount in PR alone, not to mention increased dominance of an emerging market.

10. Even the exposure calculations seem suspect

Benefits of design alternatives *"were estimated on the basis of the reduction of risk expressed in terms of whole body person-rem per year received by the total population within an 80.5-km (50-mile) radius of the AP1000 plant site, as discussed in section 19.4.2 of the AP1000 FSER."* (EA p.19)

First one must question how one can estimate populations that are totally hypothetical. But secondly one must query the use of the ENTIRE population within a 50-mile radius of the plant. Is the AP1000 that dangerous?

It seems more likely that this method was used here, as in the FSER, because this would have the effect of diluting the hypothetical exposure from an accident in a larger pool of mostly unaffected hypothetical individuals. This would then have the result of rendering such exposures below a level of concern, so that projected increases in cancer are only marginally over the current incidence. This gives a free pass on many projected increases in cancer.

This may go a large way towards explaining why the "benefit" of the proposed SAMDAs is so pathetically small, combined with the fact that it appears that all other costs of a severe accident were excluded.

11. NRC accepts applicants methodology when cost of a SAMDA is too high, but not when it is within acceptable range

Should any further proof be needed that time, not safety, is driving the AP1000 certification process, NRC accepts the applicant's flawed methodology when estimating the cost of implementing a SAMDA as higher than the estimated benefit, yet rejects the applicant's estimate for SAMDAs that fall within an acceptable range of being equal to the estimated benefit.

Although it was one of two issues the NRC felt deserved further discussion, one possible safety improvement, SAMDA 3, self-actuating containment isolation valves (CIVs), is dismissed on page 25 of the EA, even though the applicant had estimated that the cost was close to the estimated benefit. The NRC blithely claims that the applicant had underestimated the cost of self-actuating CIVs so "the NRC concludes that this design alternative is not cost-beneficial and need not be further evaluated."

12. Remaining uncertainties and significant omissions

The EA concludes that

"it is possible that the areas of the PRA [probabilistic risk assessment] where modeling is least complete, or supporting data are sparse or even nonexistent, may actually be the more important contributors to risk. Areas not modeled or incompletely modeled include human reliability, sabotage, rare initiating events, construction and design errors, and systems interactions. [But] the NRC does not expect that additional contributions would change the conclusions in absolute terms."

(EA p.27)

It is simply unacceptable that these aspects of reality-based operation were not modeled at all, when they are considered "the more important contributors to risk." It is simply not good enough for the NRC to adopt a "stuff happens" policy to these risks. While the frequency of some of the factors can hardly be predicted, it is precisely these factors that lend importance to the 14 issues so cavalierly dismissed earlier in the EA, and apparently in the design approval process.

If preventing Sept. 11th would have cost a few hundred thousand dollars, who could be found to say it would be too expensive? Why is a runaway reactor held to a different standard?

Does the NRC really want to throw the last switch on the deployment of a new generation of nuclear reactors without ensuring that the risk of accidents and/or offsite releases is as close to zero as possible?

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* Institute for Energy and Environmental Research, "The Nuclear Power Deception: Chapter 7, 'Inherently Safe' Reactors," Sept. 2001.

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