FPL Energy Duane Arnold, LLC
3277 DAEC Road
Palo, Iowa 52324

FPL Energy.
Duane Arnold Energy Center

March 20, 2007

NG-07-0257
10 CFR 50.90

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Duane Arnold Energy Center
Docket 50-331
License No. DPR-49

Response to Request for Additional Information Regarding Proposed Technical Specification Changes at Duane Arnold Energy Center to Implement the Revised Rule for Combustible Gas Control (TAC NO. MD2619)

References: 1) G. Van Middlesworth (FPL Energy Duane Arnold) to USNRC, "Technical Specification Change Request (TSCR-083): Adoption of TSTF-478, Rev. 0, "BWR Technical Specification Changes that Implement the Revised Rule for Combustible Gas Control," NG-06-0472, dated July 17, 2006.

2) K. Feintuch (USNRC) to T. Browning (FPL Energy Duane Arnold), "Draft Request for Additional Information Regarding Proposed Technical Specification Changes at Duane Arnold Energy Center to Implement the Revised Rule for Combustible Gas Control (TAC NO. MD2619)," transmitted by facsimile on February 9, 2007.

3) TSTF Letter to USNRC, "Response to NRC Request for Additional Information Regarding TSTF-478, Revision 0, 'BWR Technical Specification Changes that Implement the Revised Rule for Combustible Gas Control,' dated November 9, 2006," TSTF-07-07, dated February 7, 2007.

In Reference 1, FPL Energy Duane Arnold requested an amendment to the Duane Arnold Energy Center (DAEC) Technical Specifications (TS) to eliminate the requirement for the Containment Atmosphere Dilution (CAD) System from the DAEC design and licensing basis. The change request also proposes to extend the allowable time for the primary containment to be de-inerted during startup and shutdown evolutions. The proposed changes to the DAEC TS are consistent with those previously docketed by the Technical Specification Task Force (TSTF) as a generic traveler, TSTF-478, Rev. 0, which is also under review by the Staff.

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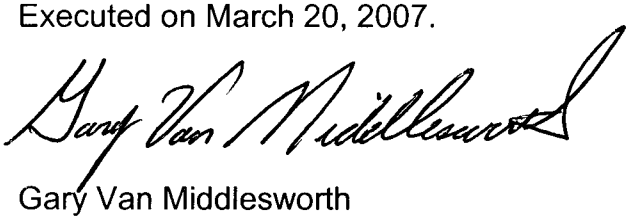
The Staff has determined that additional information is needed in order to review our application (Reference 2). This request for additional information (RAI) is very similar to the Staff's generic questions posed on TSTF-478, to which the TSTF responded in Reference 3. FPL Energy Duane Arnold has reviewed the Reference 3 responses and proposes to utilize that information in our enclosed responses to Reference 2, as applicable to the DAEC.

This letter makes no new commitments or changes to any existing commitments.

If you have any questions or require additional information, please contact Mr. Tony Browning at (319) 851-7750.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on March 20, 2007.



Gary Van Middlesworth
Site Vice President, Duane Arnold Energy Center
FPL Energy Duane Arnold, LLC

Enclosure

cc: Administrator, Region III, USNRC
Project Manager, DAEC, USNRC
Resident Inspector, DAEC, USNRC
D. McGhee (State of Iowa)

NRC Request for Additional Information

General Comment Regarding Extending the Completion Time from 24 hours to 72 hours

In the late 1980's, the U.S. Nuclear Regulatory Commission (NRC) pressed the industry to eliminate the 24-hour time period during which the containment could be de-inerted. In response, some licensees voluntarily limited the de-inerted periods to much less than the 24-hour limiting condition for operation (LCO) within their technical specifications. As discussed in SECY-89-017, the staff did not further pursue eliminating the time period on the basis that: (1) the probability of an accident occurring within the 24-hour de-inerted period is small, and (2) eliminating this time of de-inerting would not significantly reduce risk. The fact that licensees did not need the entire 24-hour period seems at odds with the current FPL Energy argument that 24 hours is insufficient. Furthermore, the staff is unaware of any plant-specific requests for a completion time greater than 24 hours. In this regard, please provide the additional information identified below to support the claim that a longer completion time is appropriate and would not substantially impact risk.

FPL Energy Response:

FPL Energy cannot comment on why the industry, as a whole, did not pursue this change in the late 1980's. We can only discuss this situation within the context of actions on behalf of the Duane Arnold Energy Center (DAEC). At that point in time, postulation of combustible gas mixtures was still considered to be part of the plant's design and licensing basis, pursuant to 10 CFR 50.44. Consequently, relief from these requirements would have required an exemption per 10 CFR 50.12. Because "risk informed decision making" had not yet been introduced into the regulatory process, only deterministic arguments and analysis were accepted as technical justifications for such exemptions. The deterministic analysis approach was prescriptively described in the DAEC Updated Final Safety Analysis Report (UFSAR) in our commitments to Safety Guide 7 (later, Regulatory Guide (RG) 1.7). Thus, until RG 1.174 for risk-informed changes to the licensing basis became available in 1998, there was no practical alternative approach for seeking relief from the previous requirements under §50.44, notwithstanding any hardships imposed by those requirements. These hardships formed the motivation for the NRC to use risk-informed arguments to revise §50.44 in 2003, i.e., that these prescriptive requirements were not commensurate with the associated risk. The industry, including FPL Energy, is now utilizing the relief offered by the revised rulemaking to §50.44 to relax the prescriptive requirements beyond those originally provided in generic Technical Specification change package TSTF-477, which was approved for the DAEC as License Amendment 254 in 2004.

Specific Information Requested

1. Provide a more detailed description of the operational experience with the 24-hour completion time at Duane Arnold Energy Center (e.g., over the last 15 to 20 years), with supporting statistics. Include the following items in the response:

   a) a typical timeline for a plant startup and a plant shutdown, showing the times at which inerting/de-inerting is initiated and completed, the times in each operating mode, and the times at which the LCO is entered/exited,

   b) the number of startups and shutdowns in which inerting/de-inerting: caused a trip, became a critical path activity, or was perceived to have placed the plant in a less-safe state, and the total number of startups and shutdowns in the covered period,

   c) a description of typical control room staffing during the startup and shutdown periods, whether the control room staffing is supplemented to address inerting and de-inerting, and how the responsibilities for inerting and de-inerting are distributed among the control staff, and

   d) a discussion of any other operational hardships created by the current 24 hour "window" to perform inerting/de-inerting.

FPL Energy Response:

a) The generic timeline given in Reference 3 of the cover letter, response to Question 1a, is basic to most Boiling Water Reactors (BWRs) that have inerted containments and is considered applicable to the DAEC.

   From the last DAEC startup with inerting activities (Refuel Outage (RFO) 19):

   May 3, 2005

   04:30 Reactor enters MODE 1
   11:15 Primary Containment N_2 purge (inerting) begun
   11:18 Reactor Power ~15% of rated (LCO entered, 24 hour clock begins)
   15:38 Main Generator placed on grid
   17:35 Primary Containment Inerting complete (LCO exited)

   time to inert = 6 hours, 20 minutes
   time on LCO clock = 6 hours, 17 minutes

   From the last DAEC shutdown with de-inerting activities (RFO 20):

   February 3, 2007

   04:28 Primary Containment de-inerting begun

06:13 Primary Containment O_2 level ~4% (LCO entered, 24 hour clock begins)
17:06 Power Reduction begun in preparation for RFO20

February 4, 2007

01:22 Reactor Power ~15% of rated (LCO exited)
02:17 Reactor enters MODE 2
04:10 Reactor enters MODE 3
14:50 Primary Containment air purge complete (de-inerted)
15:24 Reactor enters MODE 4

time to de-inert = 34 hours, 22 minutes
time on LCO clock = 19 hours, 9 minutes

b) While it is not practical for us to research the operational records for the last 20 years, most of which are microfilmed hardcopy Operations logbooks, to itemize the occasions where this Technical Specification (TS) provision created delays or other problems, we can say that the DAEC experience with the subject TS provision is very similar to that described generically in the TS Task Force (TSTF) letter (Reference 3 in this cover letter).

Simple electronic searches in the DAEC Corrective Action Program database, which covers the time period of 1994 to date, found at least 4 instances where equipment issues caused delays in inerting/de-inerting the containment.

c) FPL Energy does not specifically augment the control room staff for the purposes of inerting/de-inerting the containment during startup/shutdown sequences. The normal compliment of operations personnel consists of:

1 Operations Shift Manager (OSM) – Senior Reactor Operator (SRO) license
1 Control Room Supervisor (CRS) – SRO license
3 Reactor Operators (RO) – Reactor Operator license
2 Equipment Operators - non-licensed
1 Shift Technical Advisor (STA)
Note: another SRO may be assigned to supervise core reactivity manipulations during startup/shutdown sequences.

The duties for inerting activities are shared between one RO in the Control Room and two Operators in the plant, with oversight by the CRS, and support from one Health Physics technician. These are not dedicated activities; these individuals will also be involved in other startup/shutdown evolutions concurrent with those associated with inerting/de-inerting. Because licensed operators are needed for these activities, it is not practical, nor prudent, to assign additional personnel to the Control Room to assist, without adversely impacting crew manning on later shifts (i.e., there are a finite number of DAEC licensed operators), and diluting the Command and Control function of the Control Room Supervisor by having extra personnel engaged in control room activities.

d) One additional hardship that is associated with this TS requirement is that the LCO Applicability uses 15% RTP [rated thermal power], which is a dynamic state during plant evolutions. Depending on other equipment manipulations, power can drift above and below 15% power causing the Applicability's 24 hour clock to needlessly start and stop. As requested in the TS change, the new Applicability would simply be MODE 1, which is a static point in the startup sequence.

2. Provide an anticipated typical timeline for a plant startup and a plant shutdown assuming a 72 hour completion time, showing the times at which inerting/de-inerting is initiated and completed, the times in each operating mode, and the times at which the LCO is entered/exited.

FPL Energy Response:

The generic timeline given in Reference 3 of the cover letter is judged to be applicable to the DAEC.

3. Provide justification that inerting/de-inerting would have a lower likelihood of causing a trip, becoming a critical path activity, or placing the plant in a less-safe state if the completion time is extended from 24 hours to 72 hours.

FPL Energy Response:

As described in the Reference 1 submittal, by opening up the window from 24 to 72 hours, inerting can be postponed during the startup sequence from a time with many required activities in progress (15% to 20% RTP), to a less busy time (after 40% RTP). FPL Energy Duane Arnold believes that this extended LCO time would improve Control Room functioning (command and control) by having fewer concurrent activities underway. Implicit in this belief is that the likelihood of human error leading to an unacceptable outcome is diminished.

The current TS window requires a prediction of a future event (i.e., when 15% RTP will be reached during the shutdown sequence), in order to know when the de-inerting window opens up. If there is any substantial delay in reaching 15% RTP after de-inerting has commenced, a situation can develop where a needless distraction and diverting of operator attention from the cause of the delay (typically an equipment problem), and a commensurate waste of nitrogen gas, to restore compliance with the LCO on Oxygen Concentration before the 24 hour clock expires. By providing more time margin in the prediction of this future event, the likelihood of exiting the LCO Applicability (<15% RTP) prior to the expiration of the compliance window is increased, and such distractions would be avoided.

4. Based on a scoping assessment performed by the NRC staff for Duane Arnold Energy Center, the change in large early release frequency (ΔLERF) for the proposed

extension would exceed the 1 E-7 per year value associated with a "very small change" in Regulatory Guide 1.174. (Note that the NRC's assessment of ΔLERF is based on core damage frequency x ΔLCO x Δconditional containment failure probability.) Provide an assessment of the approximate level of the risk increase associated with extending the completion time from 24 hours to 72 hours. This assessment should address the factors identified below.

a. the likelihood of either an internally-initiated or an externally-initiated core damage event occurring during the additional 96-hour period (i.e., 48 additional hours during startup and 48 additional hours during shutdown),

b. the potentially higher core damage frequency associated with transition risk during startup and shutdown, when the containment might be de-inerted, and

c. the increase in the conditional containment failure probability for a de-inerted containment (essentially 1.0) versus an inerted containment.

FPL Energy Response:

a) The original submittal (Reference 1 of the cover letter, Attachment A, page 5) contained FPL Energy Duane Arnold's evaluation of ΔLERF for internal events, using the DAEC plant-specific Probabilistic Risk Assessment (PRA) model and is repeated here for the Staff's convenience.

> However, the additional 48 hour allowance above the current 24 hours is judged to not be a risk-significant increase in LERF, as the additional time the containment will be de-inerted while in the Mode of Applicability will be only a 1.2% increase annually (assuming one plant shutdown and startup sequence per year = 96 additional hours de-inerted and a 30 day shutdown). Per Reference 6[1], it was judged that the conditional probability of a large early release approached unity (1.0) if a Mark I containment was not inert at the onset of core damage. With this assumption, using the baseline LERF value for the DAEC of 1.39 E-6/yr (Rev. 5C), a 1.2% increase would yield a delta-LERF (ΔLERF) value of 1.67 E-8, which is within the guidelines of Regulatory Guide (RG) 1.174 for an acceptable increase (i.e., < 1.0 E-7).

The current DAEC PRA model does not allow quantification of LERF from external events, such as seismic and fire. Therefore, FPL Energy Duane Arnold will rely upon the generic evaluation of risk from external events (i.e., seismic and fire) provided in Reference 3 of the cover letter.

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[1] SECY-00-0198, "Status Report on Study Of Risk-Informed Changes to the Technical Requirements of 10 CFR Part 50 (Option 3) and Recommendations on Risk-Informed Changes to 10 CFR 50.44 (Combustible Gas Control)," dated September 14, 2000.

b) The DAEC PRA model is not capable of evaluating transitional risk; however, as noted in Reference 3 of the cover letter, the transitional risk is determined to not be impacted by the proposed change in de-inerted time. That conclusion is deemed to be applicable to the DAEC.

c) As noted in our response to Question 4a above, a conditional probability of 1.0 was assumed in this evaluation.