



FPLEnergy.

Duane Arnold Energy Center

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

September 1, 2006

NG-06-0576
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 Related to the Proposed Amendment
Requesting Elimination of Main Steamline Radiation Monitor Trips (TAC NO. MC8883)

- References: 1) G. Van Middlesworth (Nuclear Management Company) to USNRC, "Technical Specification Change Request (TSCR-074): 'Elimination of Main Steam Line Radiation Monitor Trips'," NG-05-0594, dated November 14, 2005.
- 2) D. Spaulding (USNRC) to G. Van Middlesworth (FPL Energy Duane Arnold), "Duane Arnold Energy Center - Request for Additional Information Related to the Proposed Amendment Requesting Elimination of Main Steamline Radiation Monitor Trips (TAC NO. MC8883)," dated August 1, 2006.

In Reference 1, Nuclear Management Company¹ requested an amendment to the Duane Arnold Energy Center (DAEC) Technical Specifications (TS) to eliminate the requirement for the Main Steamline Radiation Monitor trips. Subsequent to that application, the Staff has determined that additional information is needed in order to review this application (Reference 2)². Enclosure 1 to this letter contains the requested information. Enclosure 2 is a CDROM, which contains the requested computer files. Please note that Enclosure 2 contains a site drawing that the Staff may consider to be "sensitive," as defined in RIS 2005-26 and should be withheld from public disclosure pursuant to 10 CFR 2.390(d)(1).

¹ By License Amendment 260, dated January 27, 2006, the facility operating license and operating authority for the Duane Arnold Energy Center was transferred to FPL Energy Duane Arnold, LLC.

² The Reference 2 request was received by FPL Energy Duane Arnold on August 15, 2006. Therefore the 30 day response period expires on September 15, 2006.

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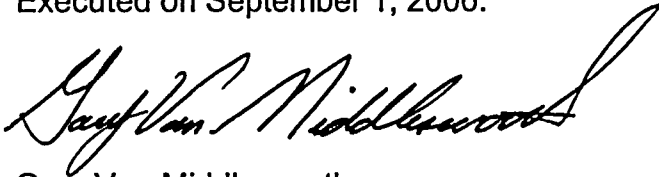
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This letter makes no new commitments or changes to any existing commitments.

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 September 1, 2006.

A handwritten signature in black ink, reading "Gary Van Middlesworth". The signature is written in a cursive style with a large, sweeping initial "G".

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

Enclosures (2)

cc: Administrator, Region III, USNRC
Project Manager, DAEC, USNRC (w/o Enclosure 2)
Resident Inspector, DAEC, USNRC (w/o Enclosure 2)
D. McGhee (State of Iowa) (w/o Enclosure 2)

Enclosure 1 to
NG-06-0576
September 1, 2006

FPL Energy Duane Arnold
Response to NRC Request for Additional Information
Related to the Proposed Amendment Requesting Elimination of
Main Steamline Radiation Monitor Trips
(TAC NO. MC8883)

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REQUESTING ELIMINATION OF MAIN STEAMLINE RADIATION MONITOR TRIPS
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NRC Questions

1. The "New Analysis for [Main Steamline Rad Monitor] Trip Elimination," section of the application provides the final results and a high level description of the methodology used. The purpose of presenting the re-baseline analysis is not clear. Please provide a clear and detailed description of the scope, analytical methods, and relevant assumptions of the control rod drop accident analysis including, but not limited to:

- a. Inputs and assumptions used supported by appropriate justification.
- b. Complete input deck for RADTRAD 3.03, with description and justification of the chosen options that significantly affect the calculated doses.
- c. RADTRAD output in support of reported doses.
- d. Complete description of the isotopic source term.
- e. Provide the assumed fractions of the failed and melted fuel and the basis for the assumptions.

FPL Energy – Duane Arnold Response:

1. a. See Enclosure 2 to this letter, a CD-ROM, which contains the complete, verified calculation used to support this analysis. Section 3 of the calculation write-up contains the Assumptions; Section 4 contains the Design Inputs.
1. b. See Enclosure 2 to this letter, a CD-ROM containing these files.
1. c. See Enclosure 2 to this letter, a CD-ROM containing these files.
1. d. As described in the original application, in the section titled "Re-baseline Analysis," the release fractions of RG 1.183, App. C were used in this analysis. The isotopic breakdown is found in Enclosure 2 to this letter, Attachments 2 and 3 to the calculation write-up.
1. e. In the original application, the first bulleted item in the section titled "Key Inputs" provides this information, which is repeated here.

The available source term is the same as that used in the original analysis (Amendment 240) and accounts for the portion of fuel which experiences clad breach (1200 rods) and the portion of damaged fuel which experiences melting (0.77%).

2. Please provide a detailed justification for the statement, "calculation of [control room] and [technical support center] doses is performed in accordance with approved Nuclear Regulatory Commission guidance in [Regulatory Guide (RG)] 1.183."

FPL Energy – Duane Arnold Response:

As stated in the original application, in the section titled, "Re-baseline Analysis," explicit calculations of the dose to Control Room and Technical Support Center (TSC) personnel were included, as they were not performed in the original DAEC Alternative Source Term (AST)

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analysis (Amendment 240). The purpose of the quoted statement was to indicate that no deviations were taken from the guidelines of RG 1.183 with respect to calculation of the Control Room and TSC doses. This statement was included as a clarification since a portion of the original AST analysis was conducted using the draft guide (DG-1081).

3. The exclusion area boundary dose acceptance criterion for the control rod drop accident is 6.3 rem (RG 1.183). Your calculated dose of 7.4 rem exceeds the acceptance criterion. Please provide additional justification for why this is acceptable.

FPL Energy – Duane Arnold Response:

The calculated dose for the Exclusion Area Boundary (EAB), using the DAEC licensing basis assumption of Operator action at 10 minutes, is 2.85 REM TEDE (see Results section Table in the original application). This is well within the guidelines of 6.3 REM, per RG 1.183.

The cited value of 7.4 REM was from the Sensitivity Analysis, “No Operator Action” case. This case was not performed to demonstrate doses are within the guidelines of RG 1.183, but to demonstrate that the worst-case results - a complete failure of the Operators to take mitigative action, still meets the criterion in the Standard Review Plan (Chapter 15.4.9) of “well within the exposure guideline values” of 10 CFR 50.67 (25 REM TEDE). The purpose of this evaluation was to demonstrate that the associated instrumentation and alarms do not meet the RG 1.97 definition for a Type A variable and that the assumed Operator actions in the licensing basis case are not “time critical.”

4. Please provide the inputs and outputs of the PAVAN atmospheric dispersion factors (χ/Q values) listed in the tables for postulated elevated releases to the control room and the technical support center. Do the elevated release χ/Q values listed in the tables include occupancy adjustment factors for both the ARCON96 values and the PAVAN χ/Q values used for the control room and technical support center dose calculations or only for the ARCON96 values?

FPL Energy – Duane Arnold Response:

- 4.a The requested PAVAN input files were provided to the Staff in our response to Request for Additional Information (RAI) to the original AST submittal (ADAMS Accession # ML010870296).

The associated PAVAN output files can be found on the CD-ROM in Enclosure 2 to this letter.

- 4.b Both the PAVAN and ARCON96 values have occupancy adjustment factors included.

Noteworthy is that while both the ARCON96 and PAVAN X/Qs, as well as the RADTRAD input parameters, all include the occupancy adjustment factors, i.e., double accounting, it has

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no impact on the results, since the occupancy adjustment factor is 1.0 over the 0 – 24 hour period assumed for the radiological release.

The release period assumption of 24 hours is per RG 1.183, App. C, Assumption 3.4:

The turbine and condensers leak to the atmosphere as a ground-level release at a rate of 1% per day² for a period of 24 hours, at which time the leakage is assumed to terminate.

² If there are forced flow paths from the turbine or condenser, such as unisolated motor vacuum pumps or unprocessed air ejectors, the leakage rate should be assumed to be the flow rate associated with the most limiting of these paths. Credit for collection and processing of releases, such as by off gas or standby gas treatment, will be considered on a case-by-case basis.

In the “Sensitivity Case” in the original submittal, where the Mechanical Vacuum Pump (MVP) continues to run for the full 24 hour period (elevated release), the total dose reaches its final values approximately 2 hours into the event. This indicates that the MVP essentially evacuates the entire source term from the condenser to the environment very early into the release period. Thus, the occupancy adjustment factor does not influence either the Control Room or Technical Support Center dose.

5. The tables of the exclusion area boundary and low population zone (LPZ) χ/Q values list 2-8 hour LPZ values of $6.43 \times 10^{-5} \text{ s/m}^3$ and $3.58 \times 10^{-6} \text{ s/m}^3$ for the ground level and elevated releases, respectively. Based on information provided to support Amendment No. 240, it appears that these values are for the 0-8 hour time period. Please verify the time interval to which these χ/Q values apply. Were dose assessments to the LPZ made using 0.5-2 hour and 2-8 hour LPZ χ/Q values or 0.5-8 hour χ/Q values?

FPL Energy – Duane Arnold Response:

The ground level release X/Q for the LPZ used in the most-recent analysis for the period labeled 2-8 hours ($6.43 \text{ E-}05 \text{ s/m}^3$) is indeed the same as that labeled “0-8 hours” in the original AST submittal.

In the table for this submittal, the X/Q data was presented to explicitly state the interval over which each value applied, vice the original labeling in the submittal for Amendment 240, which was based upon the nomenclature used by the PAVAN code. For clarification, the following tables reconcile the labeling of two sets of X/Q data:

For the ground level release X/Q s for the LPZ:

Time Period (RADTRAD)	PAVAN Nomenclature	$X/Q \text{ (s/m}^3\text{)}$
0 – 2 hours	0 – 2 hours	1.34 E-04
2 - 8 hours	0 – 8 hours	6.43 E-05

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Similarly for the elevated (stack) release X/Qs for the LPZ:

Time Period (RADTRAD)	PAVAN Nomenclature	X/Q (s/m ³)
0 - 0.5 hours	Fumigation period	3.15 E-05
0.5 - 2 hours	0 - 2 hours	6.69 E-06
2 - 8 hours	0 - 8 hours	3.58 E-06

To respond to the specific question, the dose assessment to the LPZ used 0.5 - 2 hour and 2 - 8 hour X/Q data for the elevated release.

6. There appears to be a typographical error in the exponent of one of the 8-24 hour χ/Q values in the table for postulated releases from the stack to the technical support center. Because RG 1.194, "Atmospheric Relative Concentrations for Control Room Radiological Habitability Assessments at Nuclear Power Plants," allows the use of the ARCON96 χ/Q value for the 8-24 hour time period, it would appear that the χ/Q value in the column titled RG 1.194 should be the ARCON96 χ/Q value of 8.00×10^{-8} s/m³ instead of 8.00×10^{-7} s/m³.

FPL Energy – Duane Arnold Response:

Yes, the Staff is correct. This is a typographical error. The value of $8.00 \text{ E-}08 \text{ s/m}^3$ is correct and was the actual value used in the analysis.

7. The section of your proposed amendment, "New Analysis for MSLRM Trip Elimination," discusses the need for manual action by operators to trip the mechanical vacuum pump (MVP) and terminate the elevated release from the offgas stack. In regard to this manual action, please provide the following information:

- a. Describe the steps required for operators to accomplish the manual action of tripping the MVP and terminating the elevated release from the offgas stack. Specifically, describe the exact actions operators will carry out to accomplish the task, the time required for each action, and the indication(s) available to reflect successful task completion. Discuss if any equipment or support personnel will be needed.
- b. The submittal states that operators would be prompted by alarms in the control room "shortly after the event occurred" to take the manual action. Please clarify what is meant by shortly after the event (i.e., provide a time estimate).

FPL Energy – Duane Arnold Response:

7.a The following is a "best estimate" time line for the Operator actions to secure the Mechanical Vacuum Pump upon receipt of an alarm/indication of an elevated release. As noted in the original application, all Operator actions can be accomplished from the main Control Room and no other support personnel are needed.

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Time Line (est.)	Event/Operator Action	Indications
T = 0.0	Rod Drop occurs with instantaneous fuel damage.	N/A.
T = 5.0 sec.	Fission products transported to Main Condenser.	None.
T = 2 – 5 min.	Mechanical Vacuum Pump exhausts fission products to Offgas Stack through 1.75 minute hold-up line.	Offgas Stack Radiation Monitor(s) reach alarm/trip settings.
T = 6 min.	Operator acknowledges Control Room alarms on high Offgas Stack radiation.	Annunciators on Control Room Panel 1C-03.
T = 7 min.	Operator reviews Annunciator Response Procedure (ARP) 1C03A and confirms Offgas high radiation condition.	Radiation Monitor Indicators on Control Room Panel 1C10 and Radiation Monitor Recorders on 1C02.
T = 10 min.	Operator secures Mechanical Vacuum Pump.	Hand switch (HS-1377) on Control Room Panel 1C-07 to the STOP position.
T = 10.25 minutes	Operator verifies Mechanical Vacuum Pump trip.	Indication is directly above HS-1377. Red light (pump running) extinguishes and Green light (pump tripped) illuminates on Panel 1C-07.

While the above constitutes a best estimate time line for accomplishing the assumed Operator actions in the dose analysis supporting this TS change, FPL Energy Duane Arnold does not consider the above to constitute “time critical Operator actions,” as the sensitivity study performed as part of the original submittal demonstrates that the “No Operator Action” case still conforms to the SRP acceptance guidelines for doses being “well within” the exposure guide values in the regulations.

7.b From the time line above, based upon the dose calculations, the trip setting for the Offgas Stack radiation monitor(s) should be reached at approximately 2 - 5 minutes into the event.

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ENCLOSURE 2

CD-ROM Containing

Dose Calculation Write-up, including Input/Output Files

for the RADTRAD and PAVAN codes