

Dated this 12th day of April 2005 at Rockville, Maryland.

For the Nuclear Regulatory Commission.

**Margaret M. Doane,**

*Deputy Director, Office of International Programs.*

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## NUCLEAR REGULATORY COMMISSION

[Docket No. 50-368]

### Entergy Operations, Inc.; Arkansas Nuclear One, Unit 2; Exemption

#### 1.0 Background

Entergy Operations, Inc. (the licensee) is the holder of Facility Operating License No. NPF-6 which authorizes operation of the Arkansas Nuclear One, Unit 2 (ANO-2) nuclear power plant. The license provides, among other things, that the facility is subject to all rules, regulations, and orders of the Nuclear Regulatory Commission (NRC, the Commission) now or hereafter in effect.

The facility consists of a pressurized water reactor located in Pope County, Arkansas.

#### 2.0 Request/Action

Title 10 of the Code of Federal Regulations (10 CFR), part 50, appendix A, General Design Criterion (GDC) 57, regarding closed system containment isolation valves (CIVs), states:

Each line that penetrates primary reactor containment and is neither part of the reactor coolant pressure boundary nor connected directly to the containment atmosphere shall have at least one containment isolation valve which shall be either automatic, or locked closed, or capable of remote manual operation. This valve shall be outside containment and located as close to the containment as practical. A simple check valve may not be used as the automatic isolation valve.

By application dated October 30, 2003, and supplemented by a letters dated July 1, November 15, and December 3, 2004, and March 3, 2005, the licensee requested a permanent exemption from 10 CFR part 50, appendix A, GDC 57 for certain CIVs at ANO-2. Specifically, the licensee requests an exemption for the applicable manual upstream CIV associated with the emergency feedwater (EFW) system steam trap and the applicable manual upstream CIV associated with the atmospheric dump valve (ADV) drain steam trap. This will allow the plant to operate at power with these CIVs open, rather than locked closed.

The CIVs under review are located on main steam lines outside containment, but upstream of the main steam isolation valves (MSIVs). The main steam and feedwater lines inside containment, in combination with the secondary side of the steam generators, constitute closed systems inside containment, so GDC 57 applies. The CIVs are not automatic or capable of remote manual operation, and the licensee does not wish to keep them locked closed.

#### 3.0 Discussion

Pursuant to 10 CFR 50.12, the Commission may, upon application by any interested person or upon its own initiative, grant exemptions from the requirements of 10 CFR part 50 when (1) the exemptions are authorized by law, will not present an undue risk to public health or safety, and are consistent with the common defense and security; and (2) when special circumstances are present.

Special circumstances, in accordance with 10 CFR 50.12(a)(2)(ii), are present in that plant operation with the applicable manual upstream CIV associated with the EFW system steam trap and the applicable manual upstream CIV associated with the ADV drain steam trap in the closed position is not necessary to achieve the underlying purpose of 10 CFR part 50, appendix A, GDC 57. The staff's rationale is as follows.

#### *Operation With the EFW Steam Trap CIVs and the ADV Drain Steam Trap CIVs Open*

The steam supply lines for the ANO-2 EFW pump and the ADVs tap off of the "A" and "B" main steam headers outside containment and upstream of the MSIVs. The steam supply from the "B" main steam header has a steam trap upstream of the EFW pump turbine isolation valve, which is a GDC 57 boundary valve. Therefore, the upstream CIV for this steam trap is subject to GDC 57. The manual isolation valves for this steam trap (which include the upstream CIV) are normally open during power operation. Keeping the EFW steam trap isolation valves closed during operation potentially threatens the operability of the steam-driven EFW pump. It is noted that the EFW steam trap for the "A" EFW pump turbine is located downstream of the turbine isolation valve. The ADV associated with the "A" main steam header has a drain steam trap whose isolation valves are also maintained open during power operation. The upstream CIV for this steam trap is also subject to GDC 57. Keeping the ADV drain steam trap

isolation valves closed during operation could cause the potential for waterhammer when an ADV line is opened and damage the piping associated with the ADV, due to condensate buildup. Since these applicable CIVs (associated with the EFW and ADV drain steam traps) are manual CIVs and do not have remote closure capability, GDC 57 requires that they be locked closed. Therefore, the licensee requests an exemption from the requirements of GDC 57 to keep these CIVs open during operation.

Operating with the ANO-2 EFW steam trap and ADV drain steam trap CIVs open results in the secondary system pressure boundary inside containment providing the only barrier against the release of radioactivity to the environment through the steam trap piping. However, the licensee has evaluated the effects of these valves being open during power operation (provided below) and has shown this to have no impact on the consequences of any of the events evaluated in the Safety Analysis Report (SAR). Operating with the EFW steam trap CIVs closed and the ADV drain steam trap CIV closed could compromise the operability of the EFW pump turbine and damage the piping associated with the ADV, due to condensate buildup.

Of the 36 events listed in Chapter 15 of the ANO-2 SAR, only ten involve a radiation dose evaluation. The waste gas decay tank rupture and the fuel handling accident need not be evaluated since they cannot physically involve the EFW and ADV steam trap CIVs. Additionally, the malfunction of the turbine gland sealing system can also be eliminated from evaluation since it is bounded by the turbine trip event, which will be discussed below. The remaining seven events are turbine trip, loss of alternating current (AC) power, excess heat removal, main steam/feed line break, loss of reactor coolant system (RCS) forced flow, loss-of-coolant accident (LOCA), and steam generator tube rupture.

For the turbine trip, loss of AC power, excess heat removal, and main steam/feed line break, no post-event RCS activity is involved in the dose estimate since the RCS integrity is not compromised. Having the EFW and ADV steam trap CIVs open would not impact this event since the containment isolation function is not a factor.

For the loss of RCS forced flow, only the reactor coolant pump shaft seizure has a dose estimate, and that dose estimate is based on a normal cool down to shutdown cooling with no secondary isolations assumed. Therefore, having

the EFW and ADV steam trap CIVs open would not impact this event.

For the LOCA, activity in the secondary system is not considered in the dose estimate because of the massive radioisotope inventories that are conservatively and deterministically considered to be in the containment building. No credit for the closure of the MSIVs or other secondary system flowpaths is taken for this analysis unless a passive failure of the secondary system pressure boundary inside containment is assumed. Since the design and quality of the secondary system process and drain lines inside containment is equivalent to that of the containment liner, a passive failure of this piping is not considered in the SAR analysis. Also, pertinent regulations (e.g., 10 CFR part 50, appendix J, Option A, section II.H.4) assume that the closed system inside containment remains intact during the accident. Therefore, having the EFW and ADV steam trap CIVs open would not impact this event.

For the steam generator tube rupture, no containment isolation signal or main steam isolation signal would be generated. Manual isolation of the affected steam generator is assumed to occur 60 minutes following a steam generator tube rupture, followed by cool down to shutdown cooling conditions using the unaffected steam generator. The isolation of the affected steam generator includes the local manual isolation of the EFW and ADV steam traps. Therefore, the fact that they are not equipped to be operated remotely has no effect on analyzed dose consequences.

The staff has evaluated the licensee's analyses and makes the following findings:

(a) Only 7 of the 36 Chapter 15 events need to be evaluated, for the reasons given above.

(b) For the turbine trip, loss of AC power, excess heat removal, and main steam/feed line break, the containment isolation function is not a factor, so the position of the subject steam trap CIVs has no effect on the consequences of the accidents.

(c) The loss of RCS forced flow event analysis does not assume secondary system isolation (which includes the subject steam trap CIVs), so the position of these CIVs has no effect on the analyzed dose consequences.

(d) For the LOCA, secondary system isolation is not assumed in the analyses, and pre-existing secondary system radioactivity is insignificant compared to the analyzed releases, so the position of the subject steam trap CIVs has no effect on the analyzed dose consequences.

(e) For the steam generator tube rupture event, no containment isolation signal or main steam isolation signal would be generated. The analysis assumes the local manual isolation of the subject steam trap CIVs. Therefore, the licensee's proposal, to allow the subject steam trap CIVs to remain open during power operation, with only local manual closure capability, is consistent with the event analysis.

Based on the above discussion, leaving the EFW and ADV steam trap CIVs open during power operation would have no impact on the consequences of any of the accidents evaluated in the SAR.

#### *Alternate Solutions*

The licensee has stated that operating with the EFW steam trap CIV closed and the ADV drain steam trap CIV closed could compromise the operability of the EFW pump turbine and damage the piping associated with the ADV, due to condensate buildup. However, in its October 30, 2003, letter, the licensee did not explicitly address another possible alternative to the requested exemption; that being, to bring the CIVs (associated with EFW and ADV drain steam traps) into compliance with GDC 57 by installing remote manual operators on the CIVs. The CIVs could then be left open during plant operation. In its supplemental letter dated July 1, 2004, the licensee stated again that leaving the CIVs open during power operation would have no impact on the consequences of any of the accidents evaluated in the SAR. Considering this, the licensee believes that any potential benefit derived from implementing a modification to install remote manual operators on the subject CIVs would not be commensurate with the cost and resource burden associated with preparing and implementing the modification. Therefore, the licensee believes that the most expeditious, efficient, and cost effective resolution of the nonconformance with GDC 57 is the subject exemption request.

Although the staff considers there to be significant safety value to the dual, redundant barrier concept of containment isolation, the staff finds that, in this case, given the SAR analyses and the assumption of an intact closed system inside containment during a LOCA, it is not necessary to require compliance with the explicit requirements of the regulation in order to achieve the underlying purpose of the regulation, which is to ensure that the primary containment serves as an essentially leak-tight barrier against the uncontrolled release of radioactivity to the environment, because leaving the

EFW and ADV steam trap CIVs open during power operation would have no impact on the consequences of any of the accidents evaluated in the SAR. Thus, the staff finds that the safety benefits of the modification are not commensurate with the cost.

#### *Summary*

The staff finds that, based on the above, it is not necessary, in this case, for the subject CIVs to be locked closed, automatic, or remote manual, as required by GDC 57, in order to achieve the underlying purpose of GDC 57. Therefore, pursuant to 10 CFR 50.12(a)(2), the staff concludes that the operation of ANO-2 with the subject CIVs open is acceptable, and that the requested exemption from GDC 57 is justified.

#### **4.0 Conclusion**

Accordingly, the Commission has determined that, pursuant to 10 CFR 50.12(a), the exemption is authorized by law, will not present an undue risk to the public health and safety, and is consistent with the common defense and security. Also, special circumstances are present. Therefore, the Commission hereby grants Entergy Operations, Inc. an exemption from the requirements of 10 CFR part 50, appendix A, GDC 57, to allow ANO-2 to operate with the applicable manual upstream CIV associated with the EFW system steam trap and the applicable manual upstream CIV associated with the ADV drain steam trap in the open position.

Pursuant to 10 CFR 51.32, the Commission has determined that the granting of this exemption will not have a significant effect on the quality of the human environment (70 FR 19106).

This exemption is effective upon issuance.

Dated in Rockville, Maryland, this 15th day of April 2005.

For the Nuclear Regulatory Commission.

**Ledyard B. Marsh,**

*Director, Division of Licensing Project Management, Office of Nuclear Reactor Regulation.*

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