10 CFR 50.90

APS

A subsidiary of Pinnacle West Capital Corporation

Palo Verde Nuclear Generating Station

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July 22, 2010

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

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Docket Nos. STN 50-528, 50-529, and 50-530
Request for Amendment to Change an Element of Methodology Used in Evaluating the Radiological Consequences of Design Basis Steam Generator Tube Rupture (SGTR) Accidents

As permitted by 10 CFR 50.90, Arizona Public Service Company (APS) hereby requests to amend Operating Licenses NPF-41, NPF-51 and NPF-74, for Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3, respectively. The proposed amendment will change an element of methodology used in evaluating the radiological consequences of design basis Steam Generator Tube Rupture (SGTR) accidents at PVNGS. This change will revise the iodine spiking factor used for a coincident event-Generated Iodine Spike (GIS) from a value of 500 to a value of 335. The proposed change has no effect on the dose consequences in Updated Final Safety Analysis Report (UFSAR) Chapter 6, Engineered Safety Features, which are based on a limiting Pre-accident Iodine Spike (PIS) rather than a coincident GIS. The change requested in this submittal is based on prior NRC staff actions and decisions, such as those taken in NRC Memorandum, "Results of Initial Screening of Generic Issue 197, "Iodine Spiking Phenomena"," J. L. Uhle (NRC) to C. J. Paperiello (NRC), May 8, 2006 (Agencywide Document Access and Management System [ADAMS] Accession No. ML061100331).

Approval of the methodology change would allow for greater flexibility when evaluating SGTR related Emergency Operating Procedure mitigation strategies. The proposed change involves a "departure from a method of evaluation described in the UFSAR," as defined in 10 CFR 50.59(a)(2). Therefore, pursuant to 10 CFR 50.59(c)(2)(viii), the change requires NRC approval via license amendment prior to implementation. The proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c).

A001
NRR

Approval of the proposed amendment is requested by July 22, 2011. Once approved, the amendment shall be implemented within 90 days.

No commitments are being made to the NRC by this letter.

In accordance with the PVNGS Quality Assurance Program, the Plant Review Board and the Offsite Safety Review Committee have reviewed and concurred with this proposed amendment. By copy of this letter, this submittal is being forwarded to the Arizona Radiation Regulatory Agency (ARRA) pursuant to 10CFR 50.91(b)(1).

Should you need further information regarding this amendment request, please contact Russell A. Stroud, Licensing, Section Leader, at (623) 393-5111.

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

Executed on July 22, 2010
(Date)

Sincerely,

FOR D.C. MIMS

DCM/RAB/DFS/gat

Enclosure: Evaluation of the Proposed Change

cc:	E. E. Collins Jr.	NRC Region IV Regional Administrator
	J. R. Hall	NRC NRR Senior Project Manager
	L. K. Gibson	NRC NRR Project Manager
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ENCLOSURE

Evaluation of the Proposed Change

Subject: **Request for Amendment to Change an Element of Methodology Used in Evaluating the Radiological Consequences of Design Basis Steam Generator Tube Rupture (SGTR) Accidents**

ATTACHMENT:

PVNGS Updated Final Safety Analysis Report Mark-up

1. SUMMARY DESCRIPTION

This evaluation supports a request to amend Operating Licenses NPF-41, NPF-51, and NPF 74, for Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3, respectively.

The proposed change would revise the Operating Licenses by incorporating a change to an element of the methodology used in evaluating the radiological consequences of design basis Steam Generator Tube Rupture (SGTR) accidents into the Updated Final Safety Analysis Report (UFSAR) Chapter 15, Section 15.6.3, Steam Generator Tube Rupture. Specifically, APS proposes to change the iodine spiking factor for a coincident event-Generated Iodine Spike (GIS) from a value of 500 to 335 (i.e., the increase in primary coolant iodine concentration would be estimated using a spiking model that assumes the iodine release rate from the fuel rods would increase to a value that is 335 times that of the release rate corresponding to the iodine concentration at the Technical Specification (TS) equilibrium value of 1.0 µCi/gm Dose Equivalent (DEQ) Iodine(I)-131).

Nuclear Regulatory Commission (NRC) approval of the methodology change would allow for greater flexibility when evaluating SGTR related Emergency Operating Procedure mitigation strategies (e.g., steaming from the affected steam generator (SG) to prevent overfill conditions, rather than from the unaffected SG).

2. DETAILED DESCRIPTION

The proposed license amendment would revise UFSAR Chapter 15, Section 15.6.3 as follows:

Change the wording in Section 15.6.3.3.5.B.3. to read "A spiking factor of 335 is employed for the GIS at the time of event initiation."

Change the dose values for the GIS event case for the period and location (0-2 Hour at the Exclusion Area Boundary (EAB)), to 124 rem and for the period and location (0-8 Hour at the Low Population Zone (LPZ)), to 84 rem in Table 15.6.3-5, Radiological Consequences for the Limiting SGTRLOPSF Event. There is no change to any technical specifications as a result of the methodology element proposed change.

3. TECHNICAL EVALUATION

Methodology Element Change

The current PVNGS licensing basis accident analyses for postulated SGTR events account for both the GIS and pre-accident Generated Iodine Spike (PIS) cases as coincident occurrences. For the GIS cases, a spiking model is used that increases the primary coolant iodine concentration by increasing the iodine release rate from the fuel pins to the primary coolant. The initial release rate from the fuel pins corresponds to the iodine concentration at the TS equilibrium value of 1.0 µCi/gm DEQ Iodine (I)-131, and iodine removal mechanisms (i.e., radioactive decay and primary coolant purification flow). The fuel pin release rate over the 8-hour SGTR accident duration is assumed to increase to a value that is 500 times that of the initial release rate. This model

effectively results in a continuous flow of contaminated fluid with a higher concentration of iodine from the reactor coolant system into the affected SG, and thereby increases the potential radiological consequences (e.g., via steam discharges through the atmospheric dump valve (ADV) lines).

The proposed methodology element change would revise the GIS iodine spiking factor from a value of 500 to a value of 335 for SGTR accident analyses. This change would result in substantially lower radiological dose consequences in the SGTR GIS analyses. Therefore, this change would not yield results that are essentially the same as, or more conservative than, previously calculated results. As a result, NRC approval is requested.

The methodology element change for a postulated SGTR with a coincident loss of offsite power, a GIS, and a failed open ADV (i.e., one of the two Steam Generator Tube Rupture with Loss of Offsite Power and Single Failure (SGTRLOPSF) analyses described in PVNGS UFSAR Section 15.6.3), would result in the previously reported 2-hour thyroid dose value of 182 rem at the EAB to be reduced to approximately 124 rem (assuming all other analysis inputs, methods, and assumptions remain unchanged). Likewise, the previously reported 8-hour thyroid dose at the LPZ limit for this event combination would be reduced from 125 rem to approximately 84 rem.

A second SGTRLOPSF analysis presented in UFSAR Section 15.6.3 addresses the case in which a PIS iodine spike of 60 µCi/gm DEQ I-131 occurs in the primary coolant. The previously reported 2-hour and 8-hour thyroid dose values of 294 rem and 91 rem, respectively, would not be affected by the proposed methodology change. However, the proposed methodology change results in the GIS case 8-hour thyroid dose at the LPZ limit no longer being the bounding maximum, being replaced by the PIS maximum dose. The NRC acceptance criterion previously specified on the PVNGS licensing docket for both GIS and PIS cases, is 100% of the 10 CFR Part 100 guideline values which allow a maximum thyroid dose of 300 rem. The results of this proposed change still remains within these acceptance criteria.

The proposed methodology element change has no effect on previously reported dose consequences for control room personnel following a postulated SGTR event. The consequences reported in UFSAR Chapter 6 are based on a PIS, rather than a GIS.

Justification for this change is based on prior NRC staff actions and decisions, such as those taken in NRC Memorandum, Results of Initial Screening of Generic Issue 197, "Iodine Spiking Phenomena," J. L. Uhle (NRC) to C. J. Paperiello (NRC), May 8, 2006 (Reference 6.1). Specifically, the NRC staff has already reviewed pertinent industry operating experience relative to the iodine spiking phenomena and determined that a GIS spiking factor of 335 is suitably conservative for Pressurized Water Reactor (PWR) SGTR analyses, across a wide variety of PWR designs. Furthermore, the NRC has allowed PWR licensees to use this revised spiking factor independent of other elements of methodology, within an overall SGTR analysis framework or method of evaluation. For example, the NRC staff has previously accepted a GIS spiking factor of 335 for use in SGTR analyses with source terms established in accordance with 10 CFR 50.67 in Regulatory Guide (RG) 1.183, Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors, July 2000 (Reference 6.2); with

guidance from Technical Information Document (TID) 14844, Calculation of Distance Factors for Power and Test Reactors, contained in RG 1.195, Methods and Assumptions for Evaluating Radiological Consequences of Design Basis Accidents at Light-Water Nuclear Power Reactors, May 2003 (Reference 6.3); and with guidance from International Commission on Radiation Protection (ICRP) Publication 30: Limits For Intakes Of Radionuclides By Workers, August 1982 (Reference 6.4). This has previously been accepted in NRC Letter, Diablo Canyon Nuclear Power Plant, Unit Nos. 1 and 2 – Issuance of Amendment RE: Revision to Technical Specification 1.1, "Definitions, Dose Equivalent I-131, "and Revised Steam Generator Tube Rupture and Main Steam Line Break Analyses, February 20, 2003 (Reference 6.5). APS currently utilizes ICRP-30 source terms in accordance with the PVNGS TS 1.1 definition for DEQ I-131, and is therefore making no new commitments with respect to NRC Regulatory Guides 1.183 and 1.195.

This request applies only to the use of the revised GIS spiking factor of 335 for SGTR accident analyses. APS acknowledges that the NRC staff will continue to require that a GIS spiking factor of 500 be utilized for other PVNGS design basis accident analyses (e.g., main steam line breaks).

4. REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

NRC Memorandum, "Results of Initial Screening of Generic Issue 197, "Iodine Spiking Phenomena"," J. L. Uhle (NRC) to C. J. Paperiello (NRC), May 8, 2006 (Reference 6.1) provided the results of NRC staff reviews of pertinent industry operating experience relative to iodine spiking phenomena, and determined that a GIS spiking factor of 335 is suitably conservative for Pressurized Water Reactor (PWR) SGTR analyses, across a wide variety of PWR designs.

4.2 Precedent

There is precedent for the methodology change as the NRC has allowed PWR licensees to use this revised spiking factor independent of other elements of methodology, within an overall SGTR analysis framework or method of evaluation. This was approved in NRC Letter, "Diablo Canyon Nuclear Power Plant, Unit Nos. 1 and 2 – Issuance of Amendment RE: Revision to Technical Specification 1.1, "Definitions, Dose Equivalent I-131," and Revised Steam Generator Tube Rupture and Main Steam Line Break Analyses," B. Benney (NRC) to G. M. Rueger (Pacific Gas and Electric Company), February 20, 2003 (Reference 6.5).

For the accident-initiated iodine spike case where the SGTR causes an iodine spike in the primary system, Diablo Canyon Nuclear Power Plant's (DCNPP's) revised SGTR radiological consequences analysis incorporates an iodine spiking factor of 335 for the EAB dose calculation. Both DCNPP's and PVNGS's use of the iodine spiking factor of 335 is consistent with current analysis techniques as indicated in Appendix F of RG 1.183, Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors, July 2000 (Reference 6.2). There are no differences in the application and use of the revised iodine spiking factor of 335 between the DCNPP and PVNGS submittals.

4.3 No Significant Hazards Consideration Determination

The proposed amendment changes an element of methodology used in evaluating the radiological consequences of design basis Steam Generator Tube Rupture (SGTR) accidents (i.e., the iodine spiking factor for a coincident event-Generated Iodine Spike (GIS) is changed from a value of 500 to 335.)

Arizona Public Service Company (APS) has evaluated whether or not a significant hazards consideration is involved with the proposed amendment(s) by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of Amendment," as discussed below:

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No.

   The proposed amendment changes an element of the methodology used in evaluating the radiological consequences of design basis SGTR accidents. This change will revise the iodine spiking factor used for a GIS from a value of 500 to a value of 335. The proposed change in the methodology element does not involve any design or physical changes to the facility or any component of that facility. The proposed change creates no new failure modes or initiating occurrences that could result in a design basis transient or accident evaluated in the Palo Verde Nuclear Generating Station (PVNGS) Updated Final Safety Analysis Report (UFSAR). Therefore the proposed change does not involve a significant increase in the probability of an accident previously evaluated.

   The proposed change in the methodology element does change the design basis analyses results for PVNGS. However, the results remain bounded by the previous analyzed values and remain within the acceptance criteria for PVNGS of 100% of the 10 CFR 100 maximum thyroid dose limit of 300 rem. Therefore, the proposed change does not involve a significant increase in the consequences of an accident previously analyzed.

2 Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No.

   The proposed amendment changes an element of the methodology used in evaluating the radiological consequences of design basis SGTR accidents. This change will revise the iodine spiking factor used for a GIS from a value of 500 to a value of 335. The proposed change in the methodology element does not involve any design or physical changes to the facility or any component of that facility. The proposed change in the methodology element does change the design basis analyses results for PVNGS; however, these results remain bounded by the previous analyzed values and remain within the acceptance criteria for PVNGS of 100% of the 10 CFR 100 maximum thyroid dose limit of 300 rem. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.

3. Does the proposed amendment involve a significant reduction in a margin of safety?

   Response: No.

   The proposed amendment changes an element of the methodology used in evaluating the radiological consequences of design basis SGTR accidents. This change will revise the iodine spiking factor used for a GIS from a value of 500 to a value of 335. The proposed change in the methodology element does not involve any design or physical changes to the facility or any component of that facility. The proposed methodology element change for a postulated SGTR, with a coincident loss of offsite power, GIS, and a failed open atmospheric dump valve (ADV), results in lower maximum dose consequences at the Exclusion Area Boundary (EAB) and Low Population Zone (LPZ) then previously analyzed for this event combination. The methodology element change results in the 2-hour maximum thyroid dose value of 182 rem at the EAB being reduced to 124 rem. In addition, the 8-hour maximum thyroid dose of 125 rem at the LPZ, would be reduced to 84 rem.

   Previously for PVNGS, the GIS 8-hour maximum thyroid dose was bounding at the LPZ and the pre-Accident Iodine Spike (PIS) 2-hour maximum thyroid dose was bounding at the EAB. The methodology element change reduces the GIS calculated dose at both the EAB and LPZ for SGTR events, but it does not affect the PIS dose values. Since the GIS calculated dose at the LPZ drops below the PIS
   8-hour LPZ maximum thyroid dose (91 rem), the PIS 8-hour LPZ dose will become bounding for PVNGS. The PIS 2-hour EAB maximum thyroid dose (294 rem), remains the bounding dose at the EAB.

   The revised dose consequences remain bounded by the previous analyzed values and remain within the 10 CFR Part 100 guideline values which are the acceptance criteria for PVNGS Units 1, 2, and 3. In addition, the proposed change has no effect on previously reported dose consequences for control room personnel following any postulated SGTR event. Therefore, the proposed change does not involve a significant reduction in the margin of safety.

Based on the above, APS concludes that the proposed amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92(c) and, accordingly, a finding of "no significant hazards consideration" is justified.

4.4 Conclusions

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5. ENVIRONMENTAL CONSIDERATION

A review has determined that the proposed amendment would change an element of methodology used in evaluating the radiological consequences of design basis SGTR accidents. That change results in a reduction in both the GIS 2-hour maximum thyroid dose at the EAB and the GIS 8-hour maximum thyroid dose at the LPZ. As a result of this reduction, the PIS 8-hour maximum thyroid dose at the LPZ becomes the limiting dose at the LPZ. The dose consequences, as a result of the proposed amendment, remain bounded by the previous analyzed values and remain within the 10 CFR Part 100 guideline values which are the acceptance criteria for PVNGS Units 1, 2, and 3.

This proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or a significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6. REFERENCES

6.1. NRC Memorandum, Results of Initial Screening of Generic Issue 197, "Iodine Spiking Phenomena", J. L. Uhle (NRC) to C. J. Paperiello (NRC), May 8, 2006 (ADAMS Accession No. ML061100331).

6.2. NRC Regulatory Guide 1.183, Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors, July 2000.

6.3. NRC Regulatory Guide 1.195, Methods and Assumptions for Evaluating Radiological Consequences of Design Basis Accidents at Light-Water Nuclear Power Reactors, May 2003.

6.4. International Commission on Radiation Protection (ICRP) Publication 30: Limits For Intakes Of Radionuclides By Workers, August 1982.

6.5. NRC Letter, Diablo Canyon Nuclear Power Plant, Unit Nos. 1 and 2 – Issuance of Amendment RE: Revision to Technical Specification 1.1, "Definitions, Dose Equivalent I-131," and Revised Steam Generator Tube Rupture and Main Steam Line Break Analyses (TAC Nos. MB3516 AND MB3518), B. Benney (NRC) to G. M. Rueger (Pacific Gas and Electric Company), February 20, 2003 (ADAMS Accession No. ML030510452).

ATTACHMENT

PVNGS Updated Final Safety Analysis Report Mark-up

B. Input Parameters and Initial Conditions

The assumptions and parameters used to determine the activity releases and offsite doses for a SGTRLOPSF are discussed below.

1. Accident doses are calculated for two different iodine spiking assumptions: (a) an event-Generated Iodine Spike (GIS) coincident with the initiation of the event and (b) a Pre-accident Iodine Spike (PIS).

2. Technical Specification limi[illegible]tial primary system (1.0 µCi/gm) and secc[illegible]activity (0.1 µCi/gm) concentrations are a[illegible]sient primary system specific activity is [illegible]ng the dilution from HPSI flow.

Replace 500 with 335

3. A spiking factor of ~~500~~ is employed for the GIS at the time of event initiation.

4. A CVCS purification efficiency of 100% is assumed based on the bounding purification flow rate of 150 gpm.

5. The I-131 decay constant is 9.97×10^{-7} sec^{-1}.

6. For the PIS condition, a PIS factor of 60 for the primary system activity concentration is employed.

7. Total allowable primary-to-secondary leakage of 1 gpm is conservatively assumed to be in the unaffected steam generator for the duration of the transient, instead of 0.5 gpm per steam generator.

8. In the unaffected steam generator, the primary-to-secondary is released to the atmosphere with the Decontamination Factor (DF) of 100.

DECREASE IN REACTOR

COOLANT INVEN

Replace 182 with 124

Table 15.6.3-5

RADIOLOGICAL CONSEQUENCES FOR THE LIMITING SGTRLOPSF EVENT

Event Case	Evaluation Period & Location	Dose (REM)
GIS	0-2 hrs at EAB	~~182~~
	0-8 hrs at LPZ	~~125~~
PIS	0-2 hrs at EAB	294
	0-8 hrs at LPZ	91

Replace 125 with 84

15.6.3.3.6 Conclusions

The dynamic behavior of important NSSS parameters during a typical event was presented in Figures 15.6.3-17 through 15.6.3-31. The radiological releases calculated for the limiting SGTR event (SGTR with a loss of offsite power and a fully stuck open ADV) were demonstrated to be within the 10 CFR 100 guidelines.

The RCS and secondary system pressures were shown to be below 110% of the design pressure limits, thus assuring the integrity of these systems.

Additionally, it was demonstrated that there would be no violation of the fuel thermal limits, since the minimum DNBR remains above the DNBR SAFDL value throughout the duration of the event.

15.6.4 RADIOLOGICAL CONSEQUENCES OF MAIN STEAM LINE FAILURE OUTSIDE CONTAINMENT (BWR)

Not applicable.