Arizona Public Service Company
PALO VERDE NUCLEAR GENERATING STATION
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JAMES M. LEVINE
VICE PRESIDENT
NUCLEAR PRODUCTION

192-00732-JML/TRB/DAJ
July 29, 1991

Mr. John B. Martin, Regional Administrator
U. S. Nuclear Regulatory Commission, Region V
1450 Maria Lane, Suite 210
Walnut Creek, CA 94596-5368

Dear Mr. Martin:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Unit 1, 2, and 3
Docket No. STN 50-528 (License No. NPF-41)
Docket No. STN 50-529 (License No. NPF-51)
Docket No. STN 50-530 (License No. NPF-74)
Response to NRC Concern Regarding Reactor Coolant Strontium Measurements
Inspection Report Nos. 50-528, 529, and 530/91-20
File: 91-070-026

APS has evaluated the strontium measurement inconsistencies which arose during a confirmatory measurement inspection conducted December 3 through 7, 1990, by Messrs W. Tenbrook and L. Coblentz. These inconsistencies and attendant NRC concerns are discussed in Inspection Report 50-528, 529, 530/91-20 dated May 30, 1991. APS has been evaluating the methods used for measuring reactor coolant strontium levels and has been implementing improvements in laboratory techniques which have resulted in more consistent and accurate sample results. APS has also evaluated the method used at PVNGS to analyze strontium levels and determined that since strontium levels contribute very little to the overall levels of radioactive material permitted in the reactor coolant system and since improved performance in our analytical interlaboratory blind comparison results has been noted, current PVNGS analytical practices provide acceptable results. APS is, however, continuing to evaluate analytical methods to determine if further practical improvements can be made.

Information concerning the results of our evaluation and a summary of the actions APS intends to take are provided as an attachment to this letter.

If you have any questions regarding this response, please contact Mr. J. A. Scott at (602) 393-3965.

Very truly yours,

James M Levine

JML/TRB/DAJ/dmn

Attachments

cc: W. F. Conway
D. H. Coe
A. H. Gutterman
A. C. Gehr
NRC Document Control Desk

ATTACHMENT

EVALUATION

Each unit's reactor coolant is analyzed twice a year for determination of the average disintegration energy (E-bar) of radioactive materials in the coolant in accordance with Technical Specification 3.4.7. The levels of Strontium-89 and Strontium-90 are analyzed and used as an input to the determination of the value of E-bar. The value of E-bar establishes the maximum permissible activity of the reactor coolant. A recent, representative example of the contribution of Strontium-89 and Strontium-90 (Unit 2, February, 1991) to the value of E-bar shows that Strontium-89 contributed 0.003% and Strontium-90 contributed 0.0001% to the total E-bar value. Therefore, the levels of Strontium do not appreciably contribute to the value of E-bar and thus the levels of activity permitted in the reactor coolant.

In early 1990, APS recognized the need to improve strontium analysis techniques and has been implementing improved laboratory controls to assure more consistent sample results. In June 1991, APS conducted a set of internal splits and spikes using a June 1991 Unit 2 reactor coolant sample to evaluate improvement in the analytical methods. The evaluation resulted in a 12% variance about the mean for Strontium-89 measurements over nine separate analyses. A mean value for Strontium-89 of 1.3 E-4 uCi/ml was obtained. Since Unit 2 operated at essentially full power from December 1990 to June 1991, the strontium levels would not be expected to change. APS compared the June 1991 results to the value obtained by the NRC in December 1990 (9.9 E-5

uCi/ml) and determined that they were consistent.

Also, the APS results are consistently conservative (biased high for their intended use in determining E-Bar) as demonstrated by periodic confirmatory measurement blind samples. APS analyzed the results of comparisons of interlaboratory blind samples for the previous six (6) quarters. The results indicate that PVNGS is within the acceptance range for the blind samples approximately 91% of the time.

Concerning the validity of using the single separation technique versus the two separation method of determining the levels of Strontium, APS reviewed the article referenced in Inspection Report 50-528, 529, 530/91-20 (Bowman et-al, Health Physics, V. 31, pp 495-500). This article states that the single separation technique (method used at PVNGS), "yields acceptable relative error levels only when the Strontium-89 activity is close to twice the Strontium-90 activity." Bowman further indicates that at a 5 to 1 ratio, the Strontium-89 uncertainty for the single separation technique approximates that of the two separation method. PVNGS is currently operating with Strontium-89 activity levels of approximately 5 times higher than Strontium-90 (5 to 1 ratio); therefore, the current Strontium-89 uncertainty is comparable to that achieved by the two separation method and is acceptable. Greater uncertainty is experienced in the PVNGS method for current levels of Strontium-90; however, APS considers that the uncertainty is acceptable considering its intended use. As the PVNGS cores age, the ratio of Strontium-89 to Strontium-90 will

decrease, reducing the uncertainty of Strontium-90 and increasing the uncertainty of Strontium-89. PVNGS acknowledges that the uncertainty of determining the levels of Strontium-89 and Strontium-90 is dependent on the ratio of the two nuclides and the analytical method used. However, APS considers the level of uncertainty associated with the single separation technique acceptable considering the inherent simplicity and advantages of the single separation technique (e.g., lower cost, transport of radioactive material) and the minimal contribution of Strontium to obtaining an accurate value for E-Bar.

CORRECTIVE ACTIONS

While continuing to use the single separation technique, PVNGS will take the following actions to improve the consistency of results and attempt to resolve the high biased Strontium measurements. A new calculation method for the single separation technique is being investigated by PVNGS to determine whether greater accuracy can be obtained. The instruments used at PVNGS for chemical yield determination will be evaluated and, if feasible, improvements made to minimize chemical interferences present. Dedicated Chemistry Department personnel specializing in performing strontium measurements will be responsible for performing strontium analysis. These corrective actions are expected to be completed by December 31, 1991. Following the completion of these corrective actions a split sample between APS and an independent laboratory will be performed to evaluate the effectiveness of these actions.