

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-312/85-24
Docket No. 50-312
License No. DPR-54
Licensee: Sacramento Municipal Utility District
P. O. Box 15830
Sacramento, California 95813
Facility Name: Rancho Seco Nuclear Generating Station
Inspection at: Herald, California
Inspection conducted: July 22-25, 1985

Inspector: GP Yuhas Gen 8/13/85
G. H. Hamada, Radiation Laboratory Specialist Date Signed

Approved By: GP Yuhas 8/13/85
G. Yuhas, Chief Date Signed
Facilities Radiological Protection Section

Summary:

Onsite Inspection of July 22-25, 1985 (Report No. 50-312/85-24)

Areas Inspected: This was a routine, announced, confirmatory measurements inspection involving the Region V Mobile Laboratory. A total of 56 onsite inspection hours were expended by two inspectors.

This inspection involved activities covered in inspection procedure 84725.

Results: No items of noncompliance were identified in the areas inspected.

DETAILS

1. Persons Contacted

*R. Colombo, Regulatory Compliance Supervisor
*G. Coward, Plant Superintendent
*S. Crunk, Regulatory Compliance
*J. Jewett, Site QA Supervisor
*D. J. Kearl, Chemical and Radiation Protection Technician
*F. Kellie, Chemical and Radiation Protection Superintendent
*S. Manofsky, Senior Chemical and Radiation Protection Assistant
*W. A. Wilson, Senior Chemical and Radiation Protection Assistant

*Denotes personnel present at exit interview.

2. Discussion

This inspection was conducted to complete inspection procedure 84725 as well as to determine the status of unresolved items identified during the previous inspection (Inspection Report 50-312/84-30).

During the previous inspection, it was determined that one of the areas needing improvement was Rancho Seco's ability to accurately measure charcoal cartridge samples. The licensee had indicated that new charcoal cartridge calibrations would be performed with new standards. In the interim since the last inspection, new calibrations were performed for several different geometries including charcoal cartridge. However, because the reactor was in a shut-down mode during the current inspection, certain sample categories, like charcoal cartridge, could not be used for lack of activity to measure. It was necessary, therefore, to substitute NRC's charcoal cartridge calibration standard for the charcoal cartridge test. The results below indicate adequate agreement, and thus confirms the validity of the new calibrations.

Table 1

NRC Charcoal Cartridge Standard

| <u>Nuclide</u> | <u>Rancho Seco</u> <u>uCi</u> | <u>NRC</u> <u>uCi</u> | <u>Ratio</u> <u>RS/NRC</u> | <u>*Agreement</u> <u>Range</u> |
|----------------|----------------------------------|--------------------------|-------------------------------|-----------------------------------|
| Co-57 | 3.93 E-3 | 3.21 E-3 | 1.22 | 0.60-1.66 |
| Co-60 | 2.27 E-2 | 1.80 E-2 | 1.26 | 0.75-1.33 |
| Cd-109 | 9.99 E-2 | 7.99 E-2 | 1.25 | 0.75-1.33 |
| Cs-137 | 1.68 E-2 | 1.59 E-2 | 1.06 | 0.80-1.25 |

*See enclosure for explanation of agreement criteria.

Table 2

Decay Heat Removal Liquid Sample

| <u>Nuclide</u> | <u>Rancho Seco</u> <u>uCi/ml</u> | <u>NRC</u> <u>uCi/ml</u> | <u>Ratio</u> <u>RS/NRC</u> | <u>Agreement</u> <u>Range</u> |
|----------------|-------------------------------------|-----------------------------|-------------------------------|----------------------------------|
| Co-58 | 4.04 E-3 | 4.17 E-3 | 0.97 | 0.85-1.18 |
| Co-60 | 1.35 E-3 | 1.27 E-3 | 1.06 | 0.80-1.25 |
| Ag-110M | 5.83 E-4 | 4.72 E-4 | 1.24 | 0.80-1.25 |
| Cs-134 | 2.54 E-3 | 2.28 E-3 | 1.11 | 0.80-1.25 |
| Cs-137 | 3.04 E-3 | 3.12 E-3 | 0.97 | 0.85-1.18 |

Table 2 lists the nuclides identified in reactor coolant (decay heat removal system). This sample category was measured to test the ability of the peak analysis software program to separate, identify and quantify all peaks found in the sample. Apparent anomalies were detected in several earlier measurements (Report Nos. 50-312/84-03 and 50-312/84-30) which pointed to the peak analysis software, and in particular the user designated parameters, as a potential source of the problem. Although the above results indicate adequate agreement for this particular sample, the peak program must continue to be scrutinized by the licensee until the issue is more fully understood or until it has been established that the problems encountered earlier are not recurring problems.

Table 3

Waste Gas Decay Tank

| <u>Nuclide</u> | <u>Rancho Seco</u> <u>(4 L Marinelli)</u> <u>uCi/cc</u> | <u>NRC</u> <u>(1 L Marinelli)</u> <u>uCi/cc</u> | <u>NRC</u> <u>(30 cc Bulb)</u> <u>uCi/cc</u> | <u>Ratio</u> <u>RS/NRC</u> | <u>Agreement</u> <u>Range</u> |
|----------------|---|---|--|-------------------------------|----------------------------------|
| Kr-85 | 1.20 E-3 | 1.68 E-3 | 1.32 E-3 | 0.91 | 0.60-1.66 |
| Xe-131M | 2.12 E-5 | 2.87 E-5 | 3.18 E-5 | 0.67 | 0.50-2.00 |

Table 3 lists the results obtained for a waste gas decay tank split sample. Because of the prolonged outage, only the longer-lived fission gases, Kr-85 and Xe-131M could be detected. It can be seen that the results fall within the agreement range.

Table 4

Serum Vial Gas Standard

| <u>Nuclide</u> | <u>Rancho Seco (5 cc Vial)</u> <u>uCi/cc</u> | <u>NRC (15 cc Vial)</u> <u>uCi/cc</u> |
|----------------|---|--|
| Kr-85 | 1.91 E 0 | 2.40 E 0 |
| Xe-133 | 1.90 E-1 | 2.69 E-1 |

Table 4 lists the certificate values for Rancho Seco's 5 cc serum vial gas calibration standard against NRC's measured values for this standard. Because NRC is not calibrated for a 5 cc serum vial geometry, NRC's 15 cc serum vial calibration parameters were used to quantify the results. This comparison was made on the assumption that these two geometries were close enough to provide useful information for assessing the validity of the 5 cc serum vial calibration. It was expected that because of the larger and less efficient geometry (with consequent larger efficiency factor) used by the NRC, the NRC results would be larger than the certificate value, and indeed this is the case. When allowance is made for the geometry difference, the agreement is reasonably good. The intent of this test was to determine the accuracy of the transfer of the gas standard into the serum vial which is usually the weakest link in the calibration procedure.

Another issue brought to the licensee's attention during the previous inspection involved quantification of the radioactivity content in reactor coolant. This is normally done by collecting pressurized reactor coolant in a pressure bomb, depressurizing and stripping the gases from the liquid and measuring each fraction separately. The gaseous and liquid activities are summed after correcting for volume differences to obtain the total activity per gram of reactor coolant. Often, the gaseous activity remaining in the liquid is negligible and can be ignored. Rancho Seco's gas stripping procedure, however, has occasionally left as much as 50 percent of the gaseous activity in the liquid. This situation requires that all gaseous activity in the liquid fraction be quantified and included in the total. The licensee indicated that this in fact was being done and recently, this requirement was formalized into a written procedure.

All unresolved items identified in the previous report (Report No. 50-312/84-30) have been resolved and open item No. 84-30-01 is closed.

3. Exit Interview

Inspection findings were discussed with licensee personnel indicated in paragraph 1.

Enclosure

Criteria for Accepting the Licensee's Measurements

| <u>Resolution</u> | <u>Ratio</u> |
|-------------------|--------------|
| <4 | 0.4 - 2.5 |
| 4 - 7 | 0.5 - 2.0 |
| 8 - 15 | 0.6 - 1.66 |
| 16 - 50 | 0.75 - 1.33 |
| 51 - 200 | 0.80 - 1.25 |
| 200 | 0.85 - 1.18 |

Comparison

1. Divide each NRC result by its associated uncertainty to obtain the resolution. (Note: For purposes of this procedure, the uncertainty is defined as the relative standard deviation, one sigma, of the NRC result as calculated from counting statistics.)
2. Divide each licensee result by the corresponding NRC result to obtain the ratio (licensee result/NRC).
3. The licensee's measurement is in agreement if the value of the ratio falls within the limits shown in the preceding table for the corresponding resolution.