UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SACRAMENTO MUNICIPAL UTILITY DISTRICT

DOCKET NO. 50-312

RANCHO SECO NUCLEAR GENERATING STATION

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 114
License No. DPR-54

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Sacramento Municipal Utility District (the licensee) dated June 10, 1988 as revised January 11, 1989 complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. DPR-54 is hereby amended to read as follows:

(2) Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 114, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment shall become effective within 30 days of the issuance date. The implementation delay is provided to allow time for modification of affected procedures and promulgation of the changes to personnel.

FOR THE NUCLEAR REGULATORY COMMISSION

George W. Knighton

George W. Knighton, Director
Project Directorate V
Division of Reactor Projects III,
IV, V and Special Projects
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: October 26, 1989

ATTACHMENT TO LICENSE AMENDMENT NO. 114

FACILITY OPERATING LICENSE NO. DPR-54

DOCKET NO. 50-312

Replace the following pages of the Appendix "A" Technical Specifications with the attached pages. The revised pages are identified by Amendment number and contain vertical lines indicating the area of change.

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4.21 LIQUID EFFLUENTS

4.21.1 Concentration

Surveillance Requirements

The concentration of radioactive material at any time in liquid effluent released from the site shall be continuously monitored in accordance with Table 3.15-1.

The liquid effluent continuous monitor having provisions for automatic termination of liquid releases, as listed in Table 3.15-1, shall be used to limit the concentration of radioactive material released at any time from the site to areas beyond the site boundary to the limits given in Specification 3.17.1.

The radioactivity concentration of each Retention Basin to be discharged shall be determined prior to release by sampling and analysis in accordance with Table 4.21-1, Item A. The results of Retention Basin pre-release sample analyses shall be used with the calculational methods described in the OFFSITE DOSE CALCULATION MANUAL (ODCM) to ensure that the concentration at the point of release is within the limits of Specification 3.17.1.

Bases

This Specification is provided to ensure that the concentration of radioactive materials released in liquid waste effluents from the site to areas beyond the site boundary will be less than the concentration levels specified in 10 CFR Part 20, Appendix B, Table II, Column 2 for liquid effluent. This limitation provides additional assurance that the levels of radioactive materials in bodies of water outside the site will result in exposures within the limits of 10 CFR Part 20.106 to MEMBER(S) OF THE PUBLIC. The concentration limit for dissolved or entrained noble gases is based upon the assumption that Xe-135 is the controlling radioisotope and its MPC in air (submersion) was converted to an equivalent concentration in water using the methods described in International Commission on Radiological Protection (ICRP) Publication 2.

There are no continuous releases of radioactive material in liquid effluents from the plant. All radioactive liquid effluent releases from the plant are by batch method.

4.21.2 Doses

Dose Calculations

Cumulative dose assessments associated with the release of radioactive liquid effluent shall be determined by sampling and analysis in accordance with Table 4.21-1, Item B and calculations performed in accordance with the methodology described in the ODCM at the following frequencies:

a. Prior to the initiation of a release of radioactive liquid effluent from the A or B RHUT; and,

b. Upon verification of monthly composite analysis results for radioactive liquid effluent released from the A and B RHUTs.

A dose tracking system and administrative dose limits shall be established and maintained. With the 31-day dose projection in excess of the Specification 3.17.4 limits, adjust liquid effluent operating parameters to give reasonable assurance of compliance with the dose limits of Specification 3.17.2 (10 CFR 50, Appendix I dose guidelines) and maintain radioactive liquid releases as low as is reasonably achievable.

Bases

This specification is provided to implement the requirements of Sections II.A, III.A, and IV.A of Appendix I, 10 CFR Part 50. The Limiting Condition for Operation implements the guides set forth in Section II.A of Appendix I. Specification 4.21.2 provides the required operating flexibility and, at the same time, implements the guides set forth in Section IV.A of Appendix I which assures, by definition, that the releases of radioactive material in liquid effluents will be kept "as low as reasonably achievable." The dose calculation methodology in the ODCM implements the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data such that the actual exposure of an individual through appropriate pathways is unlikely to be substantially underestimated. The equations specified in the ODCM for calculating the doses due to the actual release rates of radioactive materials in liquid effluents are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Dose to Man from Routine Releases of Reactor Effluent for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977, and Regulatory Guide 1.13, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I," April 1977.

The Lower Limits of Detection established in Table 4.21-1, Item B are based on an estimated maximum annual effluent outflow of 20 million gallons with a minimum annual average flow rate in the plant effluent stream of 8,500 gallons per minute. The RHUT pre-release Lower Limits of Detection equate to an offsite dose of less than 50 percent of the 10 CFR 50, Appendix I guidelines. The monthly RHUT composite Lower Limits of Detection equate to an offsite dose of less than 10 percent of the 10 CFR 50, Appendix I guidelines. These Lower Limits of Detection along with the dose tracking system give reasonable assurance that the dose limits prescribed in Technical Specification 3.17.2 (the 10 CFR 50, Appendix I dose guidelines) will be met.

There is also reasonable assurance that the operation of the facility will not result in radionuclide concentrations in finished drinking water that are in excess of the requirement of 40 CFR 141.

Surveillance Standards

Table 4.21-1

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

Liquid Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD)(a) (μCi/ml)
A. Retention Basin N/S (b)	Each Batch P	Each Batch P	Mn-54, Fe-59 Co-58, Co-60 Zn-65, Mo-99 Cs-134, Cs-136 Cs-137, Ba-140 Ce-141, Ce-144 I-131	3E-7
			Dissolved and Entrained Noble Gases (Gamma Emitters)	1E-5
			H-3	
B. Regenerant Hold-Up Tank A/B (c,d)	Each Batch P	Each Batch P	Mn-54, Fe-59 Co-58, Co-60 Zn-65, Cs-134 Cs-137, Ce-141 I-131	2E-8
			Cs-136	8E-9
			Mo-99, Ba-140 Ce-144	6E-8
			H-3	1E-5
	Each Batch P	Composite (e) M	Cs-134, Cs-137	3E-9
			Mn-54, Co-58 Co-60	4E-9
			Zn-65	6E-9
			Fe-59	8E-9
			Sr-89	5E-9
			Sr-90	1E-9
			Gross Alpha	1E-7

Table 4.21-1 (Continued)

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

Table Notation

a. (1) The Lower Limits of Detection (LLDs) for the radionuclides presented in this table are the smallest concentrations (expressed in microcuries per milliliter) which are required to be detected, if present, in order to give reasonable assurance of compliance with the limits of Specification 3.17.2 (10 CFR 50, Appendix I) for an RHUT transfer to a Retention Basin and assurance of compliance with the limits of Specification 3.17.1 (10 CFR 20, Appendix B, Table II, Column 2) for a Retention Basin discharge.

(2) The LLD of a radioanalysis system is that value which will indicate the presence or absence of radioactivity in a sample when the probability of a false positive and of a false negative determination is stated. The probabilities of the false positive and false negative are taken as equal at 0.05. The general equation for estimating the maximum LLD in microcuries per milliliter is given by the following:

$$LLD = \frac{2.71/t_s + 3.29S_b}{3.70E4(YEV)\exp(-\lambda t_c)}$$

where 2.71 = factor to account for Poisson statistics at very low background count rates, and 3.29 = two times the constant used to establish the one sided 0.95 confidence interval.

S_b = the standard deviation of the background counting rate

$$= (B/(t_b t_s) + B/t_b^2)^{0.5}$$

where,

B = background counts

t_b = background counting interval (seconds)

t_s = sample counting interval (seconds)

Table 4.21-1 (Continued)

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

Table Notation

3.70E4 = disintegrations/second/microcurie

Y = yield of the radiochemical process, i.e., the product of all factors such as abundance, chemical yield, etc.

E = counting efficiency (counts/disintegration)

V = sample volume (milliliters)

λ = the radioactive decay constant for the particular radionuclide ($seconds^{-1}$)

t_c = the elapsed time from midpoint of sample collection to the midpoint of counting (seconds)

(3) The LLD is defined as an **a priori** (before the fact) estimate and is not to be calculated for each sample analyzed on an **a posteriori** (after the fact) basis.

Table 4.21-1 (Continued)

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

Table Notation

b. A batch release is the discharge of liquid wastes of discrete volume from the north or south Retention Basin. The Retention Basins are the maximum permissible concentration accountability points for 10 CFR 20, Appendix B compliance.

c. An RHUT will be isolated and its contents thoroughly mixed to assure representative sampling prior to transferring the contents to a Retention Basin. The A and B RHUTs are the dose equivalent accountability points for 10 CFR 50, Appendix I compliance.

d. Isotopic peaks which are measurable and identifiable from an RHUT pre-release sample analysis shall be reported and included in ODCM evaluations. Nuclides which are not observed in the analysis shall be reported as "less than" the nuclide's **a posteriori** minimum detectable concentration and shall not be reported as being present. The "less than" results shall be considered "zero" for the purposes of ODCM evaluations; however, if a nuclide is measured and identified at a value less than the Table 4.21-1 LLD value, it shall be reported and entered in ODCM evaluations.

Isotopic peaks verified to be measurable and identifiable from a monthly RHUT composite sample analysis which were not identified on a pre-release analysis during the composite period shall be reported and included in ODCM evaluations to update the cumulative doses.

e. A composite sample shall be obtained by mixing liquid aliquot volumes in proportion to the volume of liquid released from each RHUT.

Table 4.22-1 (Continued)

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

Table Notation

a. (1) The Lower Limits of Detection (LLDs) for the radionuclides presented in this table are the smallest concentration (expressed in microcuries per unit volume) which are required to be detected, if present, in order to achieve compliance with the limits of Specifications 3.18.1, 3.18.2 and 3.18.3.

(2) The LLD of a radioanalysis system is that value which will indicate the presence or absence of radioactivity in a sample when the probability of a false positive and of a false negative determination is stated. The probabilities of the false positive and false negative are taken as equal at 0.05. The general equation for estimating the maximum LLD in microcuries per cubic centimeter is given by the following:

$$LLD = \frac{2.71/t_s + 3.29S_b}{3.70E4(YEV)\exp(-\lambda t_c)}$$

where 2.71 = factor to account for Poisson statistics at very low background count rates, and 3.29 = two times the constant used to establish the one sided 0.95 confidence interval.

S_b = the standard deviation of the background counting rate

$$= (B/(t_b t_s) + B/t_b^2)^{0.5}$$

where,

B = background counts

t_b = background counting interval (seconds)

t_s = sample counting interval (seconds)

Table 4.22-1 (Continued)

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

Table Notation

3.70E4 = disintegrations/second/microcurie

Y = yield of the radiochemical process, i.e., the product of all factors such as abundance, chemical yield, etc.

E = counting efficiency (counts/disintegration)

V = sample volume (cubic centimeters)

λ = the radioactive decay constant for the particular radionuclide (seconds $^{-1}$)

t_c = the elapsed time from midpoint of sample collection to the midpoint of counting (seconds)

(3) The LLD is defined as an a priori (before the fact) estimate and is not to be calculated for each sample analyzed on an a posteriori (after the fact) basis.

b. An analysis shall also be performed when a gross beta or gamma activity analysis of reactor coolant indicates greater than 10 µCi/ml. The analysis shall be repeated after each additional increase of 10 µCi/ml in the reactor coolant gross beta or gamma activity analysis.

c. Tritium grab samples shall be taken at least once per seven days from the ventilation exhaust from the auxiliary building stack during refueling and anytime fuel is in the spent fuel pool and the pool temperature exceeds 110°F. Below 110°F there is essentially no evaporation from this source.

Table 4.22-1 (Continued)

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

Table Notation

d. Samples shall be changed at least weekly and analyses shall be completed within 48 hours. Sampling and analysis shall also be performed when reactor coolant indicates 10 µCi/ml gross beta gamma activity and every 10 µCi/ml increases thereafter. When samples collected for less than 24 hours are analyzed, the corresponding LLDs may be increased by a factor of 10.

e. Tritium grab samples shall be taken at least daily during refueling activities.

f. Principal gamma emitters for which the LLD applies are: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, Xe-135m, and Xe-138 for gaseous samples and Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99 (or Tc-99m), Cs-134, Cs-137, Ce-141, and Ce-144 for particulate samples. This list does not mean only these nuclides will be detected and reported. Other peaks that are measurable and identifiable shall be reported in the Semiannual Radioactive Effluent Release Report, pursuant to Specification 6.9.2.3. All peaks which are measurable and identifiable shall be reported and entered into the ODCM evaluations. Nuclides which are not observed for the analysis shall be reported as "less than" the nuclide's **a posteriori** minimum detectable concentration and shall not be reported as being present. The "less than" results shall be considered "zero" for the ODCM evaluations; however, if a nuclide is measured and identified at a value less than the Table 4.22-1 LLD value, it shall be reported and entered in ODCM evaluations.

g. A gross beta analysis is performed on a monthly basis for each environmental release particulate sample. If any one of these samples indicates greater than 1.0 E-11 µCi/cc gross beta activity, then a Sr-89 and Sr-90 analysis will be performed on those samples exceeding this value.

h. A gross alpha analysis is performed on a monthly basis for each environmental release particulate sample. This fulfills the requirements of performing a monthly composite.

i. After purging seven reactor building volumes, a technical evaluation, prior to reinitiation of a purge following an out of service period, may be conducted in lieu of sampling and analysis.

Table 4.26-1 (Continued)

MAXIMUM VALUES FOR THE LOWER LIMITS OF DETECTION (LLD)[a,d]

Table Notation

a. (1) The Lower Limits of Detection (LLDs) for the radionuclides presented in this table are the LLD values recommended in NUREG-0472, Revision 2, and NRC Branch Technical Position dated November 1979 for an acceptable Radiological Environmental Monitoring Program.

(2) The LLD of a radioanalysis system is that value which will indicate the presence or absence of radioactivity in a sample when the probability of a false positive and of a false negative determination is stated. The probabilities of the false positive and false negative are taken as equal at 0.05. The general equation for estimating the maximum LLD in picocuries per unit sample is given by the following:

$$LLD = \frac{2.71/t_s + 3.29S_b}{3.7E\text{-}2(YEV)\exp(-\lambda t_c)}$$

where 2.71 = factor to account for Poisson statistics at very low background count rates, and 3.29 = two times the constant used to establish the one sided 0.95 confidence interval.

S_b = the standard deviation of the background counting rate

$$= (B/(t_b t_s) + B/t_b^2)^{0.5}$$

where,

B = background counts

t_b = background counting interval (seconds)

t_s = sample counting interval (seconds)

Table 4.26-1 (Continued)

MAXIMUM VALUES FOR THE LOWER LIMITS OF DETECTION (LLD)[a,d]

Table Notation

3.7E-2 = disintegrations/second/picocurie

Y = yield of the radiochemical process, i.e., the product of all factors such as abundance, chemical yield, etc.

E = counting efficiency (counts/disintegration)

V = sample volume (liters) or mass (kilograms)

λ = the radioactive decay constant for the particular radionuclide ($seconds^{-1}$)

t_c = the elapsed time from midpoint of sample collection to the midpoint of counting (seconds)

(3) The LLD is defined as an a priori (before the fact) estimate and is not to be calculated for each sample analyzed on an a posteriori (after the fact) basis.

(4) Occasionally, unavoidably small sample sizes or other uncontrollable circumstances may result in a priori LLD values not being met. In such cases, the contributing factors will be identified and described in the Annual Radiological Environmental Operating Report.