APPENDIX C

QUALITY CONTROL SAMPLE ANALYSIS RESULTS

QUALITY ASSURANCE AND CONTROL

Implementation of the Radiological Environmental Monitoring Program (REMP) consists of a number of discrete steps including:

- ⇒ Sample collection,
- ⇒ Packaging,
- ⇒ Shipment and receipt,
- ⇒ Measurements of radioactivity,
- ⇒ Data evaluation, and
- ⇒ Reporting.

These program elements are performed according to approved, written procedures to assure the validity of REMP results. This section discusses the internal quality control measurements made by the analysis laboratory, Eberline Services, and the results of their participation in the Interlaboratory Comparison Program implemented by the National Institute of Standards Testing (NIST). The Interlaboratory Comparison Program and the analysis laboratories Quality Assurance Programs provide information on the validity (accuracy and precision) of the REMP implementation steps listed above.

Because REMP measurement validity is important for evaluating protection of the health and safety of the public, RSNS has established an Environmental Quality Assurance Program (EQAP) for radiological environmental measurements. The Environmental QA Program implements the guidance provided in Regulatory Guide 4.15, (NRC79a).

INTERLABORATORY COMPARISON PROGRAM

Eberline Services participates in the Interlaboratory Comparison Program (ICP) sponsored by the DOE. The ICP is a radiological analysis quality control program implemented by NIST and provided by vendor laboratories. Eberline Services participates in an ICP provided by the Department of Energy (DOE). Participation in an ICP is a requirement of the Rancho Seco Quality Manual (RS02), section 1.4.3.2. It provides for an independent check of the proficiency of the laboratory. It also provides information on the precision and accuracy of measurements of radioactive material in REMP samples by Eberline Services. The extent of Eberline Services participation in this program includes all of the environmental radioactivity determinations that are related to the analyses required by the REMP manual.

INTERLABORATORY COMPARISON PROGRAM (continued)

The Intercomparison Program consists of sample media spiked with known quantities of specific radioactive materials at levels normally found in environmental samples. Most samples require long counting times to determine if any activity is present, and the results may have large deviations from the mean. When the samples are distributed, there is an implied precision requirement given in terms of the analysis requested to be performed. After the labs provide the results of their analyses, the DOE laboratory provides a statistical summary of all the results by the participating laboratory. This report includes the acceptance control limits, the mean of all laboratories and the standard deviation of the results by all labs, among other statistics.

If the results of a determination by Eberline Services in the ICP is outside the specified control limits or do not pass the outliers test, Eberline Services must investigate and, if a problem is identified, take corrective action to prevent problem recurrence.

During 2002, Eberline Services analyzed 24 ICP samples related to the current REMP program. All sample results reported by Eberline Services were within the control limits.

The Eberline Services measurement results are presented in Table C-1 along with the acceptable values for each test.

INTRALABORATORY QUALITY ASSURANCE PROGRAM

Eberline Services by contract also operate an Intralaboratory Comparison Program (Quality Assurance Program) to maintain an acceptable quality level on a routine basis.

As part of their Quality Assurance Program, the laboratory performs background counts, an analysis of spiked samples, and duplicate sample counts for every ten Rancho Seco REMP samples analyzed. These quality control procedures are performed for all analyses except gamma spectrometry, for which weekly energy and efficiency checks are performed. Personnel not directly involved with the analysis prepare the spiked and duplicate samples. Spiked samples, as well as the radioactive sources used for the gamma spectrometer checks, are traceable to the National Institute for Standards and Technology (NIST).

RANCHO SECO AUDIT AND SURVEILLANCE RESULTS

The Rancho Seco Quality Program requires periodic audits of REMP activities, including Eberline Services. Contract laboratory performance is evaluated by the Rancho Seco QA Department.

CONCLUSIONS

The Intralaboratory and Interlaboratory results provided by Eberline Services indicate that Eberline Services performance was acceptable.

DIRECT RADIATION (Luxel) COMPARISON PROGRAM

The monitoring badge vendor, Landauer participates in a comparison program provided by the Idaho National Environmental Laboratory (INEL). INEL did not conduct this comparison program in 2002; therefore no results from that program are available for this report. Landauer also maintains NVLAP certification with NIST. A review of Landauer's NVLAP certification results indicates that Landauer has satisfactorily completed all of the required tests for the types of environmental radiation monitored at RSNS.

This comparison program satisfies the requirement of the REMP manual section 6.0.

TABLE C-1
2002 INTERLABORATORY COMPARISON PROGRAM

Sample Type (QAP 56)	Sample Date	Assay Type	EML Result	Eberline Result	Control Limits (Reported/ EML value)
Air Filter	6/02	Co-60	30.520±0.652	26.490±0.190	0.80-1.26
Air Filter	6/02	Cs-137	28.230±0.701	25.950± 2.340	0.80-1.32
Air Filter	6/02	Gross Beta	1.300 ±0.130	1.082 ±0.045	0.76-1.36
Air Filter	6/02	Mn-54	38.530±0.867	34.710±2.700	0.80-1.35
Soil	6/02	Cs-137	1326.670± 66.510	1158.000± 60.000	0.80-1.25
Vegetation	6/02	Co-60	11.230±0.677	11.690±.3.160	0.80-1.44
Vegetation	6/02	Cs-137	313.667± 15.910	316.000± 10.000	0.80-1.31
Water	6/02	Co-60	347.330± 12.400	372.700± 4.000	0.80-1.20
Water	6/02	Cs-134	3.357±0.200	3.770± 0.940	0.80-1.30
Water	6/02	Cs-137	56.067±2.929	62.280 ±4.240	0.80-1.22
Water	6/02	Gross Beta	1030.000± 103.000	917.100± 21.300	0.61-1.43
Water	6/02	Tritium	283.700± 3.380	294.900± 10.660	0.78-2.45

TABLE C-1
(cont.)
2002 INTERLABORATORY COMPARISON PROGRAM

Sample Type (QAP 57)	Sample Date	Assay Type	EML Result	Eberline Result	Control Limits (Reported/ EML value)
Air Filter	12/02	Co-60	23.000±0.059	21.340± 0.350	0.80-1.26
Air Filter	12/02	Cs-137	32.500±0.777	30.840±0.370	0.80-1.32
Air Filter	12/02	Gross Beta	0.871±0.087	0.768±0.153	0.76-1.36
Air Filter	12/02	Mn-54	52.200±1.170	49.510±0.450	0.80-1.35
Soil	12/02	Cs-137	829.330± 41.580	718.600± 7.600	0.80-1.25
Vegetation	12/02	Co-60	9.660±0.630	8.753±.1.678	0.80-1.44
Vegetation	12/02	Cs-137	300.670± 15.250	258.400± 3.800	0.80-1.31
Water	12/02	Co-60	268.670± 9.710	261.200± 2.200	0.80-1.20
Water	12/02	Cs-134	60.200±1.860	62.400±2.820	0.80-1.30
Water	12/02	Cs-137	81.430±4.280	80.360±1.170	0.80-1.22
Water	12/02	Gross Beta	900.000± 90.000	737.050± 38.040	0.61-1.43
Water	12/02	Tritium	227.300± 5.615	243.500± 24.000	0.78-2.45

APPENDIX D

SAMPLE COLLECTION AND ANALYSIS METHODS

For each of the sample media collected, the method of collection is documented in Rancho Seco Nuclear Station procedures. Detailed analysis methods are documented in procedures controlled by the contract laboratory, Eberline Services. A brief description of these collection and analysis methods is included in this Appendix.

Sample Media	Collection/Analysis Method
AIR	An air sampler continuously moves air through a filter paper designed to capture particulates by filter paper impaction. The air samplers are equipped with an elapsed time meter and flow gauge, which are used to calculate the volume of air that has passed through the filter paper. The filter paper is exchanged weekly. At least one day is allowed to elapse between sample collection and counting to reduce the interference of naturally occurring radon and thorium daughters on the sample analysis. The filter paper is assayed for gross beta radioactivity by placing the filter on a stainless steel planchet and counted with an internal gas flow proportional counter. The individual particulate filter papers are saved over a calendar quarter and the composite collection is assayed for gamma isotopic radioactivity by gamma spectroscopy.
DIRECT RADIATION	Monitoring badges, (Luxels), are located within a ten (10) mile radius of the site. The badges within a five (5) mile radius are considered indicator badges. Two (2) badges are placed at each monitoring location to assure adequate data recovery and to improve measurement statistics. The badge field exposure cycle is approximately ninety (90) days. At the end of the field exposure cycle, the badges are exchanged and returned to the contract laboratory for processing.

Sample Media	Collection/Analysis Method
SOIL & SEDIMENT	Samples of sediment and soil are collected from the top three inches of the sampled material. Sediment samples are obtained approximately two feet from the shoreline. Each sample is assayed directly for gamma isotopic radioactivity by gamma spectroscopy.
GARDEN PRODUCE	Samples of vegetables are collected semi-annually from a garden, which is maintained at the Station Site Boundary. Control location samples are collected from a local commercial vendor. The vegetables are assayed directly for gamma isotopic radioactivity by gamma spectroscopy. Samples are also collected from the vineyards near the site during the annual harvest. Samples from the vineyards are analyzed for gamma isotopic radioactivity by gamma spectroscopy and also analyzed for tritium activity.
FISH	Fish are collected semi-annually from the Clay Creek system. The dissected (edible) portion of each sample is assayed directly for gamma isotopic radioactivity by gamma spectroscopy.
ALGAE	Samples of algae in the Clay Creek system are collected semi-annually and assayed directly for gamma isotopic radioactivity by gamma spectroscopy.
WATER	1-gallon grab samples of water from locations in the liquid effluent pathway and groundwater are collected as follows: • Surface water and Drinking water are collected monthly • Runoff water is collected biweekly • Well water is collected quarterly. At two locations, samples are obtained to provide a monthly composite sample. All samples are assayed for tritium by liquid scintillation counting and for gamma isotopic radioactivity by gamma spectroscopy. Drinking and Well water samples are analyzed for Gross Beta activity.
RAIN WATER	Samples of rainwater are collected on a seasonal basis. All samples are assayed for tritium by liquid scintillation and for gamma isotopic radioactivity by gamma spectroscopy.

APPENDIX E

ENVIRONMENTAL MONITORING PROGRAM DESIGN

PROGRAM BASIS

The Sacramento Municipal Utility District conducts a continuous Radiological Environmental Monitoring Program (REMP) at the Rancho Seco Nuclear Station to assess the impact of Station operation on the surrounding environment. The current Post-Operational REMP is a continuation of a similar program initiated prior to and during operation of the Station. Samples of the surrounding environment are collected on a routine basis and analyzed to determine the amount of radiation and radioactive materials present in the exposure pathways.

During 2002 the program was directed and executed by the Radiation Protection/ Chemistry Superintendent. Decommissioning Chemistry/ Radiation Protection Technicians perform sample collection. The Radiological Health Supervisor performs data review and Program maintenance/ oversight. The Program is operated with primary accountability and cognizance of the Manager, Plant Closure and Decommissioning.

The Program is designed consistent with Title 10, Code of Federal Regulations, Part 50, Appendix I - Section IV, B.2, B.3 and C, and Appendix A, "General Design Criteria for Nuclear Power Plants," Criterion 64. The program also complies with Title 10, Code of Federal Regulations, Part 20, "Standards for Protection Against Radiation," Section 1302. These federal requirements are cited in the Rancho Seco Quality Manual, Appendix A, and the REMP manual. REMP requirements are implemented through the review, approval and routine use of several documents, namely the REMP Manual, Offsite Dose Calculation Manual, Surveillance Procedures and Health Physics Implementing Procedures.

The programmatic elements of the REMP are based on regulatory requirements and associated guidelines. The objectives of the Program are to:

1. Provide the technological basis and the instruction for monitoring the environs for radioactivity sources. The radioactive sources, which contribute to detectable radioactivity in the local environs, are comprised of:

   ⇒ naturally occurring background,
   ⇒ releases during normal operations,
   ⇒ world-wide weapons testing, and
   ⇒ major global nuclear accidents

PROGRAM BASIS
(Continued)

2. Provide the means to verify the effectiveness of the Rancho Seco Nuclear Station Radiological Effluents Control Program.

3. Meet the minimum detectable limits for radioisotopes in environmental samples.

4. Provide quantitative measurements in the gaseous, liquid and direct radiation exposure pathways for radionuclides.

5. Provide indications of the largest potential radiation exposure for individuals as a result of radionuclides in the principal exposure pathways.

The Program is developed and conducted using recognized standards and practices NRC79a, NRC79b, NUREG79, and NUREG80a.

REMP CHANGES

The Permanently Defueled Technical Specifications administrative requirements for the REMP program were moved to the Rancho Seco Quality Manual, Appendix A, in 2002. The REMP manual was not revised during 2002.

EXPOSURE PATHWAYS

The fundamental parameters, which have been defined prior to monitoring the environs, are:

1. Identification of the effluent release pathways

2. Identification of the human exposure pathways

3. Identification of the land use parameters by the population within a two-mile radius of the plant site.

Each of these three parameters is discussed below.

EXPOSURE PATHWAYS

Effluent Release Pathways

There are two principal pathways, which may result in human exposure to radiation and radioactive material originating from Station operation:

1. Liquid effluents and

2. Direct radiation from these effluents and onsite sources.

Liquid Effluents

In the liquid exposure pathway, humans can ingest radioactive materials in surface waters directly or indirectly through the consumption of aquatic foods such as fish and shellfish. Humans can consume vegetation, which is irrigated with Clay Creek water, which may contain radioactive material. Another exposure pathway from liquid effluents results from the consumption of animal products such as meat and milk from animals, which have fed upon irrigated vegetation and/ or consumed Clay Creek water.

Direct Radiation

In the direct radiation pathway, potential radiation exposure may occur from radioactive material storage areas, which are contained within the site boundary. People can potentially be exposed to direct radiation from ground deposition of particulates deposited on the ground from liquid effluents. With the off-loading of spent fuel to the ISFSI, the ISFSI has become part of the direct radiation pathway.

LAND USE CENSUS

On a biennial basis, a land use census is conducted within a two-mile radius to identify any changes in the human exposure pathways. The Land Use Census is used to determine the changes needed for REMP monitoring activities. The results of the land use census conducted during 2001/ 2002 are presented in Appendix A of this Report. The next scheduled land use census will be conducted in 2003/ 2004 and reported in the 2004 AREOR. From data obtained from the Land Use Census, exposure pathways are analyzed through a systematic process, which identifies a sample medium, or organism that is found to potentially contribute to an individual's radiation exposure. Usage and bioaccumulation factors (NRC77) are then specified which represent the magnitude of radioactive material transfer through the food chain to a receptor. The analysis of the effluent and exposure pathways enables monitoring sites to be identified as "indicator" (for sites at which the potential effects of Station effluents would be readily detected) or "control" (for those sites which are not expected to be influenced by Station operation). The analysis results of samples obtained at indicator and control sites are routinely compared to identify potential exposures above background levels.

MONITORING LOCATION SELECTION

The REMP maintains the monitoring sites required by the REMP manual, Table 6. This program is supplemented with additional samples to compensate for changes in the radiological environment surrounding Rancho Seco. The California Department of Health Services also selected some of the monitoring sites as part of their monitoring programs. Indicator sites are placed in areas, which would be most sensitive to the effects of Station effluents such as downwind, or downstream areas near the Station. If radioactive material is detected above background at any of these indicator sites, observed potential exposure and dose to humans can be estimated to verify the effectiveness of the Offsite Dose Calculation Manual in predicting potential exposures or doses. It is important to note that the detection of radioactive material in indicator samples does not necessarily mean that its presence can be attributed to Rancho Seco operations. Moreover, especially with liquid effluent pathway samples, the detection of radioactive material is difficult to interpret since it is unknown when the material was deposited. In many instances, the observed radioactive material could correctly be ascribed to historical (pre-2002) depositions.

Control locations provide data that should not be influenced by the operation of Rancho Seco. These locations are selected based upon distance from the Station in the upwind or upstream direction of the effluent release pathways. Samples obtained from control locations should, upon analysis, reveal information about the presence and distribution of naturally occurring and man-made radioactive materials. Data from these locations are used to aid in the discrimination between the effects of Rancho Seco releases and other natural phenomena or accidental releases, which may result in human exposure.

MONITORING LOCATION SELECTION
(continued)

Gaseous effluent indicator monitoring sites are generally placed in areas, which receive prevailing winds crossing the Rancho Seco site. Liquid radioactive effluents are discharged in batches from two onsite Retention Basins into "No Name" Creek located southwest of the Station. Dilution water, obtained from the Folsom South Canal, is discharged into "No Name" Creek to give reasonable assurance of compliance with the 10CFR50, Appendix I dose guidelines. "No Name" Creek flows southerly into the Clay Creek. Without this dilution water flow, the Clay Creek would be in a dry state for most of the year.

Beyond the Site Boundary at a point north of Highway 104, the Clay Creek empties into the Hadselville Creek. Hadselville Creek then empties into the Laguna Creek at a point west of North Clay Station Road near the Folsom South Canal. Finally, Laguna Creek flows into the Cosumnes River at a point located approximately 20 straight-line miles west of Rancho Seco. Since this stream system is the only routine release pathway for liquid radioactive and non-radioactive effluents from the Station, the liquid exposure pathway indicator sites are located along these creeks and nearby land.

The direct radiation pathway is monitored principally through a network of monitoring badges at sites distributed in sectors centered on the Station. The badges are located primarily at the site, residential, and recreational areas around the Rancho Seco location. This design provides the capability to easily detect Station-induced direct radiation contributions to the observed terrestrial and cosmic direct radiation background.

Some badges have been sited in special locations to record direct radiation resulting from known depositions of radioactive material and to provide 10 CFR Part 72 license required data for the Interim Spent Fuel Storage Installation (ISFSI).

Appendix B contains a detailed description and illustration of the REMP sample and monitoring locations.

SAMPLE MEDIA

Samples are collected from predetermined monitoring sites at a specified frequency. The sample media chosen is a function of the type of monitoring desired and coincides with one of the following exposure pathways:

- Atmospheric
- Direct radiation
- Terrestrial
- Aquatic life
- Water

Atmospheric monitoring is accomplished by filtering a volume of air using a mechanical air pump to collect particulates with a particulate filter paper. Four air sampler locations are used to collect weekly air samples. Two locations (Meteorological Tower and Rancho Seco Reservoir) are control locations and the remaining two locations are indicator locations on the plant site.

Direct radiation monitoring is achieved by placing monitoring badges at aboveground sites. The monitoring badges respond to, and record the amount of, gamma radiation exposure. The source of this gamma radiation exposure is varied and includes potential Station effluents, naturally occurring terrestrial, and cosmogonic radionuclides. The monitoring badges are also influenced by seasonal and global (fallout) radiation sources.

There are 35 sites, which are monitored within a 10-mile radius of the Station. The monitoring badges are placed at the Station Industrial Area Boundary, near the property boundary, locations of interest such as nearby residences, and at control locations located beyond five miles of the Station.

Terrestrial monitoring is accomplished by obtaining samples of sediment, soil, and garden vegetation to measure the quantity of radioactive material deposited from gaseous and liquid effluents. There are five mud and silt, 26 soil, 2 garden vegetation locations, and 2 vineyard (grape) sample locations.

Aquatic monitoring includes the sampling of fish and algae. Algae is an excellent concentrator of radioactivity contained in water and is sampled to provide an early indication of increased liquid radioactive material concentration. There are four fish and five algae sample locations.

SAMPLE MEDIA
(continued)

Water monitoring includes samples of surface, runoff, drinking, and well sources from locations in the liquid effluent pathway and from area wells. The six surface water sampling locations monitor site supply water (Folsom South Canal), runoff water and water discharged from the Station. Drinking water is sampled from nine groundwater wells and three drinking water taps.

Rainwater is also collected at one location on a seasonal basis.

SAMPLE ANALYSIS & DATA HANDLING

The laboratory, which provides radio-analytical services for the Program, is Eberline Services located in Richmond, California. Sample analysis results submitted by Eberline Services are reviewed for accuracy and completeness and then entered into a computerized database for evaluation.

Data comparisons are made between individual control and indicator sample sites to isolate potential Station influences on the measurement results.

The summarized results of the 2002 Radiological Environmental Monitoring Program are presented in Table 2.

Individual (raw data) results are presented in Appendix F, Tables F-1 through F-11.

REGULATORY REPORTING LEVELS

Sample analysis data is reviewed and evaluated by the Radiological Health Supervisor as the results are received. All sample analysis results are reviewed for correct sensitivity and anomalies.

The activity concentration values listed in Table E-1 are the environmental Fuel Cycle Dose quantities that, if exceeded, require a Special Report to be submitted to the USNRC. In accordance with the REMP Manual (Section 5, Fuel Cycle Dose), the Special Report must include an evaluation of any release conditions, environmental factors or other aspects, which caused the reporting limits to be exceeded.

REGULATORY REPORTING LEVELS
(continued)

In addition to the Fuel Cycle Dose reporting requirements, a Special Report is required to be submitted to the USNRC when more than one of the radionuclides in Table E-1 are detected in the sampling medium and the summed ratio of detected activity concentration to the respective Reporting Level concentration is greater than, or equal to, unity (1). When radionuclides other than those listed in Table E-1 are detected which are a result of Station effluents, a Special Report is required to be submitted if the potential annual dose commitment exceeds the 10 CFR 50, Appendix I guidelines.

No reports of the types described above were required to be submitted during 2002.

SENSITIVITY OF THE REMP MEASUREMENT PROCESS

All Program measurements must be performed at a sensitivity, which meets USNRC requirements. This sensitivity is determined "before the fact" (*a priori*) for each radionuclide of interest and sample analysis type. Typical controllable sensitivity parameters include:

⇒ Sample volume or mass

⇒ Sampling efficiency

⇒ Time from sample collection to measurement

⇒ Instrument detection efficiency for the nuclides (energies) of interest

⇒ Background radiation levels

⇒ Chemical recovery factors

By adjusting and controlling each of these parameters to maximize measurement process efficiency, a maximum sensitivity level (activity concentration) can be specified for each nuclide of interest and analysis type while maintaining an economic measurement process. The maximum sensitivities in the REMP are specified by the USNRC in the REMP Manual approved for Rancho Seco. These sensitivities are referred to as "LLD's", an acronym for "Lower Limit of Detection". LLD's are specified on an "*a priori*" basis and apply to routine measurement process capabilities when no other interfering radioactivity is present. The word "routine" is emphasized since occasional circumstances, such as limited sample mass, elevated levels of background radiation and interfering nuclides can contribute to sensitivity degradation.

Such occurrences are normally noted and reported during the conduct of REMP activities.

SENSITIVITY OF THE REMP MEASUREMENT PROCESS
(continued)

Meeting the LLD requirements is a quality control function shared by both REMP and the analytical laboratory personnel. Once the laboratory establishes values for the controllable parameters for each analysis type, sample chain of custody controls ensure that these parameters are upheld. If all parameters are upheld, then compliance with the LLD requirements has been demonstrated. The specific LLD values for Program measurements are included in Table E-2.

Since most of the samples analyzed result in the detection decision "activity not identified", a Minimum Detectable Activity (MDA) concentration value is calculated and reported. This value can be thought of as the LLD-at-the-time-of-counting since it is calculated using an equation, which is similar to the one, used to establish LLD parameters. The biggest difference is that actual (not "*a priori*") parameters are used, including interference from natural radioactive material in the sample. It is important to note that MDA's are reported only for those measurements where the "activity not identified" decision has already been made.

MDA values are used primarily to identify changes in the measurement process and to convey more information about the measurement itself. Without the use of the MDA concept, most Program measurements would be reported simply as "<LLD". With MDA used, Program measurements are reported as "< xxx " where "xxx" is the calculated MDA concentration.

TABLE E-1

REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

Analysis	Water (pCi/L)	Airborne Particulate or Gases (pCi/m^3)	Fish (pCi/kg, wet)	Food Products (pCi/kg, wet)
H-3	20000[a]			
Mn-54	1000		30000	
Co-60	300		10000	
Zn-65	300		20000	
Cs-134	30	10	1000	1000
Cs-137	50	20	2000	2000
Gross Beta	40 [b]	2 [c]		

Notes: [a] For drinking water samples, this is a 40 CFR Part 141 value

[b] Gross Beta activity in water of ten times the yearly mean of the control samples is indicated as the level that gamma isotopic analysis should be performed on the individual sample (NRC79a). Gamma isotopic analysis on each water sample is required by the REMP and therefore this requirement does not apply.

[c] Gross Beta activity in air of ten times the yearly mean of the control samples is indicated as the level that gamma isotopic analysis should be performed on the individual sample. The value indicated is Site specific.

TABLE E-2

MAXIMUM (REQUIRED) LLD VALUES FOR ENVIRONMENTAL SAMPLES[ac] (NRC79A)

Analysis (d)	Water (pCi/L)	Airborne Particulate or Gases (pCi/m^3)	Fish (pCi/kg, wet)	Food Products (pCi/kg, dry)	Sediment (pCi/kg, dry)
Gross Beta	4[b]	0.01			
H-3	2000 (1000, [b])				
Mn-54	15		130		
Co-60	15		130		150[e]
Zn-65	30		260		
Cs-134	15 (10[b])	0.01[d]	130	60	150
Cs-137	18 (10[b])	0.01[d]	130	60	150

Notes:

(a) Analysis requirements are those recommended in the BTP [NRC79A] and RETS [NUREG79].

(b) LLD for water samples utilized for human consumption only [NUREG79].

(c) Other peaks, which are measurable and identifiable, together with the nuclides in Table E-2, shall be identified and reported.

(d) Composite analysis LLD is Shown; individual sample LLD is 0.05 pCi/m^3 (Site specific value).

(e) LLD for Mud and Silt Co-60 is not required by RETS [NUREG79]. This value is consistent with the RETS required value for Cs-134 and Cs-137.