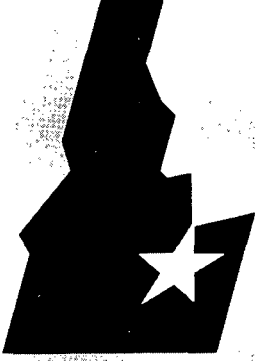


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TECHNICAL EVALUATION REPORT
for the
PROPOSED GUIDANCE FOR REVIEWS OF
REPORTS REQUIRED BY RETS

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ABSTRACT

A detailed discussion is given of the required contents of Licensee reports submitted in accordance with technical specifications identical to the model RETS for boiling water reactors prepared by the NRC staff (NUREG-0473). Instructions are also given for preparation of technical evaluation reports (TERs) documenting reviews of RETS-related reports required by Federal regulations and plant - specific RETS. These instructions include the format of the TER, descriptions of the contents of every section to be included, and examples of all required data tables and figures.

These instructions will enable different groups to prepare a consistent set of review TERs.

FOREWORD

This report is supplied as part of the "Reviews of Radiological Issues for BWRs, Project 2" being conducted for the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation, by the Idaho National Engineering Laboratory, EG&G Idaho, Inc., Radiological Physics.

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ABBREVIATIONS USED IN THIS REPORT

Abbreviation	Complete Identification
RETS	Radiological Effluent Technical Specifications
LCO	Limiting Condition of Operation
NRC	Nuclear Regulatory Commission
LLD	Lower Limit of Detection
NUREG-0473	"Standard Radiological Effluent Technical Specifications for Boiling Water Reactors," Rev. 3, Draft 7", September 1982
Regulatory Guide 1.21	"Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," U. S. Atomic Energy Commission, Revision 1, June 1974.
Regulatory Guide 4.1	NRC document: Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants, April 1975.
Regulatory Guide 4.8	NRC document: Environmental technical specifications for Nuclear Power Plants, December 1975.
Regulatory Guide 1.109	NRC document: Calculation of Annual Doses, October 1977.
Regulatory Guide 4.15	NRC document: Quality Assurance for Radiological Monitoring Programs, February 1979.
RABTP (1979)	Radiological Assessment Branch Technical Position: Environmental Monitoring Program, November 1979.
NUREG-0133	NRC document: Preparation of RETS for Nuclear Power Plants, October, 1978.
10 CFR 20	Code of Federal Regulations: Standards for Protection Against Radiation, January 1986
10 CFR 50	Code of Federal Regulations: Domestic Licensing of Production and Utilization Facilities, January 1986.

10 CFR 61	Code of Federal Regulations: Licensing Requirements for Land Disposal of Radioactive Waste, January 1986.
10 CFR 71	Code of Federal Regulations: Packaging and Transportation of Radioactive Material, January 1986.
40 CFR 190	Code of Federal Regulations: Environmental Radiation Protection Standards for Nuclear Power Operations, 1981.
40 CFR 141	Code of Federal Regulations: Maximum Containment Levels for Beta Particle and Photon Radioactivity from Man-made Radionuclides in Community Water Systems, July, 1976.
NUREG-0020	Licensed Operating Reactors Status Summary Report, December, 1984..
RETS TER	"Radiological Effluent Technical Specifications (RETS) Implementation - plant's name'" [A technical evaluation report prepared by contract with the NRC - available in NRC Public Document Room]. Documents prepared by the plant are preferred.
NUREG-0837	NRC thermoluminescent detector (TLD) Direct Radiation Monitoring Network, May, 1986.
Appendix	Appendix _ of the RETS-required reports review document being prepared.
Annual Report	Plant's "Annual Radiological Environmental Operating Report" or equivalent document, as required by NUREG-0473.
Semiannual Report	Plant's "Semiannual Radioactive Effluent Release Report", submitted twice a year as required by NUREG-0473.
Nucleonics Week	McGraw-Hill Inc. published weekly, 1221 Ave of the Americas, NY, NY 10020
Monthly Operating Report	Final Safety Analysis Report
ODCM	Offsite Dose Calculation Manual

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PROPOSED GUIDANCE FOR REVIEWS OF REPORTS REQUIRED BY RETS

1. INTRODUCTION

Radioactive Effluent Technical Specifications (RETS) for a nuclear power plant are those technical specifications dealing with the release of radioactive materials in liquid and gaseous effluents to UNRESTRICTED AREAS, solidification of radioactive waste, shipment of radioactive solid waste offsite, calculation of radiation doses due to radioactive effluents from the nuclear power plant and other nearby uranium fuel cycle sources to MEMBER(S) OF THE PUBLIC, and monitoring of radioactive materials in the plant environs. The RETS define limiting conditions of operation (LCOs) and reporting requirements for these subjects.

The Nuclear Regulatory Commission (NRC) staff has prepared model technical specifications (model RETS) for boiling water reactors (BWRs) and issued them as NUREG-0473, Revision 3, Draft 7", "Standard Radiological Effluent Technical Specifications for Boiling Water Reactors," September, 1982. (This document will henceforth be referred to as NUREG-0473 in this report.) Licensee's RETS are not required to conform exactly to the content and format of NUREG-0473, which was issued as an example of RETS that comply with NRC regulations.

The model technical specifications in NUREG-0473 are based on earlier guides for measuring, evaluating, and reporting radioactivity in solid wastes, releases of radioactive material in liquid and gaseous effluents, and radioactive materials in the environment and for calculating radiation doses. These earlier guides include the following:

- "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," Regulatory Guide 1.21, Revision 1, June, 1974

- "Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants," Regulatory Guide 4.1, Revision 1, April, 1975
- "Environmental Technical Specifications for Nuclear Power Plants," Regulatory Guide 4.8, December, 1975
- "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Regulatory Guide 1.109, Revision 1, October, 1977
- "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," NUREG-0133, October, 1978
- "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment," Regulatory Guide 4.15, Revision 1, February, 1979
- "Radiological Assessment Branch Technical Position An Acceptable Radiological Environmental Monitoring Program," Revision 1, November, 1979

These documents give practical guidance concerning how a nuclear power plant may comply with the sections in regulations 10 CFR 20, 10 CFR 50, and 40 CFR 190 that address radioactive effluents, shipments of radioactive material, and doses to MEMBERS OF THE PUBLIC.

The RETS require routine and non-routine reporting of specific data and information concerning radioactive effluents, shipments of radioactive material, and doses to MEMBERS OF THE PUBLIC. The majority of these data and information are contained in a power plant's annual radiological environmental operating report, which must be submitted prior to May 1 of each year, and semiannual radioactive effluent release reports, which must be submitted within 60 days of January 1 and July 1

of each year. Plants are also required to submit additional reports (e.g., special reports, licensee event reports) subject to conditions.

The RETS-required reports must be reviewed in order to monitor licensee compliance with their technical specifications, evaluate the impact of plant operation on the environment and radiation dose to the public, and identify for possible evaluation reportable changes made by the plant (i.e., changes to the Licensee's offsite dose calculation manual or radwaste treatment systems) that could affect radioactive effluents, shipments, or doses to the public.

The Process Control Program (PCP) requirement has been removed from NUREG-0473 and placed in another document. Consideration of changes to the PCP, therefore, is no longer required in the review of RETS-required reports.

1.1 Objectives of This Report

It is the objective of this report to:

- Summarize general requirements for contents of the reports required by RETS
- Provide a tabulation of the baseline documents used in the review of RETS-required reports
- Provide guidance for review of RETS-required reports, including insights developed during previous reviews of RETS-required reports
- Provide detailed guidance for producing a Technical Evaluation Report (TER) documenting the review of the RETS-required reports and recording the quality and general acceptability of information provided in those reports

- Provide guidance concerning the type of expertise required of personnel who perform the reviews of RETS-required reports

1.2 Structure of This Report

This report is structured so that it can be used as a working document in the review and evaluation of RETS-required reports and the subsequent preparation of a TER documenting this review and evaluation. (i.e., the review TER).

Section 1 contains a general introduction to this report, including descriptions of RETS and RETS-required reports, specific objectives of the report, and an outline of the contents of the report. Section 2 contains the criteria for the contents of RETS-required reports. These criteria provide guidance for the review and evaluation of the RETS-required reports.

Section 3 complements Section 2 by providing additional guidance for the review and evaluation of RETS-required reports together with detailed guidance for producing a TER documenting this review and evaluation. The format of Section 3 follows that of the recommended format for the review TER. All tables and appendices required in the review TER are addressed in Section 3. Insights concerning what information to look for, where to find information in Licensee submittals, and how to evaluate the information are included in this section together with guidance concerning the experience and expertise required of the personnel who do the reviewing and evaluating.

Appendices A through F present examples of suggested contents for the appendices to the review TER.

2. RETS-REQUIRED REPORTS REQUIREMENTS

This section gives guidance concerning what the Licensee must include in the various RETS-required reports (annual, semiannual, special, etc.) The guidance given here is general, being taken from NUREG-0473 and the other baseline documents cited in Section 1, and may in specific cases be superseded by the Licensee's technical specifications. Prior to reviewing the contents of the Licensee's RETS-required reports, therefore, the Licensee's specific technical specifications must be reviewed to determine exactly what their requirements are.

2.1 Annual Radiological Environmental Operating Report

Licensee technical specifications that follow the guidance of Specification 6.9.1.11, NUREG-0473 require that the annual radiological environmental operating reports be submitted prior to May 1 of each year. The reports give results of environmental monitoring programs designed to implement Section IV.B.2 of Appendix I to 10 CFR 50 by providing data on measurable levels of activity and radioactive materials in the environment to evaluate the relationship between quantities of radioactive material released in effluents and resultant radiation doses to individuals from principal pathways of exposure. The reports also implement Section IV.B.3 of Appendix I to 10 CFR 50 by identifying changes in the use of unrestricted areas (e.g., for agricultural purposes) to permit modifications in monitoring programs for evaluating doses to individuals from principal pathways of exposure.

The items discussed in the following sections (except Section 2.1.7) are to be included in each annual radiological environmental operating report (annual report). The items in Section 2.1.7 are to be included only if conditions existed requiring the reporting.

2.1.1 Radiological Environmental Monitoring Program (Summary Description)

This summary description forms an interface between the Licensee's RETS, Offsite Dose Calculation Manual (ODCM), and annual report. It provides a convenient reference against which to evaluate the completeness of the data reported because it should include the effect of any changes to the RETS and ODCM.

NUREG-0473, Specification 6.9.1.1 requires that the annual report shall include a summary description of the radiological environmental monitoring program and at least two legible maps (one map covering stations near the site boundary and a second including the more distant stations) covering all sampling locations keyed to a table giving distances and directions from the centerline of one reactor. For the summary description, the equivalent of a copy of Table 3.12-1 from NUREG-0473 together with the required maps and table of sampling locations is satisfactory. A more detailed discussion of sampling and analysis methods, however, would be informative.

2.1.2 Results of Current Year's Sample Analyses

The results of the current year's sample analyses are to be presented in a table giving most of the pertinent data obtained in the Licensee's environmental monitoring program. This summary table should be in the format of Table 3 of the Radiological Assessment Branch Technical Position, Revision 1, November 1979, as required by essentially all of the Licensee's RETS. Since the data provided in this table constitute a condensed report of essentially all of the radiological environmental monitoring program activities associated with the plant, their completeness and accuracy should be checked closely. A brief column-by-column commentary follows:

1. Medium or Pathway Sampled (Unit of Measurement). The entries in this column should correspond to the media and pathways required to be sampled by the Licensee's RETS table corresponding to Table 3.12-1 in NUREG-0473.
2. Type and Total Number of Analyses Performed. This column should indicate all analyses performed, whether or not detectable activities existed in the samples measured. The total number of analyses should indicate all analyses performed (e.g., gross beta, Sr-90, gamma spectrometry, etc.) whether or not detectable activities were measured. However, it is not necessary to list all isotopes searched for (but not detected) in the gamma spectrometric analyses. The "Number of Analyses" should be the number of samples actually analyzed, not the number required by the RETS. This number should equal the sum of the denominators of the fraction (f) in the fourth (All Indicator Locations) and seventh (Control Locations) columns, since all Licensees report the fraction (f) as the number of samples yielding detectable activities divided by the total number of samples instead of as a reduced fraction.
3. Lower Limit of Detection (LLD). As indicated in Notation c to Table 4.12-1 of NUREG-0473, the LLD shown here should be appropriate for the measurement apparatus and procedures used to analyze the Licensee's environmental samples. These LLDs will give a good estimate of the levels of radioactivity detectable by the Licensee's monitoring and analysis program. Generally they are expected to be lower than the LLDs shown in Table 4.12-1 of NUREG-0473 and the corresponding table in many Licensee's RETS, which are the allowed maximum LLDs. (Note: In many cases the Licensees report LLDs only for the nuclides shown in Table 4.12-1 of NUREG-0473.)

4. All Indicator Locations: Mean, (f), Range. The data to be reported in this column are the mean and range of detectable measurements only, and the fraction (f) of detectable measurements i.e., the unreduced fraction of samples analyzed for which the analysis specified in the second column gave detectable measurements. Data in this column should be from indicator locations only. The range should be the range of individual measurements.

No official guidance is available for defining "detectable" measurements and few (if any) Licensees describe the method used to differentiate between detectable and non-detectable measurements. Examination of data reported by various Licensees indicates that two methods used for this differentiation are: (a) Only activity levels greater than the required LLDs (i.e., the LLDs appearing in the Licensee's table comparable to Table 2 of the Radiological Assessment Branch Technical Position, Revision 1, November, 1979) are considered detectable, and (b) activities are considered detectable if greater than the LLD calculated using the formula given in Notation c to Table 4.12-1 of NUREG-0473 and data associated with the individual measurement. The second method above is just one of several that could be inferred from the same reported data. The Licensees not using the required LLDs referenced in the first method might be using one of the various criteria suggested in the references given in Bases Statement 3/4.12.1 (Monitoring Program) in NUREG-0473 or some criteria included in programs furnished by the manufacturer of the analytical equipment used for analyses of environmental samples. (Note: Some of these criteria class measurements as detectable when there is only a 50% chance that activity above background exists.)

Use of the first method in the paragraph above should not be considered acceptable, since some activities detectable by state-of-the-art equipment would be ignored. Another procedure,

i.e., reporting measurements as detectable when the activities are more than one half the LLDs determined from background runs for the individual measurements (or from the baseline of the individual measurements themselves), is a reasonable compromise between reporting only measurements above the allowed LLDs and reporting all measurements for which there was a 50% chance that the activity reported was above background.

Some confusion can arise when reviewing the discussion section of a Licensee's report. Some Licensees discuss not only levels of activity below reported LLDs, but also levels of activity that were not classed as detectable in the table of summarized data.

5. Location with Highest Annual Mean. This entry should describe the indicator or control location with the highest annual mean activity. Comments on detectability in 4 above apply.
6. Control Locations: Mean, (f), Range. See 4 above, except applied to control locations only.
7. Number of Non-Routine Reported Measurements. The measurements to be flagged in this column are not well defined in published reporting criteria. The Radiological Assessment Branch Technical Position, Revision 1, November 1979 and NUREG-0473 require special reporting of levels of activity in environmental media exceeding the Reporting Levels in Table 3.12-2 of NUREG-0473. Regulatory Guide 4.8, December 1975 requires special reporting when a "confirmed measured level of radioactivity in any environmental medium exceeds ten times the control station value." The entry recommended in the Non-Routine Reported Measurements column of the data summary table by Regulatory Guide 4.8 is not entirely clear due to an

error in the footnote pertaining to the entry, but can reasonably be interpreted to be the number of measurements exceeding ten times the control station value.

Acceptable entries in this column should, therefore, be either the number of measurements exceeding the reporting levels of Table 3.12-2 of NUREG-0473, the number of measurements exceeding ten times the control station value, or the number of measurements exceeding Licensee specified values, but no greater than the higher of the previous two alternatives. If Licensees do not maintain a control sample location for a particular monitored medium, the reporting level in Table 3.12-2 of NUREG-0473 should be used as an alternative to ten times the control station value if that is the criterion used by the Licensee for entries in this column.

2.1.3 Trend Results and Interpretation

This information is needed to indicate plant effect on the environment over the life of the plant up to the current time.

The guidance given by the NRC criteria for reporting the analyses of trends is very brief, and leaves the extent of the trend analyses and the format in which it is to be presented to the discretion of the Licensee. It would, however, be informative if the Licensee provided and discussed environmental radioactivities measured throughout the history of the plant, even if no plant related activities were measured.

Each of the trends of radioactivity in each environmental medium monitored should be discussed in the annual report. The discussions should include:

1. Comparison of the results from the reporting period (current year) with results from preoperational measurements, or a statement that preoperational measurements were not made.

2. Comparison of indicator results during the reporting period with control location results from the same period. If there is a pattern of significant difference between indicator and control over the operational and/or preoperational history of the plant, this pattern should be discussed.
3. Comparison of results from the reporting period with results over the operating history of the plant.
4. Each of the above areas should be discussed even if no radioactivity attributable to the plant has ever been detected and all indicator and control values were comparable. In such cases, of course, a brief statement to that effect could satisfy the requirement for analyses of trends.

2.1.4 Effect of Plant Operation on the Environment

The NRC provides no guidance as to how the impact of plant operation on the environment is to be expressed. The 40 CFR 190 limits of 25 mrem to the whole body, 75 mrem to the thyroid, and 25 mrem to any organ except the thyroid could be recommended as quantitative bases for a statement of plant effect on the environment. Alternatively the 10 CFR 50 limits could be recommended.

The Licensee should include in the annual report an assessment of the observed impact of plant operation on the environment for each environmental medium monitored. There are no official guidelines for evaluating the Licensee assessment of the observed impacts of the plant operation on the environment. If no radioactivity reasonably attributable to plant operation is measured in the monitored medium, a simple statement that no plant effect was observed is a sufficient statement of plant impact. However, if radionuclides are detected that might be the result of plant operation but are reasonably attributable to other sources (such as fallout), the reasons for believing them to be due to the other sources should be given in as much detail as possible. These reasons should then be followed by the assessment of the effect of plant operation.

The real problem in evaluating a Licensee's assessment of plant effect on the environment arises when there is definite evidence of radioactivity in the environmental media as the result of plant operation. In these cases there is a tendency for the Licensee to assess the plant effect by using adjectives such as, minimal, insignificant, negligible, nominal, etc. These qualitative terms mean little by themselves, since they could be used to describe any level of activity from that expected of the average of the 5% false positive values allowed by the LLD formula of Notation c to Table 4.12-1 in NUREG-0473 to activities that approach the reporting levels in Table 3.12-2 of NUREG-0473. Qualitative descriptive terms should be substantiated by a quantitative statement such as a comparison of observed levels of activity with the levels required to produce doses in UNRESTRICTED AREAS in excess of the design objectives of 10 CFR 50 or the limits of 40 CFR 190.

2.1.5 Results of Land Use Census

The reasonable interpretation of NRC criteria in NUREG-0473 is that complete results of the survey should be reported. However, some Licensees interpret the requirement to be that only changes need be reported. The requirements of NUREG-0473 concerning the land use census are that the nearest milk animal, nearest residence, and nearest garden of greater than 50 m² within 8 km in each of the 16 meteorological sectors be identified. In addition, for plants with elevated releases, all milk animals and all gardens greater than 50 m² within 5 km should be identified.

The recommended requirement for reporting the results of the land use census stated in NUREG-0473 should be interpreted as requiring that a tabulation of all milk animals, residences, and gardens required to be surveyed should be furnished in each annual report. Such a tabulation is useful when questions arise in the reviewer's mind concerning the calculation of maximum doses to a MEMBER OF THE PUBLIC.

2.1.6 Results of Interlaboratory Comparison Program

The Radiological Assessment Branch Technical Position, Revision 1, November 1979, requires that the results of Licensee participation in a laboratory crosscheck program be reported if they are not participating in the Environmental Protection Agency (EPA) Crosscheck Program. However, NUREG-0473 requires reporting regardless of which crosscheck program the Licensee uses (including the EPA program). Since the recommendation in NUREG-0473 is dated later, it is the preferred requirement.

The Licensee's report should include a tabulation containing the known (intercomparison laboratory) values, the Licensee's values, and the acceptable range for the Licensee's values. The criteria for the acceptable range of the Licensee's values should also be defined. In addition, the Licensee should include a discussion of the reasons for Licensee's values outside the acceptable ranges, proposed corrective actions, and an evaluation of the laboratory's performance in the program.

2.1.7 Reporting Requirements Subject to Conditions

The items discussed in this section are to be included in the Licensee's annual report if the conditions existed requiring the reporting. (There are no requirements for the items to be addressed in the reports if the conditions did not exist, but statements indicating that the reporting was not required would contribute to the completeness of the reports.)

2.1.7.1 Deviations from the Required Monitoring Program. The following are required:

- When the radiological environmental monitoring program is not being conducted as specified in the Licensee's table corresponding to Table 3.12-1 of NUREG-0473, in lieu of a

Licensee Event Report, the Licensee should include in the annual report a description of the reasons for not conducting the program as required and the plans for preventing a recurrence.

- In the event some individual results are not available for inclusion in the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

The summarized and tabulated results (required to be reported in the format of the table in the Radiological Assessment Branch Technical Position, Revision 1, November 1979) should be checked against the Licensee's table corresponding to Table 3.12-1 of NUREG-0473 and the table and figure(s) of the Licensee's ODCM giving specific monitoring locations. Comparison of the number and types of analyses for each monitored medium as reported in the summarized data table with the required sampling and analyses gives a reasonable check of the Licensee's conduct of the required monitoring program, although specific locations from which samples were taken cannot be verified for Licensees who do not report results of the analysis of individual samples. If it is determined that all required monitoring and sample analyses were not performed, the Licensee's report should be checked for discussions of the omitted samples.

Failure to conduct the monitoring program as required and delayed reporting of results should be noted in Section 2.7.1 of the TER produced by the reviewers (i.e., the review TER). Either a synopsis of the Licensee's discussion of the omitted samples or a statement of failure to comply with this reporting requirement should be included there. Some judgement is required as to whether the Licensee should give detailed plans for preventing recurrence [e.g., an occasional missing thermoluminescent detector (TLD) is a normal occurrence, but action should be taken if TLDs from one location are repeatedly vandalized].

2.1.7.2 Potential Dose Above Limits (not due to plant). This item is provided to document the effect of radioactive materials detected in the environs of a light water reactor, but not due to effluents from thereactor. The radioactivity reported would have been detected by the radiological environmental monitoring program conducted by the Licensee but determined to have been the result of causes other than plant operations.

If the level of radioactivity detected in an environmental sampling medium (but not the result of plant effluents) exceeds the reporting levels of Table 3.12-2 in NUREG-0473 when averaged over any calendar quarter, the condition shall be reported and described in the annual report.

When more than one of the radionuclides in Table 3.12-2 are detected in the sampling medium, this report shall be submitted if:

$$\frac{\text{Concentration 1}}{\text{Reporting Level 1}} + \frac{\text{Concentration 2}}{\text{Reporting Level 2}} + \dots \geq 1.0.$$

If any of the radioactivity concentrations in environmental media reported in the Licensee's annual report exceed the reporting levels specified in the Licensee's RETS (usually equal to the levels of Table 3.12-2 in NUREG-0473), the measurement should be discussed in the annual report if the concentration is not due to plant effluents. If the concentration is due to plant effluents, a special report should have been submitted; but it is also reasonable to expect that such a high level of radioactivity would be discussed in the annual report.

2.1.7.3 Required LLDs Not Achieved. The requirement that measurements of radioactivity in environmental samples shall be made under conditions that give LLDs equal to or less than some specified maximum values insures that excessive levels of radioactivity will not go undetected in environmental samples.

NUREG-0473, Specification 6.9.1.11 requires that the annual report shall include discussions of all analyses in which the LLD required by Table 4.12-1 was not achievable.

NUREG-0473, Table 4.12-1 (Notation c) defines the LLD as the smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66s_b}{E \cdot V \cdot 2.22 \cdot 10^6 Y \cdot \exp(-\lambda \Delta t)}$$

where:

LLD is the "a priori" lower limit of detection as defined above, as picocuries per unit mass or volume,

s_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate, as counts per minute,

E is the counting efficiency, as counts per disintegration,

V is the sample size in units of mass or volume,

2.22 is the number of disintegrations per minute per picocurie,

Y is the fractional radiochemical yield, when applicable,

λ is the radioactive decay constant for the particular radionuclide, and

Δt for environmental samples is the elapsed time between sample collection, or end of sample collection period, and time of counting.

Typical values of E, V, Y, and Δt should be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement. Analyses shall be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally background fluctuations, unavoidable small sample sizes, or other uncontrollable circumstances may render these LLDs unachievable. In such cases, the contributing factors shall be identified and described in the annual report.

The annual report should include discussions of all analyses of environmental monitoring samples in which the LLDs of the Licensee's table corresponding to Table 4.12-1 of NUREG-0473 were not achieved. Therefore, the Licensee's LLD table (corresponding to Table 4.12-1 of NUREG-0473) should contain the maximum LLDs considered capable of insuring reasonable analyses of environmental monitoring samples.

The Licensee's annual report should be examined for reports of sample analyses for which the required LLDs (those in the Licensee's table corresponding to Table 4.12-1 of NUREG-0473) were exceeded. If the Licensee reports less-than values greater than the required LLDs, the analyses yielding these less-thans should be discussed under this reporting requirement. In the absence of one of the above indications there is no sure way of determining if required LLDs were met in sample analyses. However, if levels of radioactivity above the required LLDs are reported in some but not all samples of a particular medium, and the

lower end of the range is well above the required LLDs, this may indicate failure to meet the required LLDs and should be mentioned in the review document.

Although NUREG-0473 does not require the Licensee to discuss their LLDs if they are below the values in their table that corresponds to Table 4.12-1 of NUREG-0473, the reviewer should look for indications that the Licensee's reported LLDs are below these values, i.e., that the Licensee is reporting actual LLDs rather than the maximum allowed values. The Licensee could list LLDs in their summary table that are identical to those in their table corresponding to Table 4.12-1 of NUREG-0473. If they do, this should be noted in the reviewer's TER. Alternately, they could list lower values, and this should also be noted by the reviewer.

2.1.7.4 Failure to Analyze Interlaboratory Comparison Program Samples.

Participation in an approved Interlaboratory Comparison Program (laboratory crosscheck program) insures that independent checks are made on the precision and accuracy of the Licensee's measurements of radioactive material in environmental samples.

The Licensee's annual report should be examined for a discussion of participation in an Interlaboratory Comparison Program. The report should identify the samples analyzed and the quality of agreement with the known values. Licensee's values that do not meet the criteria of acceptability established for the program should be discussed in the report. However, it is reasonable to interpret a tabulation of Interlaboratory Comparison Program "known" concentrations and the Licensee's measured concentrations, with 's for both, as fulfilling the recommended NRC reporting criteria. However, if an unreasonable fraction of the Licensee's values are outside the range defined as acceptable by the operator of the Interlaboratory Comparison Program, this fact should be indicated by the Licensee and remedial actions discussed.

2.2 Semiannual Radioactive Effluent Release Reports

These reports are to be submitted within 60 days after January 1 and July 1 of each year (as required by 10 CFR 50.36a, Par(2); NUREG-0473, Specification 6.9.1.12). They document the releases of radioactive materials in liquid and gaseous effluents and the shipment of radioactive solid waste offsite. In addition, they contain the results of calculation of doses at offsite locations due to liquid and gaseous effluents.

The information provided in the reports is intended to fulfill the reporting requirements of 10 CFR 50.36a and facilitate the evaluation of the Licensee's compliance with General Design Criteria 60 and 64 of Appendix A to 10 CFR 50, Section 20.106 of 10 CFR 20, and Paragraph (C) of 10 CFR 20.1.

The items discussed in the following sections (except Section 2.2.5) are to be included in each semiannual radioactive effluent release report (semiannual report). The items in Section 2.2.5 are to be included only if conditions existed requiring the reporting.

2.2.1 Supplemental Information

Reporting of this information furnishes a convenient statement of the Licensee's technical specification limits on releases of radioactive materials, methods of determining radioactivity released, and miscellaneous data concerning plant effluents.

Appendix B to Regulatory Guide 1.21 requires that the data and information should be reported in a format similar to that given in the Supplemental Information Table in this Regulatory Guide. The Supplemental Information Table provides for reporting of the following:

1. Regulatory Limits, defined as the technical specification limits for radioactive materials released in liquid and gaseous effluents.
2. Maximum Permissible Concentrations, defined as the concentrations used to calculate permissible release rates for air and water.
3. Average (decay) Energy (E) of the radionuclide mixture in gaseous effluents.
4. Measurements and approximations of total radioactivity. This is a requirement for describing the method(s) used to determine the overall curie quantity released in effluents, and the method(s) used for estimating overall errors associated with the determinations.
5. Batch Releases. The information (for both liquid and gaseous effluents) should include the number of releases, total time period for batch releases, and the maximum, mean, and minimum time period of release. For liquid releases into a flowing stream the average stream flow during releases should be reported.
6. Abnormal releases of radioactive material in liquid and gaseous effluents, including number of releases and total curies released.

Specification 6.9.1.12 of NUREG-0473 requires that the semiannual reports shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit as outlined in Regulatory Guide 1.21, with data summarized on a quarterly basis following the format of Appendix B thereof. This requirement can be

interpreted as either requiring or not requiring that the information specified in the Supplemental Information Table of Regulatory Guide 1.21 must be included in the semiannual reports. Past reviews have been based on the interpretation that this information is not required if the Licensee's Technical Specification 6.9.1.2 is identical to that of NUREG-0473. (This interpretation was based on the wording of Specification 6.9.1.12, the fact that some of the required information is obsolete with regards to other requirements of NUREG-0473, and the fact that some of the information is required to be reported independently of the Supplemental Information Table.)

Many Licensees have written technical specifications requiring reporting the releases of radioactive materials in gaseous and liquid effluents and the shipment of solid waste offsite. Their requirements, therefore, are not identical to those in NUREG-0473. If this section of the technical specifications is not identical to NUREG-0473, it should be read carefully to determine exactly what information is required to be reported.

2.2.2 Summary of Gaseous Releases

The summary of radioactive material released in gaseous effluents documents the releases during each six-month period, providing evidence of compliance with the "as low as is reasonable achievable (ALARA)" requirements of 10 CFR 50.34a and 10 CFR 50.36a. The data also permit correlation of releases in reactor effluents with calculated offsite doses and radioactive material detected in environmental media.

The Licensee's reports of releases of radioactive materials in gaseous effluents should follow the format of Tables 1A through 1C, Appendix B to Regulatory Guide 1.21. All data to be reported in these tables are clearly defined in the tables themselves except for the "Percent of Technical Specification limit" entries in Rows 3 of Table 1A. There are two possibilities for entries in these rows. The entries could be based on either the dose rate limits in Specification 3.11.2.1

of NUREG-0473 or on the dose limits of Specifications 3.11.1.2 and 3.11.2.2 (gamma and beta air doses due to noble gases and maximum organ dose due to I-131, I-133, long-lived particulates,* and tritium). By far the most informative choice is the dose limits, since percents based on these limits give information about the plant's effect on the environment for the entire year. Percents of technical specification limits based on dose limits should be reported, but reporting must be in a modified Table 1A or a separate location since the organ dose limit is applied to the total of effluents reported in Sections B, C, and D of Table 1A.

The reviewer should check the contents of Tables 1B and 1C against the total releases reported in Table 1A. There are sometimes large discrepancies in reports not prepared using a properly operating computer program. Sometimes there are apparent (but not real) discrepancies in

Section C of Table 1A due to the fact that all particulates are reported in Tables 1B and 1C, but only those with half-lives greater than 8 days are reported in the summation Table, 1A.

2.2.3 Summary of Liquid Releases

The summary of radioactive material released in liquid effluents documents the releases during each six-month period, providing evidence of compliance with the "as low as is reasonably achievable (ALARA)" requirements of 10 CFR 50.34a and 10 CFR 50.36a. The data also permit correlation of releases in reactor effluents with calculated offsite doses and radioactive material in environmental media.

* In this report the term long-lived particulates is used to denote radioactive particulates with half-lives greater than 8 days.

The format for reporting radioactive material released in liquid effluents is clearly identified by examination of Tables 2A and 2B in Appendix B of Reg. Guide 1.21. However, the "Average diluted concentration during period" and "Percent of applicable limit" rows in Table 2A are not pertinent for Licensees whose technical specifications follow the recommendations of NUREG-0473. In these cases the limit on concentrations in liquid releases is contained in NUREG-0473, Specification 3.11.1.1 and requires that the concentration of radioactive material in liquid effluents to UNRESTRICTED AREAS shall be limited to the concentrations specified in 10 CFR 20, Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases for which the limit is 2×10^{-4} microcuries per milliliter. (For the release of more than one radionuclide, the method of determining the limiting concentration is given in "NOTE" at the end of 10 CFR 20, Appendix B.)

The limit on concentrations in NUREG-0473, Specification 3.11.1.1 is an instantaneous limit, so the average concentration over the period is not pertinent. Also, the average concentration usually reported is the total curies released divided by total volume, and therefore in most cases is not comparable to the instantaneous release limit of Specification 3.11.1.1. Since the "Percent of applicable limit" as defined in Regulatory Guide 1.21 is based on the "average diluted concentration during period," it is no longer defined.

The following pertinent percents of limits could be reported by Licensee's whose technical specifications follow the recommendations of NUREG-0473:

- The maximum percent of the instantaneous concentration allowed by Specification 3.11.1.1.
- The percents of the quarterly doses allowed by Specification 3.11.1.1. (Some BWR Licensees' reports contain the percent of the quarterly dose limits allowed by Specification 3.11.1.1 as the "Percent of applicable limit.")

The quantity that should be reported in the equivalent of Table 2A of Regulatory Guide 1.21 in the row labeled "Volume of dilution water used during period" is subject to two interpretations. It could be the total volume released via the diluting stream during the report period, or alternatively the volume released only during the release of liquid wastes. If the second alternative is chosen, plants making continuous releases would still report the total volume released during the report period, whereas plants making only batch releases would report a much smaller volume. To permit an estimation of the calculated offsite dose for all plants on a consistent basis, the volume of dilution water should be unambiguously defined to be the total volume released via the dilution stream during the report period.

Releases of radioactive material in liquid effluents should be reported in a format essentially identical to that of Tables 2A and 2B in Regulatory Guide 1.21. Minor deviations such as adding a total line below the noble gases in Table 2B are of course acceptable.

There are problems interpreting the proper entries for Rows 2 and 3 in Sections A, B, C of Table 2A of Regulatory Guide 1.21. The average diluted concentrations in Rows 2 will probably be reported based on the volume of dilution water reported in Row F. The entry in Row F may be the volume released during actual releases of liquid wastes or the total volume released via the dilution stream. This uncertainty gives problems if the reviewer attempts to correlate the releases of radioactive materials in liquid wastes with the calculated offsite doses due to liquid effluents because the dilution volume required for the dose calculation is the total dilution volume during the reporting period.

Rows 3 in Table 2A of Regulatory Guide 1.21 present a more difficult problem. For technical specifications based on NUREG-0473 there are no "applicable limits" based directly on the total release of radioactive materials in liquid effluents or the average diluted concentration during the reporting period. One technical specification limit is the maximum concentration based on 10 CFR 20, Appendix B, Table II, Column 2, with

the concentration calculated following the method described in "NOTE" at the end of Appendix B. The other technical specification limits are those on the calculated offsite total body and organ doses given in Specification 3.11.1.2 of NUREG-0473.

The maximum concentration of radioactive materials in liquid effluents is not very informative, since a single case of a release near the limit would give possibly misleading information. The best selection for reporting percent of technical specification limits is to report the percent of calculated total body and organ dose limits for liquid effluents.

2.2.4 Solid Radioactive Waste Shipped Offsite

The report of solid waste shipped offsite documents the volume, radioactivity, and radionuclide content of solid waste and irradiated fuel elements shipped from the nuclear power plant.

Regulatory Guide 1.21, Appendix B, Section D requires that the following information shall be reported in shipments of solid waste and irradiated fuel transported from the site during the report period:

1. The semiannual total quantity in cubic meters and the semiannual total radioactivity in curies for the following categories or types of waste (See Table 3 in Regulatory Guide 1.21.):
 - a. Spent resins, filter sludges, evaporator bottoms;
 - b. Dry compressible waste, contaminated equipment, etc;
 - c. Irradiated components, control rods, etc.
 - d. Other (furnish description).
2. An estimate of the major radionuclide composition in the categories of waste in 1 above.

3. The disposition of solid waste shipments. (Identify the number of shipments, the mode of transport, and the destination.)
4. The disposition of irradiated fuel shipments. (Identify the number of shipments, the mode of transport, and the destination.)

NUREG-0473, Specification 6.9.1.12 requires that the semiannual reports shall include a summary of the quantities of liquid and gaseous effluents and solid waste released from the unit as outlined in Regulatory Guide 1.21, with data summarized on a quarterly basis following the format of Appendix B thereof.

NUREG-0473, Specification 6.9.1.12 requires that the semiannual reports shall include the following information for each class of solid waste (as defined by 10 CFR 61) shipped offsite during the report period:

- a. Container volume,
- b. Total curie quantity (specify whether determined by measurement or estimate),
- c. Principal radionuclides (specify whether determined by measurement or estimate),
- d. Source of waste and processing employed (e.g., dewatered resin, compacted dry waste, evaporator bottoms),
- e. Type of container (e.g., LSA, Type A, Type B, Large Quantity),
- f. Solidification agent or absorbent (e.g., cement, urea formaldehyde).

The parts of the recommended Technical Specification 6.9.1.12 of NUREG-0473 that apply to reporting shipment of solid waste offsite require both that the reporting be in the format given in Regulatory Guide 1.21 and that the information tabulated in Specification 6.9.1.12 of NUREG-0473 is intended to supersede the information required by the format of Table 3 in Regulatory Guide 1.21. If this were so, the number of shipments, mode of transport, and destination of the shipments would be omitted from the reports. Also, from the statement of information to be included as stated in the recommended Specification 6.9.1.12, it is not clear that the report should include any information about the radionuclide composition of the waste other than a simple list of several of the most abundant radionuclides in the total shipment. Since it is obviously desirable that the total volume, number of shipments, mode of transport, destination, and radionuclide composition of the various types of waste be reported, there is a strong implication that all information required by Regulatory Guide 1.21 should be reported as well as the additional information specifically required in NUREG-0473 specification.

The additional data required to be reported by NUREG-0473 but not included in a completed Table 3 of Regulatory Guide 1.21 are: (a) the class of waste (as defined by 10 CFR 61) and total curies, (b) container volume, (c) type of processing for each type of waste in Table 3 of Regulatory Guide 1.21, (d) type of container (e.g., LSA, Type A, Type B, Large Quantity), and (e) solidification agent or absorbent (e.g., cement, urea formaldehyde.)

Licensees' RETS vary widely as to what information must be reported about radioactive solid waste shipped offsite. The three most common requirements appearing in Licensees' RETS are: (a) Report information following the content and format of Regulatory Guide 1.21, (b) Report the specific data listed in Specification 6.9.1.12 of NUREG-0473, and (c) Follow the recommendations of Specification 6.9.1.12 of NUREG-0473 exactly (i.e., the Licensee has inserted the parts of Specification 6.9.1.12 dealing with solid waste verbatim into the plant's technical specifications).

For plants requiring only that Regulatory Guide 1.21 be followed, Section D and Table 3 of the Regulatory Guide clearly define what must be reported.

For plants requiring reporting of information listed in Specification 6.9.1.12 of NUREG-0473 the definition of data to be included in the reports is more obscure. A narrow interpretation of the requirements leads to the conclusion that the only data required are the class of waste (as defined by 10 CFR 61) and the information described by items listed as a. through f. in Specification 6.9.1.12 for each class of waste. However, this interpretation would lead to failure to require reporting of total volume shipped, number of shipments, mode of transportation, destinations, and the radionuclide composition for the various types of waste. This interpretation may be defensible for Licensees making no reference to Regulatory Guide 1.21, but is clearly not desirable and should be discouraged.

For Licensees including the parts of Specification 6.9.1.12 of NUREG-0473 dealing with solid waste shipments as part of their RETS, the reported data should include that required by Table 3 of Regulatory Guide 1.21 plus the following information for all waste: (a) the class of waste (as defined by 10 CFR 61) and total curies, (b) container volume, (c) type of processing for each type of waste in Table 3 of Regulatory Guide 1.21, (d) type of container (e.g., LSA, Type A, Type B, Large Quantity), and (e) solidification agent or absorbent (e.g., cement, urea formaldehyde.) This information can be easily included in the reports in a short table in addition to the equivalent of Table 3 of Regulatory Guide 1.21.

2.2.5 Reporting Requirements Subject to Conditions

The reporting discussed in this section is required only when specific conditions exist that are not expected during normal operation or when various changes are made in operating procedures or the environmental monitoring program.

2.2.5.1 Failure to Correct Inoperability of Effluent Monitors

NUREG-0473, Specifications 3.3.3.10 and 3.3.3.11 require notification to the NRC by inclusion of information in the semiannual reports if certain liquid and gaseous effluent monitoring instrumentation required by Tables 3.3.7.11-1 and 3.3.7.12-1 was inoperable for more than 30 days. The brief statements of the reporting requirements contained in Specifications 3.3.3.10 and 3.3.3.11 of NUREG-0473 do not give detailed guidance as to what is to be reported in the semiannual reports. The only logical interpretation of the requirements is that the report should include the reason(s) for inoperability of the instrumentation, the dates of inoperability, and the reasons for not correcting the inoperability within 30 days (e.g., replacement equipment ordered but not received, major modifications being made to system).

2.2.5.2 Unplanned Releases of Radioactive Materials

Notification of the NRC by inclusion of information in the semiannual report is required by NUREG-0473, Specification 6.9.1.12 if unplanned releases of radioactive materials were made during the reporting period. No details are given in the reporting criteria concerning what details are to be reported. However, a reasonable interpretation of this reporting requirement is that the report should include the curie quantities of radionuclides released, the volume of the releases, the circumstances leading to the releases, and actions taken or to be taken to prevent future similar occurrences. The quantities released should, of course, be included in the summary of quantities of radioactive materials released discussed in Sections 2.2.2 and 2.2.3 above.

2.2.5.3 Radioactivity in Liquid Tanks Above Limits

This reporting is required by NUREG-0473, Specification 3.11.1.4 to permit monitoring of Licensees' compliance with technical specifications intended to prevent the accidental release to offsite locations of quantities of radioactive materials that could result in doses to a MEMBER OF THE PUBLIC in excess of the technical specification limits. No details are given in the reporting criteria concerning what details are to be reported. However,

a reasonable interpretation of this reporting requirement is that the report should include the curie quantity of radionuclides found to be in the tank, the maximum allowed curie quantity, the circumstances leading to exceeding the maximum allowed curie quantity in the tank, and actions taken or to be taken to prevent future similar occurrences.

2.2.5.4 Changes to Offsite Dose Calculation Locations

Specifications 3.12.2.a and 6.9.1.12 of NUREG-0473 require that if the land use census identifies a location(s) at which the calculated dose or dose commitment due to I-131, I-133, long-lived particulates, and tritium in gaseous effluents is greater than the values being calculated (as required in Specification 4.11.2.3) to determine the maximum offsite dose due to these radioactive effluents, the location(s) must be reported in the semiannual report. (It seems logical that there should also be a requirement in Specification 6.9.1.12 for reporting changes in locations for calculating maximum offsite doses due to noble gases and liquid effluents, otherwise, the doses due to I-131, etc. in gaseous effluents are given a special status.) Reports should be examined for reference to such changes and the results of the examination recorded in the checklist of Appendix F of the review TER.

2.2.5.5 Changes to Environmental Monitoring Program Locations

Reporting of changes in environmental monitoring locations is required by Specification 6.9.1.12 of NUREG-0473 and is necessary to permit evaluation of the changes in terms of the Licensee's technical specifications and the intent of the monitoring program. Specification 6.9.1.12 of NUREG-0473 also requires that the semiannual reports shall include any changes to the ODCM made during the reporting period. Therefore, since a table of sampling locations and the associated maps are part of the ODCM, all changes to environmental monitoring locations must be reported. The Licensee's report should be examined for any notification of changes in environmental monitoring locations, and the fact of reporting or lack of reporting noted in the checklist of Appendix F of the review TER.

There are no prescribed requirements in NUREG-0473 for the information that should be reported concerning the changes. However, the Licensee should give the reason for the changes and a discussion showing that the changes do not unnecessarily reduce the comprehensiveness of the monitoring program.

Some specific reportable changes that are required by NUREG-0473 are the following:

- NUREG-0473, Specification 3.12.1.2 requires that with milk or fresh leafy vegetable samples unavailable from one or more of the sample locations required by Table 3.12-1, the Licensee should identify locations for obtaining replacement samples and add them to the radiological environmental monitoring program within 30 days. The specific locations from which samples were unavailable may then be deleted from the monitoring program, and in lieu of a Licensee event report and pursuant to Specification 6.9.1.12, the Licensee should identify the cause of the unavailability of samples and identify the new location(s) for obtaining replacement samples in the next semiannual report and also include in the report a revised figure(s) and table for the ODCM reflecting the new location(s).
- NUREG-0473, Specification 3.12.2.b requires that with a land use census identifying a location(s) that yields a calculated dose or dose commitment (via the same exposure pathway) 20 percent greater than at a location from which samples are currently being obtained in accordance with Specification 3.12.1, the new location(s) should be added to the radiological environmental monitoring program within 30 days. The sampling location(s), excluding the control station location, having the lowest calculated dose or dose commitment(s), via the same exposure pathway, may be deleted from this monitoring program after (October 31) of the year in which this change was made. In lieu of a Licensee Event Report and pursuant to

Specification 6.9.1.12, the Licensee should identify the new location(s) in the next semiannual report and also include in the report a revised figure(s) and table for the ODCM reflecting the new location(s).

2.2.5.6 Radiological Dose Assessment Doses calculated using procedures compatible with the methods of Regulatory Guide 1.109 are reported to document the Licensee's meeting design objectives and limiting conditions of operation outlined in 10 CFR 50, Appendix I. The reported calculated doses also provide a ready reference for comparison with the amount of radioactive material detected by the Licensee's environmental monitoring program.

Licensees whose RETS contain requirements for the semiannual reports that are identical to Specification 6.9.1.12 of NUREG-0473 have the following requirements:

- The semiannual report for the second six months shall contain an assessment of the radiation doses due to radioactive liquid and gaseous effluents released from the unit or station during the previous calendar year
- As a minimum, all calculated doses for which the reporting levels exist in NUREG-0473 Specifications 3.11.1.2 (i.e., total body and organ doses due to liquid effluents), 3.11.2.2 (i.e., gamma and beta air doses due to noble gas effluents), 3.11.2.3 (i.e., organ doses due to I-131, I-133, long-lived particulates, and tritium) should be reported. In addition, the Licensee is required to include an assessment of these same doses if received by MEMBERS OF THE PUBLIC due to their activities onsite.
- All assumptions used in making these assessments (i.e., specific activity, exposure times, and locations) shall be included in the reports.

- An assessment of the radiation doses to the likely most exposed MEMBER OF THE PUBLIC from reactor releases and other nearby uranium fuel cycle sources, including doses from primary effluent pathways and direct radiation, for the previous calendar year shall be included in the semiannual report for the second six months to show compliance with 40 CFR 190.

This last assessment is a little more complicated than the assessments of liquid and gaseous doses individually since it calls for the maximum total body, organ other than thyroid, and thyroid doses to a given individual regardless of whether the source of the components to this dose was from gaseous effluents, liquid effluents, or direct radiation. In most cases, the total body, organ other than thyroid, and thyroid doses for the purpose of comparison with the 40 CFR 190 limits will be less than the sum of the same maximum doses from the three sources (i.e., liquid, gaseous, direct radiation), since the maximum dose from each of these components is not likely to occur at the same location.

Specific reporting requirements for Licensees who do not include the recommended Specification 6.9.1.12 of NUREG-0473 in their RETS must be determined on an individual basis.

For Licensees requiring that the "content and format" of their semiannual reports be in accordance with Regulatory Guide 1.21, an assessment of population doses and doses to individuals in the population appears to be required. In addition, the total body and skin doses due to noble gases are required.

2.3 Other Reports

Special reports, as defined in Specification 6.9.2 of NUREG-0473, are required to be submitted by a Licensee under several circumstances in which a Limiting Condition of Operation (LCO) contained in the Licensee's

RETS is exceeded. The provisions of Specifications 3.0.3 and 3.0.4, requiring HOT SHUTDOWN followed by COLD SHUTDOWN and restricting subsequent return to an OPERATING CONDITION are not applicable to these LCOs.

The various circumstances under which a special report is required are discussed below.

2.3.1 Calculated Doses Due to Liquids Exceeding a LCO

The Licensee is required by Specification 3.11.1.2 of NUREG-0473 to submit a special report within 30 days if the dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released to UNRESTRICTED AREAS exceeds (a) 1.5 mrem to the total body or 5 mrem to any organ during any calendar quarter or (b) 3 mrem to the total body or 10 mrem to any organ during any calendar year. The required special report must identify the causes for exceeding the limit(s) and must define the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the prescribed limits. If a drinking water supply is taken from within 3 miles of the plant discharge (3 miles downstream in the case of discharge into a river), the special report must also include (a) the results of radiological analyses of the drinking water source and (b) the radiological impact on finished drinking water supplies with regard to the requirements of 40 CFR 141.

2.3.2 Liquid Radwaste Treatment System Not Used as Required

The Licensee is required to submit a special report within 30 days if the liquid radwaste treatment system is not used to reduce the radioactive materials in liquid wastes prior to discharge to UNRESTRICTED AREAS when the projected dose due to the liquid effluent from a reactor unit would exceed technical specification units.

2.3.3 Calculated Air Doses Due to Noble Gases Exceeding a LCO

If the air dose to areas at and beyond the SITE BOUNDARY due to noble gases released in gaseous effluents from a reactor unit exceed technical specifications limits, then a special report should be submitted to the NRC within 30 days.

2.3.4 Calculated Organ Doses Due to Gases Exceeding a LCO

If the dose to a MEMBER OF THE PUBLIC from I-131, I-133, tritium, and long-lived radionuclides in particulate form in gaseous effluents released from a reactor unit to areas at and beyond the SITE BOUNDARY exceeds technical specification limits, then a special report should be submitted within 30 days.

2.3.5 Gaseous Radwaste Treatment System Not Used as Required

If the gaseous radwaste treatment system was not in operation and the main condenser air ejector system was in operation, then a special report should be submitted within 30 days.

2.3.6 Ventilation Exhaust Treatment System Not Used as Required

If the VENTILATION EXHAUST TREATMENT SYSTEM is not used to reduce radioactive materials in gaseous waste prior to their discharge when the projected doses due to gaseous effluent releases from a reactor unit exceeds technical specification limits, then a special report should be submitted within 30 days.

2.3.7 Total Dose Exceeding 40 CFR 190 Limits

If the annual dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle

sources exceed 25 mrem to the total body or any organ, except the thyroid, whose limit is 75 mrem, then a special report should be submitted within 30 days.

2.3.8 Radioactivity Level in Environmental Media Exceeding Reporting Level

If the level of radioactivity as the result of plant effluents in an environmental sampling medium at a specified location exceeds the reporting levels of Table 3.12-2 of NUREG-0473 when averaged over any calendar quarter, a special report should be submitted within 30 days.

2.4 Offsite Dose Calculation Manual

Changes to the NRC approved Offsite Dose Calculation Manual (ODCM) are required to be reported to the NRC. Licensee technical specifications that follow the guidance of Specification 6.14 in NUREG-0473 require that changes to the ODCM be reported to the NRC in the semiannual report for the period in which the change(s) was made. Some Licensees, however, choose to report the changes in monthly operating reports or other reports.

According to the guidelines of Specification 6.14, the report is to contain sufficiently detailed information to totally support the rationale for the change without benefit of additional or supplemental information. Information submitted with the report should consist of a package of those pages of the ODCM to be changed with each page numbered and provided with an approval and date box, together with appropriate analyses or evaluations justifying the change(s). The report should contain a determination that the change will not reduce the accuracy or reliability of the dose calculations or the setpoint determinations. The report should also document the fact that the change has been reviewed and found acceptable by the plant's unit review group.

NRC notification of approval of the initial ODCM submittal is provided when it is determined that the submittal is complete and the methodology is within the recommended guidelines of NUREG-0133 and Regulatory Guide 1.109. Consequently, changes to the approved ODCM must remain within the envelope of the recommended guidelines.

The Licensee's RETS reference supporting information and methodology to be contained in the Licensee's ODCM. The subjects discussed in the following sections are the usual subjects included in a typical an ODCM, and consequently reported changes to the ODCM will probably be changes to one of these subjects.

2.4.1 Liquid Effluent Monitor Setpoints

This section of the ODCM contains the methodology and parameters for determining the alarm/trip setpoints for the radioactive liquid effluent monitors.

Specification 3.3.3.10 of NUREG-0473 is the guideline specification identifying instrumentation requirements and the information that is to be contained in the ODCM. The methods and parameters used by the Licensee for calculating the alarm/trip setpoints must be described in the ODCM and the setpoints must ensure that the liquid effluent concentration limits of the licensee's technical specification are not exceeded. Section 4.1.1 of NUREG-0133 describes methods acceptable to the NRC for determining the alarm/trip setpoints and the Addendum to NUREG-0133 contains recommended methodology for determining the setpoints.

2.4.2 Gaseous Effluent Monitor Setpoints

This section of the ODCM contains the methodology and parameters for determining the alarm/trip setpoints for the radioactive gaseous effluent monitors.

Specification 3.3.3.11 of NUREG-0473 is the guideline specification identifying instrumentation requirements and the information that is to be contained in the ODCM. The methods and parameters used by the Licensee for calculating the alarm/trip setpoints must be described in the ODCM, and the setpoints must ensure that the gaseous effluent dose rate limits of the Licensees technical specification are not exceeded. Section 5.1.1 of NUREG-0133 describes methods acceptable to the NRC for determining the alarm/trip setpoints.

2.4.3 Concentrations in Liquid Effluents

This section of the ODCM contains the methodology and parameters for assuring that the release rates due to the release of radioactivity in liquid effluents at the point of release to the UNRESTRICTED AREA will not exceed the concentration limits of the technical specification.

Specification 3.11.1.1 of NUREG-0473 is the guideline specification identifying the concentration limits for radioactive material in liquid effluents, and Surveillance Specification 4.11.1.1.2 identifies the information that is to be contained in the ODCM. The ODCM must contain the methods and parameters used by the Licensee for assuring the concentrations at the point of release are maintained within the limits of the technical specification. Section 4.2 of NUREG-0133 describes methods acceptable to the NRC for demonstrating that the concentration limits are not being exceeded.

The ODCM must demonstrate compliance to the summation-of-ratios criterion identified in Footnote 1 of 10 CFR 20 in order to satisfy the requirements of the technical specifications. Since 10 CFR 20 is a Federal regulation, then compliance is mandatory whether stated or not. The summation of ratios is the foundation argument for demonstrating compliance to the concentration limits. The summation-of-ratios criterion coupled with the expressions in the Addendum to NUREG-0133

provide acceptable methodology for demonstrating compliance to the concentration limits. The ODCM must assure that the dilution flow during the time of release is the dilution parameter used in the calculation.

2.4.4 Dose Rates in Gaseous Effluents

This section of the ODCM contains the methodology and parameters for assuring that the release rates of radioactivity in gaseous effluents will not exceed the dose rate limits of the Licensee's technical specification.

Specification 3.11.2.1 of NUREG-0473 is the guideline specification identifying the dose rate limits due to radioactive material released in gaseous effluents and Surveillance Specifications 4.11.2.1.1 and 4.11.2.1.2 identify the information that is to be contained in the ODCM. The Licensee may choose to address the dose rate limits identified in NUREG-0473, or the Licensee may choose to address the concentration limits of 10 CFR 20, Appendix B, Table II, Column 1. Additionally, Table 4.11.2 in NUREG-0473 presents an acceptable program for the sampling and analysis of radioactive gaseous wastes to be released in the batch or continuous mode from the site. The ODCM must contain the methods and parameters used by the Licensee for assuring the dose rates to areas at and beyond the site boundary are maintained within the limits of the technical specification. Section 5.2 of NUREG-0133 describes methods acceptable to the NRC for demonstrating that the dose rate limits are not being exceeded.

Dose rates due to the release of noble gases are generally assured to be within the dose rate limits by correctly determining and setting the setpoints for the noble gas effluent monitors. However, the ODCM may contain additional methods which are probably repeats of the calculations used to determine the setpoints.

The bases statement for Specification 3.11.2.1 in an earlier version of NUREG-0473 stated that the limiting dose rate due to the release of I-131, I-133, tritium, and radionuclides in particulate form with half lives greater than eight days was to the thyroid of an infant via the inhalation pathway. It was later determined that the limiting dose rate was to the thyroid of the child via the inhalation pathway. This change stemmed from the fact that the product of the breathing rate times the I-131 dose factor for the thyroid was greater for the child's thyroid than for the infant's thyroid. The reviewer should be aware of this modification to the bases statement of NUREG-0473 since some of the submittal ODCMs contain the prescription of the earlier version. For this situation, the Licensee's technical specification may have to be modified with an accompanying change to the ODCM. Identification of the infant's thyroid is usually contained in the bases statement of the technical specification instead of in the LCO statement of the technical specification. Therefore, changing the ODCM to calculate the dose rate to the child's thyroid would not be a violation of the technical specification since the LCO statement does not identify the limiting age group.

The ODCM will either reference or copy the inhalation dose factors for a child from Table E-9 of Regulatory Guide 1.109 or will provide a table of values. Some Licensees include a large measure of conservatism in that the table is composed of the largest dose factor from Table E-9 for each radionuclide from all organs. If a table is provided, then each and every value must be checked for validity.

2.4.5 Dose Due to Liquid Effluents

This section of the ODCM contains the methodology and parameters for assuring that the dose or dose commitment due to the release of radioactive materials in liquid effluents will not exceed the limits of the technical specification.

Specification 3.11.1.2 of NUREG-0473 is the guideline specification identifying the dose limits to a MEMBER OF THE PUBLIC from radioactive materials released in liquid effluents and Surveillance Specification 4.11.1.2 identifies the information that is to be contained in the ODCM. The ODCM must contain the methods and parameters used by the Licensee to ensure that the calculated dose is within the dose limits of the Licensee's technical specification. Section 4.3 of NUREG-0133 describes methods acceptable to the NRC for the dose calculation. Section 4.3.1 of NUREG-0133 contains recommended methodology to be used for calculating the site specific dose factors or default dose factors for the maximum exposed individual.

As stated in NUREG-0133, the adult is normally assumed to be the maximum exposed individual and the ODCM should consider the potable water pathway and the consumption of fish and invertebrate pathways, as appropriate. The dilution factor in the definition for F_1 in Section 4.3 of NUREG-0133 is intended to be the average dilution flow for the reporting period of the dose calculation, e.g., month, quarter, year. It is not the average dilution flow during the time period of the release. Additionally for those plants not having a once-through condenser cooling system, NUREG-0133 allows the dilution flow parameter in the dose calculation to be adjusted to a maximum of 1000 cfs if the receiving body of water can maintain the adjusted dilution. The adjustment is for the dose calculation only and is not permitted when demonstrating compliance to 10 CFR 20. Therefore, the ODCM should identify the magnitude of the onsite dilution flow and the flow of the receiving water body and should contain a diagram showing the proximity to the receiving body of water.

The ODCM must identify the exposure pathways with a statement or with the dose factors identified in a table. In many cases the ODCM will duplicate the appropriate parameters and data tables from Regulatory Guide 1.109. Nevertheless, a check should be made comparing the data. On the other hand, the Licensee may choose to prepare site specific data,

and in this case each and every value in the prepared data tables should be calculated using NUREG-0133 methodology to ascertain the validity of the data.

2.4.6 Dose Due to Gaseous Effluents

This section of the ODCM contains the methodology and parameters for assuring that the dose or dose commitments due to the release of radioactive materials in gaseous effluents does not exceed the limits of the technical specifications.

Specification 3.11.2.2 of NUREG-0473 is the guideline specification identifying the dose limits to air due to noble gases released in gaseous effluents to areas at and beyond the site boundary and Surveillance Specification 4.11.2.2 identifies the information that is to be contained in the ODCM. Specification 3.11.2.3 is the guideline specification identifying the dose or dose commitment to any MEMBER OF THE PUBLIC from the release of I-131, I-133, tritium, and all radionuclides in particulate form with half-lives greater than eight days in gaseous effluents to areas at and beyond the site boundary and Surveillance Specification 4.11.2.3 identifies the information that is to be contained in the ODCM. The ODCM must contain the methods and parameters used by the Licensee to ensure the calculated doses are within the dose limits of the technical specifications. Section 5.3 of NUREG-0133 describes methods acceptable to the NRC for the dose calculations. Sections 5.3.1.1 through 5.3.1.5 contain recommended methodology for calculating the site specific dose factors or the default dose factors for the maximum exposed individual in all four age groups.

The description in Regulatory Guide 1.109 are the more detailed versions of the methods available in NUREG-0133. The site specific parameters must be identified in the ODCMs and the highest calculated annual average X/Q and D/Q used in the calculations must be specified.

The ODCM must identify the exposure pathways with a statement or with the dose factors identified in a table. In many cases the ODCM will duplicate the appropriate pathway tables from Regulatory Guide 1.109. Nevertheless, a check should be made comparing the data. On the other hand, the Licensee may choose to prepare site specific tables, and in this case every number in the prepared tables should be calculated using NUREG-0133 methodology to ascertain the validity of the data.

2.4.7 Dose Projections

This section of the ODCM contains the methodology and parameters for calculating the projected dose due to the anticipated release of radioactive liquid or gaseous effluents. The liquid and/or gaseous radwaste treatment systems must be used to treat radioactive waste prior to release to the environs when the projected dose exceeds trigger limits identified in the Licensee's technical specifications.

Specifications 3.11.1.3 and 3.11.2.5 of NUREG-0473 are the guideline specifications identifying the trigger limits for dose to any organ that, if exceeded, require treatment of the radwaste prior to release from the site. Surveillance Specifications 4.11.1.3 and 4.11.2.5.1 contain the requirement for including the dose projections in the ODCM. The ODCM must contain the methods and parameters used by the Licensee for the dose projections.

Sections 4.5 and 5.4 of NUREG-0133 contain the NRC position on the use of the liquid or gaseous radioactive waste treatment systems. These sections describe the information and methodology recommended for use in making dose projections. The projections use the dose calculation methodology previously described in Section 2.4.5 and 2.4.6 of this report, and the projected dose is usually based on the dose calculated due to the radioactivity releases during the previous quarter.

2.4.8 Total Dose

This section of the ODCM contains the methodology and parameters for calculating the dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from nearby uranium fuel cycle sources to demonstrate compliance to the dose limits in the Licensee's technical specifications. The technical specifications identify the dose limits of 40 CFR 190.

Specification 3.11.4 of NUREG-0473 is the guideline specification identifying the dose or dose commitment limits and Surveillance Specifications 4.11.4.1 and 4.11.4.2 identify the information and methodology that are to be contained in an ODCM. The ODCM must contain the methods and parameters used by the Licensee for demonstrating compliance to the total dose limits identified in the technical specification.

The methodology for calculating the dose due to liquid or gaseous effluents is the methodology described in Sections 4.3 and 5.3 of NUREG-0133. However, NUREG-0133 does not describe the NRC staff position for determining the contribution from direct radiation to the total dose. Therefore, the ODCM must contain the Licensee's method or an explanation of how the direct radiation contribution will be considered.

2.4.9 Radiological Environmental Monitoring Program

This section of the ODCM contains a more detailed description of the sampling locations for the radiological environmental monitoring program identified in the Licensee's RETS. Specification 3.12.1 of NUREG-0473 is the guideline specification for the radiological environmental monitoring program which along with Surveillance Specification 4.12.1 identifies the information to be included in the ODCM and the information to be included when reporting changes to the ODCM.

The ODCM must contain maps showing the locations of the environmental samplers accompanied with information on the distance and direction from the site for each and every sampler. The information can be presented in tables and/or a written description. All samplers identified in the Licensee's technical specifications must be addressed in the ODCM. The reviewer must be familiar with the contents of the Licensee's technical specification to ensure each and every sampler is addressed in the ODCM to evaluate the submittal document or changes to the previously approved document. The reviewer should review the map showing the sampler locations to determine if the samplers are located at the optimum locations to meet the intent of the sampling program. For example, do the TLDs surround the site in all 16 sectors; are the fish samples of migratory fish or of local fish, and are the samples obtained near the liquid radwaste discharge points or holding ponds such as dams; are the air samplers near the location of maximum X/Q or D/Q; are the milk samples obtained near the location of maximum D/Q?

2.5 Radwaste Treatment System

All Licensee initiated major changes to the liquid, gaseous, or solid radioactive waste treatment systems must be reported to the NRC. Licensee technical specifications that follow the guidance of Specification 6.15 in NUREG-0473 require that Licensee initiated changes be reported to the NRC in the semiannual report for the period in which the evaluation was reviewed by the plant's unit review group. Some Licensees, however, choose to report the changes as part of the annual FSAR update.

The discussion of each change shall contain sufficiently detailed information in accordance with the guidelines of Specification 6.15 of NUREG-0473.

3. GUIDANCE FOR REVIEWS OF REPORTS REQUIRED BY RETS AND DEVELOPMENT OF TER

This section provides additional guidance (in addition to the guidance in Section 2) for the review and evaluation of RETS-required reports together with detailed guidance for producing the TER (i.e., the review TER) which documents this review and evaluation and records the quality and general acceptability of the RETS-required reports. It contains, for each category listed in Section 2, insights for the reviewer(s) concerning what information and data to look for, where to look for it, and how to evaluate the information and data found. In addition, it includes examples of tables that are used in the review TER and recommendations concerning the expertise required of the personnel performing the review of the RETS-required reports.

The format followed in this section is that of the review TER to be produced. Each section of the review TER is addressed in detail, and guidance is included concerning what is required to complete each section of the review TER. Sources of information needed to complete each section are shown in curly brackets {}. Abbreviated identifications (see page iii) are used in the {}.

3.1 Preparation of TER Section 1 - Introduction

Section 1 of the review TER may be brief, but should identify the plant whose RETS-required reports were reviewed, the year(s) of operation reviewed, the specific documents used for the review guidelines, and a brief general summary of what is in the review TER. Any other information to be included is at the discretion of the reviewer(s).

3.2 Preparation of TER Section 2 - Technical Summary

Section 2 of the review TER contains a summary of the technical information from the Licensee's RETS-required reports, including pertinent plant-specific background information; important aspects of the Licensee's radioactive releases (liquid and gaseous), solid radwaste shipments, and radiological dose impacts; results of the Licensee's radiological environmental monitoring program; revisions to the ODCM, and radwaste treatment systems; results of analyses of release, dose, and environmental trends; and major deficiencies identified upon review of the contents of the Licensee's RETS-required reports.

Expertise required to perform the review and evaluation of the Licensees' RETS-required reports and to produce Section 2 of the review TER includes a working knowledge of the following: nuclear power plants and their subsystems, all the RETS guidance documents, radionuclides normally produced at and released from nuclear power plants, pathway analysis methods, radiation monitoring, and data handling and analysis.

3.2.1 Preparation of TER Section 2.1 - Plant-Specific Background

The objective of Section 2.1 of the review TER is to identify (by name, location, and operating utility) the plant whose RETS-required reports were reviewed and to provide plant-specific information pertinent to the review of the RETS-required reports. This section should contain an in-text table (in the format of Table 3.2-0) which lists this plant-specific information.

This section should also contain brief verbal descriptions of the liquid radioactive discharge system (including where effluents are released) and the gaseous radioactive discharge system (identifying each release point) {FSAR, RETS TER}. Also include a brief verbal summary of

TABLE 3.2-0. SUMMARY OF PERTINENT PLANT-SPECIFIC INFORMATION

	Unit 1	Unit 2
Type of Reactor {NUREG-0020, FSAR, Nuclear News}	BWR (General Electric)	BWR (General Electric)
Licensed Thermal Power {NUREG-0020, probably FSAR}	2511 MWt	2511 MWt
Maximum Dependable Power {NUREG-0020}	769 MWe Net	769 MWe Net
Commercial Operation {NUREG-0020}	Feb. 18, 1973	Mar. 10, 1973
RETS Implementation {RETS Approval Letter}	Jan. 19, 1985	Jan. 19, 1985
Condenser Cooling Water System {NUREG-0020, FSAR}	Once through to Mississippi River	Same as Unit 1
Major Gaseous Discharge Point {FSAR, RETS TER*}	Main Chimney, Elev. 95 m	Same as Unit 1
Gross Electric Output (MWh) {Nucleonics Week}	1983: 6,136,956 1984: 3,518,835	1983: 3,398,335 1984: 5,217,631
Average Capacity Factor {Nucleonics Week}	1983: 84.1% 1984: 48.1%	1983: 46.6% 1984: 71.3%

* TER in Public Document Room (see NUREG-0020 for location).

each unit's operation for the year reviewed (including refueling shutdowns and other major shutdowns) {Monthly reports}. Diagrams of plant layout, liquid and gaseous radwaste treatment systems, and effluent points for each unit should be contained in Appendix A of the review TER {FSAR, ODCM, annual report, RETS TER}. The existence and location of these diagrams should be noted in this section.

3.2.2 Preparation of TER Section 2.2 - Radioactive Effluent Releases

Section 2.2 of the review TER contains a summary of the gaseous and liquid radioactive releases and solid radioactive waste shipments made during the year reviewed, general observations of how those releases compared with the previous year, and any discrepancies or items of interest discovered during the review.

This section should contain a table (Table 2-1 of the review TER) in the format of Table 3.2-1 which includes the following information for the year reviewed:

- Total curie contents and major individual radionuclides identified for fission and activation products released in liquid effluents, dissolved and entrained noble gas in liquid effluents, particulates in gaseous effluents, noble gases in gaseous effluents, and radioiodines in gaseous effluents
- Tritium released in liquid effluents and in gaseous effluents
- Gross alpha activity released in liquid effluents
- Number and total cumulative time duration of batch releases of liquid effluents and gaseous effluents
- Number and curie content of abnormal gaseous releases and abnormal liquid releases

TABLE 3.2-1. SUMMARY OF REPORTED RADIOACTIVE EFFLUENT/EXPOSURES FOR 1984

I. ACTIVITY RELEASED

<u>Liquid Effluents^a</u>	<u>Gaseous Effluents^a</u>	<u>Solid Waste and Irradiated Fuel Shipment^b</u>
A. Fission and Activation Products	A. Particulates	A. Spent Resins, Filter Sludge, Evaporator Bottoms, etc.
Total: 0.115 Ci	Total: 0.0971 Ci	Total: 1833 Ci
Co-60: 0.625 (54.1%)	Co-60: 0.0373 (38.5%)	
Ru-103: 0.379 (32.8%)	Ba140: 0.0336 (34.6%)	
Cs-137: 0.0673 (5.8%)	Sr-89: 0.00799 (8.2%)	
Mn-54: 0.0446 (3.9%)	I-131: 0.00497 (5.1%)	
	Cr-51: 0.00465 (4.8%)	
B. Tritium	B. Tritium	B. Dry Compressible Waste, Contaminated Equipment, etc.
Total: 38.0 Ci	Total: 81.5 Ci	Total: 26.1 Ci
C. Dissolved or Entrained Noble Gases	C. Noble Gases	C. Irradiated Component Control Rods, etc.
Total: None	Total: 1810 Ci	Total: 7972.85 Ci
	Xe-135 1250 (69.3%)	
	Xe-133 283 (15.6%)	
	Kr-88: 169 (9.4%)	
	Kr-85m 65.6 (3.6%)	
D. Gross Alpha	D. Iodines	D. Other (unidentified)
Total: 0.0021 Ci	Total: 0.591 Ci	Total: 3.808 Ci
	I-135 0.348 (58.9%)	
	I-133 0.210 (35.6%)	
	I-131 0.0327 (5.5%)	
E. Batch Releases	E. Batch Releases	E. Disposal Site
"Controlled Batches"	None (delayed continuous)	Barnwell, SC:
Total Time: Not Reported	Total Time: N/A	120 shipments
		Richland, WA:
		34 shipments
F. Abnormal Releases	F. Abnormal Releases	F. Irradiated Fuel
None	None	None

a. Dresden Nuclear Power Station, Units 2 and 3.

b. Hatch Nuclear Plant, Units 1 and 2.

TABLE 3.2-1. SUMMARY OF REPORTED RADIOACTIVE EFFLUENT/EXPOSURES FOR 1984 (Cont.)

II. EFFLUENT DILUTIONA. Liquid Effluents^a

<u>Circulation System</u>	<u>Circulation Flow Rate (GL/yr)^b</u>	<u>Discharge Mode</u>	<u>Dilution Volume (GL)^b</u>
Variable cycle discharging to the Illinois River	Not reported	Batch	1957

B. Gaseous Effluents (NRC Parameters for Maximum Doses - Continuous Release)^{a,c}

<u>X/Q (sec/m³)</u>	<u>D/Q (m⁻²)</u>	<u>Release Type</u>	<u>Location</u>
2.1x10 ⁻⁸ 7.4x10 ⁻⁷	4.3x10 ⁻⁹ 2.0x10 ⁻⁸	Plant Stack Radwaste Bldg.	(Site Boundary, 0.48 mile north)
8.6x10 ⁻⁸ 1.5x10 ⁻⁶	3.4x10 ⁻⁹ 8.2x10 ⁻⁹	Plant Stack Radwaste Bldg.	(Residence, 1.0 mile north)
4.8x10 ⁻⁸ 4.4x10 ⁻⁷	1.0x10 ⁻⁹ 2.2x10 ⁻⁹	Plant Stack Radwaste Bldg	(Residence/Garden, 1.5 mile northeast)

III. MAXIMUM INDIVIDUAL DOSES

<u>Liquid Effluents^a</u>	<u>Gaseous Effluents^a</u>	<u>Direct Radiation^a</u>
A. Total Body Dose 2.000463 mrem (0.008%) ^d	A. Noble Gas Air Dose Gamma: 0.0404 mrad (0.20%) ^d Beta: 0.0127 mrad (0.032%) ^d	Negligible
B. Organ Dose 0.000563 mrem (0.003%) ^d Critical Organ: liver	B. Organ Doses (I-131, long-lived particulates, and tritium.) 0.968 MREM (3.23%) ^d (Infant-thyroid)	

a. Dresden Nuclear Power Station, Units 2 and 3.

b. GL (gigaliter) = 10⁹ liters.

c. NRC staff evaluation for 10 CFR 50, Appendix I for Dresden Station, Units 2 and 3.

d. Percent of 10 CFR 50, Appendix I guideline per year. The Licensee's technical specification reporting levels are the same as 10 CFR 50 guidelines.

- Curie content of solid wastes and irradiated fuel shipments, divided into the categories (A) spent resins, filter sludge, evaporator bottoms, etc.; (B) dry compressible waste, contaminated equipment, etc.; (C) irradiated components, control rods, etc.; and (D) other
- Identity of disposal site(s) and number and method of shipment to each site
- Number, curie content, and disposal site for shipments of irradiated fuel
- Type of liquid effluent circulation system, the circulation flow rate (GL/yr), discharge mode, dilution volume (GL)
- Gaseous effluent parameters X/Q and D/Q and location (use 10 CFR 50, Appendix I parameters for maximum dose for continuous release)
- Maximum individual total body dose and organ dose due to liquid effluents (give dose and percent of 10 CFR 50, Appendix I guideline per year for plant and identify critical organ)
- Maximum individual total body dose and organ dose due to gaseous effluents (give dose and percent of 10 CFR 50, Appendix I guideline per year for plant for gamma and beta noble gas air doses and organ dose and identify critical organ)
- Maximum individual dose due to direct radiation

All of the data presented in Table 3.2-1 are obtained from the data tables of Appendix B of the review TER except the circulation system type {FSAR, NUREG-0020, ODCM, RETS TER}, circulation flow rate {FSAR,

ODCM}, and NRC parameters for maximum (gaseous) doses {Safety Evaluation and Environmental Impact Appraisal (transmitted internally to the NRC by letter with subject "DSE Evaluation of (plant name) with respect to Appendix I to 10 CFR Part 50")}

3.2.2.1 Preparation of TER Section 2.2.1 - Liquid Effluent Releases. Section 2.2.1 of the review TER should summarize the important aspects of the Licensee's liquid effluent releases for the year reviewed together with a general observation of how the liquid releases for the year reviewed compare with those for the previous year.

This section should begin with a brief verbal description of the discharge of liquid effluents, identifying the receiving body and other pertinent information. It should include a list of important aspects of the Licensee's liquid effluent releases for the year reviewed (i.e., information from Table 3.2-1 and Appendix B), such as:

- Mode(s) of release (batch and/or continuous) and dominant mode (if any) during each quarter
- Number and total duration of batch releases
- Curies of tritium and of fission and activation products released
- Abnormal liquid releases during the period
- Total dilution volume during the period
- Summary of the most abundant fission and activation products released

A summary of the liquid releases for the year reviewed should be given, with major differences between that year's and the previous year's results noted. In addition, this section should contain discussions of

any other important observations and findings (e.g., incomplete data or information concerning liquid releases in the RETS-required reports, failure of the Licensee to address required topics) identified during the review of the liquid effluent release information contained in the RETS-required reports.

3.2.2.2 Preparation of TER Section 2.2.2 - Gaseous Effluent Releases. Section 2.2.2 of the review TER should summarize the important aspects of the Licensee's gaseous effluent releases for the year reviewed together with a general observation of how the gaseous releases for the year reviewed compare with those for the previous year.

This section should begin with a brief verbal description of the discharge of gaseous effluents, identifying the gaseous release points (vents and stacks) and their elevations, the major plant systems that are vented via these release points, and other pertinent information. It should include a list of important aspects of the Licensee's gaseous effluent releases for the year reviewed (i.e., information from Table 3.2-1 and Appendix B of the review TER), such as:

- Mode of release (batch and/or continuous) and location(s)
- Curies of particulates, tritium, noble gases, and iodines released during year reviewed
- Most abundant radionuclides released in each category (i.e., particulates, noble gases, iodines)
- Abnormal gaseous releases during the year reviewed

This section should also include: (a) the results of the gaseous releases for the year reviewed with major differences between that year's and the previous year's results noted, (b) the results of a comparison of the Licensee's reported X/Q {ODCM} with the value the NRC used in their

Appendix, I evaluation, and (c) discussions of any other important observations and findings (e.g., incomplete data or information in the RETS-required reports, failure of the Licensee to address required topics) identified during the review of the gaseous effluent information contained in the RETS-required reports.

3.2.2.3 Preparation of TER Section 2.2.3 - Radioactive Waste and Irradiated Fuel Shipments Section 2.2.3 of the review TER contains a summary of the important aspects of the shipment of solid radioactive waste and fuel shipments from the plant for the year reviewed. The following pertinent information {obtained from Table 3.2-1 and Appendix B of the review TER} should be included in the summary:

- Volumes and curie contents for each category of solid waste [i.e., (a) Spent resins, filter sludge, evaporator bottoms, etc.; (b) Dry compressible waste, contaminated equipment, etc.; (c) Irradiated components, control rods, etc.; (d) Other]
- Identity of each disposal site and number and mode(s) of shipment(s) to each disposal site
- Medium used as the solidification agent for spent resins, filter sludge, evaporator bottoms, etc.

Descriptions of any other important observations and findings (e.g., any unusual pattern of radwaste shipments, incomplete data or information in the RETS-required reports, failure of the Licensee to address required topics) identified during the review of the solid radwaste and irradiated component shipment information contained in the RETS-required reports should be included in this section.

3.2.3 Preparation of TER Section 2.3 - Radiological Dose Impact

The objectives of Section 2.3 of the review TER is to summarize the off-site dose impact due to the plant. If doses from effluents are more than a few percent of 10 CFR 50, Appendix I limits or radioactivities in environmental media are more than a few percent of the reporting levels of NUREG-0473, an attempt should be made to correlate the releases of radioactive material with the levels of radioactivity in the environmental media. In some cases the Licensee will include this correlation in the annual or semiannual report.

3.2.3.1 Preparation of TER Section 2.3.1 - Liquid Effluent Dose.

This section includes a summary of the reported maximum dose to individuals beyond the site boundary and in unrestricted areas due to liquid effluents {information obtained from Table 3.2-1 and Appendix B of the review TER}, including the following:

- Maximum whole body dose and percent of 10 CFR 50, Appendix I guideline
- Critical organ, maximum critical organ dose, and percent of 10 CFR 50, Appendix I guideline
- Location of maximum offsite dose and the pathway

The results of a comparison (if it can be made) of the maximum liquid effluent dose to individuals calculated for this plant with those for similar plants should be included, together with a comparison of the calculated maximum liquid effluent dose to individuals with the 10 CFR 50, Appendix I limits and with doses determined from radioactivity levels in environmental media if either of these is more than a few percent of reporting levels. Any discrepancies, missing information, or other important observations and findings identified during the review of the liquid effluent dose data and information in the RETS-required reports should also be discussed.

3.2.3.2 Preparation of TER Section 2.3.2 - Gaseous Effluent Dose.

This section includes a summary of the reported maximum dose to individuals beyond the site boundary and in unrestricted areas due to gaseous effluents, including the following {information obtained from Table 2-1 and Appendix B of the review TER}:

- Maximum gamma air dose and percent of the Licensee's technical specification reporting level
- Maximum beta air dose and percent of the Licensee's technical specification reporting level
- Critical organ, maximum critical organ dose, and percent of Licensee's technical specification reporting level
- Location of maximum offsite dose and the pathway

The results of a comparison (if it can be made) of the maximum gaseous effluent dose to individuals calculated for this plant with those for similar plants should be included together with a comparison of the reported gaseous effluent doses with the 10 CFR 50, Appendix I limits, and with doses determined from radioactivity levels in environmental media (if either is more than a few percent of reporting levels) {annual report, Appendix C of the review TER}. Any discrepancies, missing information, or other important observations and findings identified during the review of the gaseous effluent dose data and information in the RETS-required reports should also be discussed.

3.2.3.3 Preparation of TER Section 2.3.3 - Total Dose. This section should contain a summary of the important points of the Licensee's discussion of the total dose and dose commitment to any member of the public in comparison to the limits of 40 CFR 190. In addition, it should include the percent of the 40 CFR 190 limits attributable to plant operations {annual reports for current and previous years}.

3.2.4 Preparation of TER Section 2.4 - Radiological Environmental Monitoring Program

The objective of Section 2.4 of the review TER is to evaluate the Licensee's Radiological Environmental Monitoring Program for the year reviewed.

This section should contain a discussion of whether or not the Licensee's Radiological Environmental Monitoring Program is consistent with commitments in their RETS. In addition, it should contain a brief general summary of the results of the Radiological Environmental Monitoring Program for the year reviewed (including, for example, where any particular emphasis was placed in the monitoring program; whether the measured results were typical of previous measurements, mostly below the LLDs, higher than expected, etc.; whether the LLDs reported by the Licensee were lower than required by NUREG-0473 or their technical specifications.) {annual reports for current and previous years}

A summary of the monitoring program for the year reviewed should be given in a table (Table 2-2 of the review TER) whose format is that of Table 3.2-2. This table should contain a list of all types of samples collected and analyzed during the year reviewed together with the following information for each type sample {annual report or Appendix C of the review TER}:

- Number of control and indicator stations
- Sample collection frequency
- Frequency, type, and total number of analyses during the year reviewed

TABLE 3.2-2 OUTLINE OF ENVIRONMENTAL MONITORING PROGRAM, EDWIN I. HATCH NUCLEAR PLANT

Sample Type	No. of Stations		Collection Frequency	Analyses During 1985		
	Indicator	Control		Frequency	Type	Total Number
Direct Radiation (TLD)	16	2	Quarterly	Quarterly	Gama Dose	142
Outer Ring and Special ^a	18	-	Quarterly	Quarterly	Gamma Dose	Included above
Airborne Particulates	4	2	Weekly	Weekly	Gross Beta	334 ^b
			Weekly	Quarterly	Gamma Isotopic	26
Airborne Iodine	4	2	Weekly	Weekly	Iodine-131	334 ^b
Surface (River) Water	1	1	Monthly (Composite)	Monthly	Gamma Isotopic	24
				Quarterly	Tritium (Composite by location)	8
Sediment	1	1	Yearly	Yearly	Gamma Isotopic	2
Fish	1	1	Semiannually	Semiannually	Gamma Isotopic	6 or 7 ^c
Milk	2	1	Biweekly	Biweekly	Gamma Isotopic	78
					I-131	78
Grass	2	1	Monthly (during growing season)	Monthly (when collected)	Gamma Isotopic	37 ^d

a. Not defined by the Licensee as indicator locations.

b. A change in sampling locations occurred at mid-year, when the new RETS was implemented. Seven locations were apparently monitored during the first six months.

c. Sampling was required at three locations until midyear, then at only two. There is a discrepancy of one between the Licensee's text and the summary table concerning the number of samples analyzed. Two varieties of fish were collected during the first sampling period.

d. Sampling at a new location started before sampling ceased at the location being replaced.

A summary of the highlights of the monitoring program and its results for the year reviewed should be presented {using the data tabulated in Table 3.2-2 and Appendix C of the review TER}. This summary should include the following for the media emphasized in the monitoring program and the media for which radioactivities above background levels were detected:

- Number of indicator and control locations
- Mean of measured values (if above the LLD) or a comment that no measurements yielded results above the LLD
- Indication of source (plant, natural, other) for measurements above the LLD
- Fraction of reporting level for activities measured above LLD and attributable to the plant
- Identification of radionuclides detected at levels above the LLDs

This section should also include discussions of any problems or discrepancies identified during the review, such as {reference to RETS may be required}:

- Samples not taken and no (or inadequate) explanation given
- Results that should have been but were not reported
- Radionuclides detected in environmental media that were not expected either in that medium or in the environment (because, for example, short-lived, not fission or activation product or naturally occurring, fission or activation product that was not reported as being released from the plant, etc.)

- Activity levels that were measured to be higher at control locations than at indicator locations
- Mathematical problems such as a reported mean that is not within the reported range
- Reported ranges of activities that seem to be too large
- Reported measurements that seem to be anomalously high (or low)
- Unexpected location reported to have the highest annual mean radiation level or level of activity
- Any inconsistencies observed in the reported Licensee's environmental monitoring or sampling locations, such as distance, direction, sample type, etc.

3.2.4.1 Preparation of TER Section 2.4.1 - Direct Radiation. This section contains a discussion of plant effect determined by actual radiation measurements. Average doses at indicator locations (locations can be grouped if appropriate) and control locations should be given {Appendix C of review TER}.

A brief, general discussion of the most recent direct radiation monitoring program performed at the plant site by the NRC should be presented together with a comparison of the results from the NRC program with the results from the Licensee's direct radiation monitoring program {annual report, NUREG-0837}.

3.2.4.2 Preparation of TER Section 2.4.2 - Airborne Gross Beta Activity. This section should contain a discussion of results of airborne gross beta activity measurements reported by the Licensee for the year reviewed. Included should be a discussion of plant effects determined by the airborne gross beta activity measurements {Appendix C of review TER, annual report}.

3.2.4.3 Preparation of TER Section 2.4.3 - Waterborne . This section should contain discussions of any important results obtained from sampling and analysis of waterborne specimens, including any plant effects determined by the measurements {Appendix C of review TER, annual report}.

3.2.4.4 Preparation of TER Section 2.4.4 - Food Products. - This section should contain discussions of any important results obtained from sampling and analysis of any specimens of land grown food products, including any plant effects determined by the measurements {Appendix C of review TER, annual report}.

3.2.4.5 Preparation of TER Section 2.4.5 - Land Use Census. Results of the review of the Licensee's reported information concerning the Land Use Census are contained in this section. The date the Land Use Census was completed for the year reviewed should be given together with the locations identified by the Land Use Census that required reporting in the semiannual report or required a change in a location used in the environmental monitoring program. A comment should be made concerning whether or not the Licensee reported detailed results of the Land Use Census, and if they did, whether the reported results were complete. {annual report}

3.2.4.6 Preparation of TER Section 2.4.6 - Quality Assurance Program. This section contains results of the review of information reported by the Licensee concerning participation in a quality assurance program for the year reviewed. It should contain the identification of the quality assurance program(s) participated in by the Licensee (or the laboratory performing the analyses for the Licensee) for the year reviewed. In addition, it should contain a discussion of the agreement between the Licensee's (or laboratory's) results and the accepted results and a discussion of deficiencies identified, such as not reporting the types of samples (e.g., splits, replicates, blanks) used in the QA program, not reporting complete results, etc. {annual report}

3.2.5 Preparation of TER Section 2.5 - Revisions to ODCM, and Radwaste Treatment System

The objectives of Section 2.5 of the review TER are to identify reported changes to the Licensee's ODCM, and radwaste treatment systems, and to present results of reviews of the changes to the ODCM, and (if requested by the NRC) the radwaste treatment systems.

3.2.5.1 ODCM. Whether or not an ODCM or revisions to an ODCM were reviewed should be noted. If an ODCM or revisions to an ODCM were reviewed, a brief, general description of these revisions should be included together with a brief statement concerning the acceptability of the document (or revisions). Detailed results of the review should be provided in Appendix D of the review TER. {Appendix D of review TER}

3.2.5.2 Radwaste Treatment System. Any major changes to the radwaste treatment system that were reported in the semiannual report should be described. If the changes may be reported in documents that were not reviewed, it should be stated where they could have been reported. Detailed results of any review of these changes should be provided in Appendix D of the review TER. Such a review would only be performed if specifically requested by the NRC. {Appendix D of review TER}

3.2.6 Preparation of TER Section 2.6 - Analyses of Release, Dose, and Environmental Trends

Section 2.6 of the review TER presents results of analyses of trends in radioactivity release, dose, and environmental radioactivity for the year reviewed and the four previous years.

The radioactive effluent data and the calculated dose impacts for the years covered by the trend analysis should be listed in a table (Table 2-3 of the review TER) whose format is that of Table 3.2-3. This table should

include the following data {obtained from Appendix B of the review TER and semiannual reports} tabulated by year for each unit at the plant (if data for units are reported separately):

- Total (not including tritium, alpha, or noble gas activities) and tritium activities released in liquid effluents
- Noble gas, I-131, long-lived particulate, and tritium activities released in gaseous effluents
- Volume and total activity of solid waste shipments
- Maximum individual whole body and organ dose due to liquid effluents, together with the reporting levels
- Maximum individual gamma air, beta air, whole body, beta skin, and organ doses due to gaseous effluents (I-131, long-lived particulates, and tritium), together with the reporting levels.

This section should also include bar graph plots of (a) the activity of fission and activation products in liquid effluents and whole body dose due to liquid effluents, (b) the activity of fission and activation products in liquid effluents and organ dose due to liquid effluents, (c) the fission and activation gas activity and gamma air dose due to gaseous effluents, and (d) I-131 and long-lived particulate activity in gaseous effluents and organ dose due to gaseous effluents.

Plots (Figures 2-1 of the review TER) should be presented for each unit (if reported separately) {using data from Appendix B of the review TER and the semiannual reports} and the format of Figures 3.2-1.

TABLE 3.2-3. LIQUID AND GASEOUS RADIOACTIVE EFFLUENT RELEASES, SOLID WASTE SHIPMENTS, AND EXPOSURE DATA FROM 1980 THROUGH 1984 (DRESDEN UNITS 2 AND 3 FOR EFFLUENTS, DOSES AND HATCH UNITS 1 AND 2 FOR SOLID WASTE)

RADIOACTIVITY RELEASE

Year	<u>Liquid Effluents</u>		<u>Gaseous Effluents</u>				<u>Solid Waste Shipments</u>	
	<u>Total (not including tritium, alpha, gases) (Ci)</u>	<u>Tritium (Ci)</u>	<u>Noble Gases (Ci)</u>	<u>Iodine-131 (Ci)</u>	<u>Particulates (Ci)</u>	<u>Tritium (Ci)</u>	<u>Volume (m³)</u>	<u>Activity (Ci)</u>
1980	0.481	61.8	36,487	2.05	8.898	1180.0	613.27	1045.05
1981	0.0612	6.045	39,572	2.755	8.086	316.0	2691	4760
1982	0.01914	1.361	16,374	0.5053	0.4457	313.0	1692	4035
1983	0.0124	0.00145	8,430	0.320	0.302	258.0	1865.1	2275.08
1984	0.115	38.0	1,810	0.0327	0.097	81.5	2497.56	2578.85

MAXIMUM INDIVIDUAL DOSE

Year	<u>Liquid Effluent Doses</u>		<u>Gaseous Effluent Doses</u>				
	<u>Whole Body (mrem)</u>	<u>Organ (mrem)</u>	<u>Gamma Air (mrad)</u>	<u>Beta Air (mrad)</u>	<u>Whole Body (mrem)</u>	<u>Beta Skin (mrem)</u>	<u>Organ (I-131, Particulates, H-3) (mrem)</u>
1980	0.0017	0.0039	1.26	0.0851	0.493	0.647	0.102
1981	0.00038	0.00070	1.50	0.75	0.79	1.70	7.80
1982	0.000132	0.000180	0.584	0.155	0.314	0.565	1.50
1983	0.000180	0.000254	0.281	0.0164	0.122	0.153	0.00998
1984	0.000463	0.000563	0.0404	0.0127	0.0204	0.0403	0.968
Reporting Level	6 mrem	20 mrem	20 mrad	40 mrad	10 mrem	30 mrem	30 mrem

A discussion of the general trend of releases, doses, and environmental radioactivity levels should be presented, together with a discussion of any general information concerning plant operation or procedures that could be expected to affect effluent release and/or dose.

3.2.6.1 Preparation of TER Section 2.6.1 - Trends of Effluent Releases and Calculated Doses. This section should include a discussion of the observed trends in the releases of liquid and gaseous effluents and solid radwaste shipments, including the following {Appendix B, Table 2-3, and Figure 2-1 of review TER}:

1. Comparison of releases from each unit (if reported separately) for the year reviewed with previous years and the trend of the releases over the whole time period of the trend analysis for:
 - Fission and activation product activity in liquid effluents
 - Tritium activity in liquid effluents
 - Noble gas activity in gaseous effluents
 - Iodine-131 and long-lived particulate activity in gaseous effluents
 - Tritium activity in gaseous effluents
2. Comparison of volumes and activities of solid radioactive waste shipped offsite during year reviewed with previous years and trend over the whole time period of the trend analysis
3. Discussion of the trends in the radionuclide mixture in gaseous and liquid effluents and possible reasons for these trends

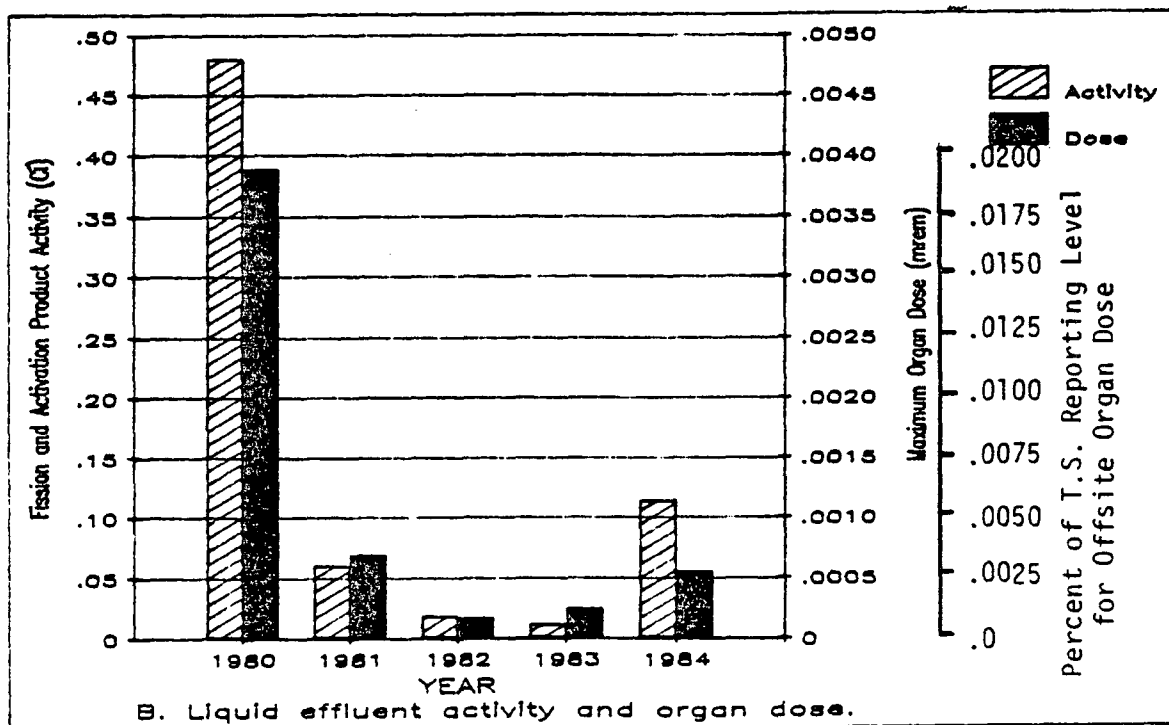
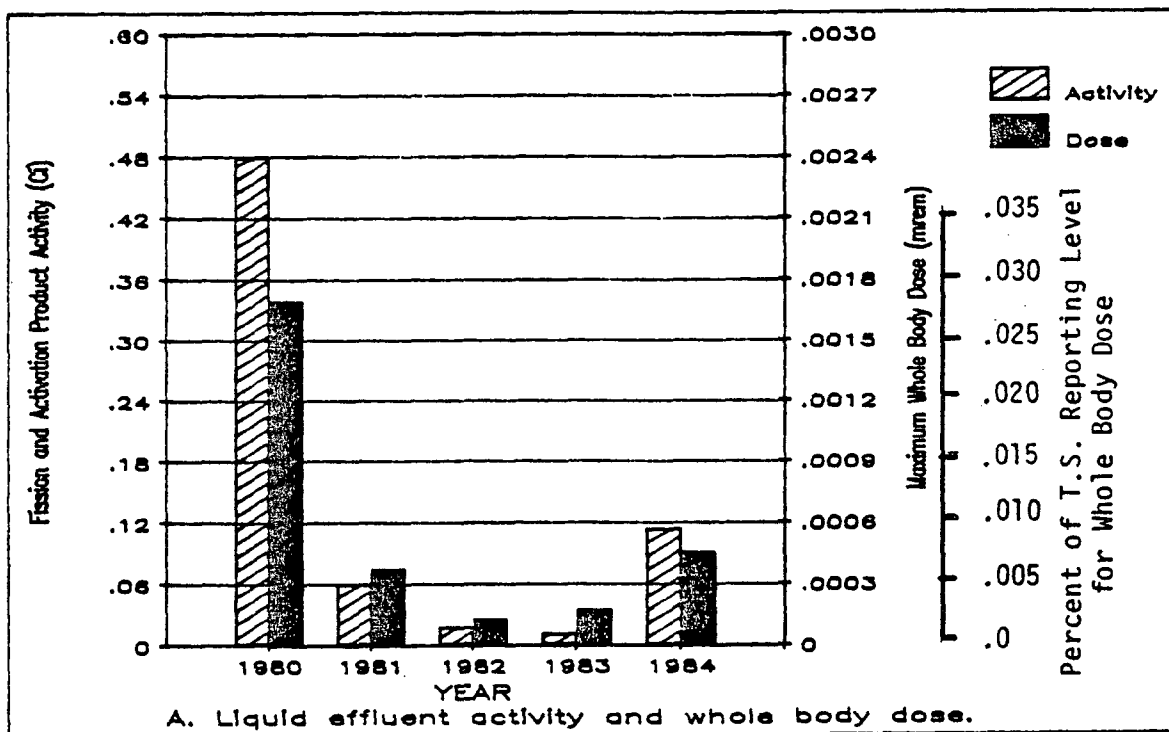


Figure 3.2-1. Radioactivity of effluents for Dresden Station Units 2 and 3 and calculated offsite doses for 1980 through 1984.

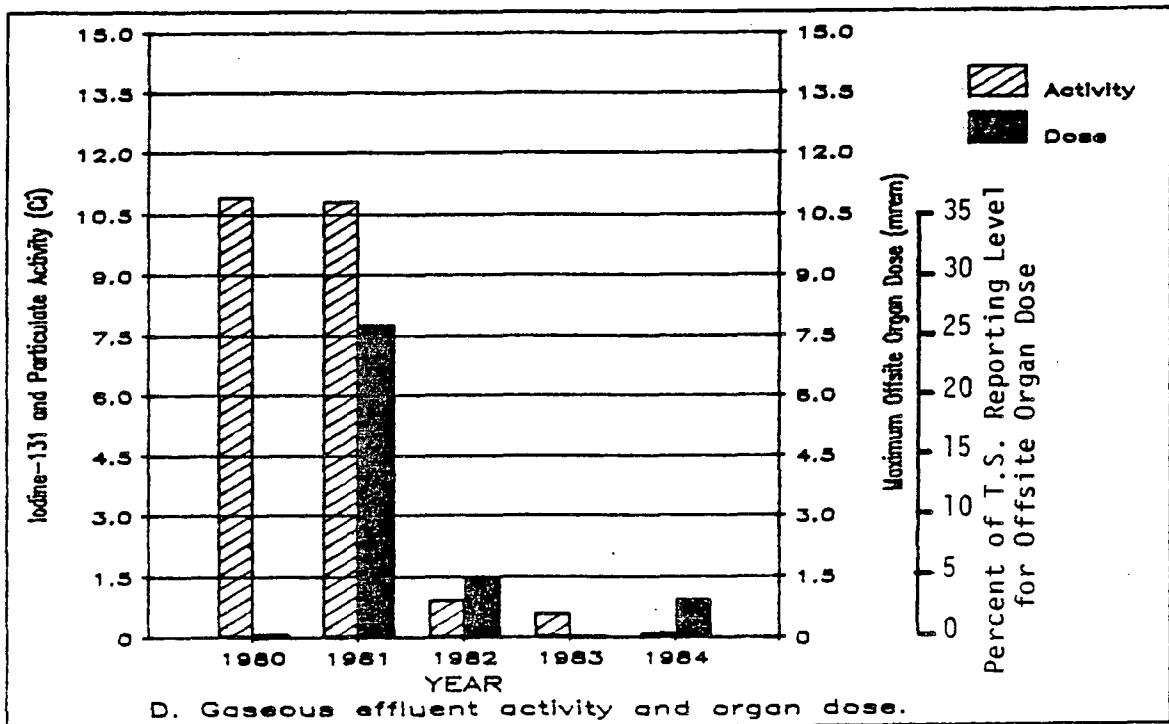
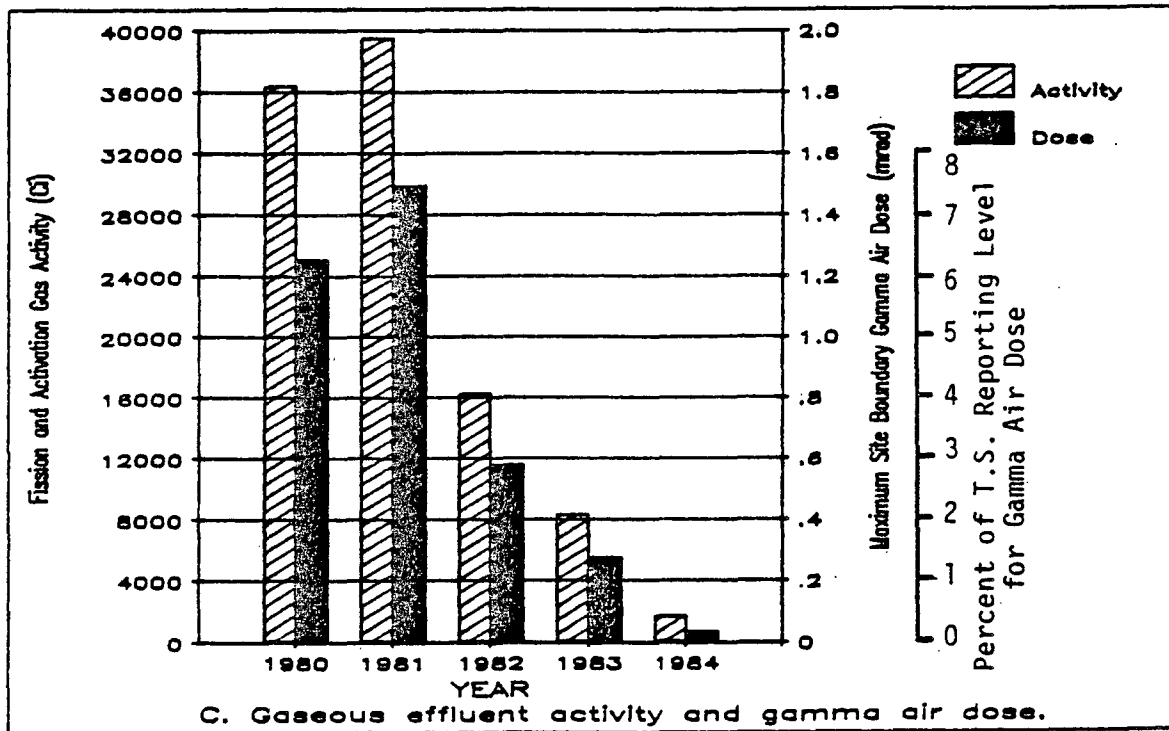


Figure 3.2-1 Radioactivity of effluents from Dresden Station Units 2 and 3 and calculated offsite doses from 1980 through 1984 (cont.)

This section should also include a discussion of trends in the calculated doses, including the following:

1. Comparison of calculated maximum dose due to releases from each unit (if reported separately) for the year reviewed with previous years and the trend of the dose over the whole time period of the trend analysis for:
 - Offsite whole body and critical organ doses due to the radioactivity in liquid effluents
 - Site boundary gamma air and beta air doses
 - Whole body dose due to the radioactivity in gaseous effluents
 - Beta skin dose due to the radioactivity in gaseous effluents
 - Offsite organ dose due to the radioactivity of I-131, long-lived particulates, and tritium in gaseous effluents.
2. Discussion of any apparent inconsistencies observed in the reported effluent releases and calculated doses, such as:
 - Changes in activities of effluents released without any apparent change in dose
 - Changes in the dose that cannot be accounted for by corresponding changes in effluents released
 - Major changes in the radionuclide mixture of either gaseous and/or liquid effluents

- Release of radionuclides in either gaseous or liquid effluents that, because of some reason (e.g., short half-lives, not fission or activation products, would not be expected in those effluents)
- Major changes in the activities of individual radionuclides released from one year to the next in either gaseous or liquid effluents
- The appearance of unexpected radionuclides (e.g., short lived, gaseous, not fission or activation products) in solid waste shipped from the plant

In order to perform the above trend analysis, the reviewer(s) must have a working knowledge of nuclear power plant effluent systems, radionuclides produced at nuclear power plants and those normally released from the plants, typical activities of the various radionuclides normally released from the plants, effects of mode of plant cycle on effluent releases, pathway analysis methods, radiation dose calculation methods, radiation doses typically calculated for effluents from nuclear power plants, and trend analysis methods.

3.2.6.2 Preparation of TER Section 2.6.2 - Trends of Environmental Radioactivity Levels. This section should include a discussion of the observed trends in the radioactivity measured in the environment in the vicinity of the plant, including direct radiation levels and radionuclide concentrations.

Included in this section should be a table (Table 2-4 of the review TER) in the format of Table 3.2-4 listing the measured direct radiation levels and airborne gross beta activities for both control and indicator locations for the period of years covered by the trend analysis and a plot (Figure 2-2 of the review TER) in the format of Figure 3.2-2 of the measured direct radiation levels and airborne gross beta activities for

TABLE 3.2-4. DIRECT RADIATION AND GROSS BETA ACTIVITY

<u>Year</u>	<u>Direct Radiation (mR/91 days)</u>		<u>Airborne Gross Beta Activity (pCi/m³)</u>	
	<u>Control Locations</u>	<u>Indicator Locations</u>	<u>Control Locations</u>	<u>Indicator Locations</u>
1980	13.6	12.4	0.032	0.032
1981	14.1	13.1	0.114	0.112
1982	13.1	12.6	0.026	0.027
1983	11.8	12.6	0.021	0.023
1984	13.4	13.6	0.024	0.025

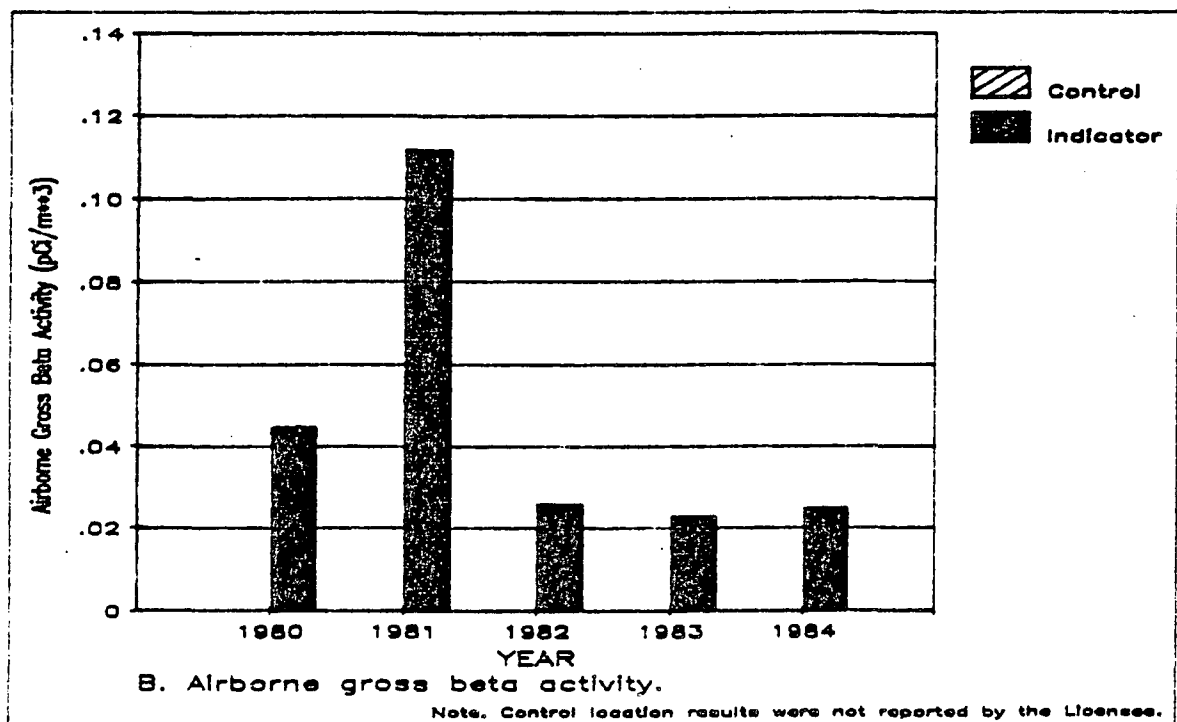
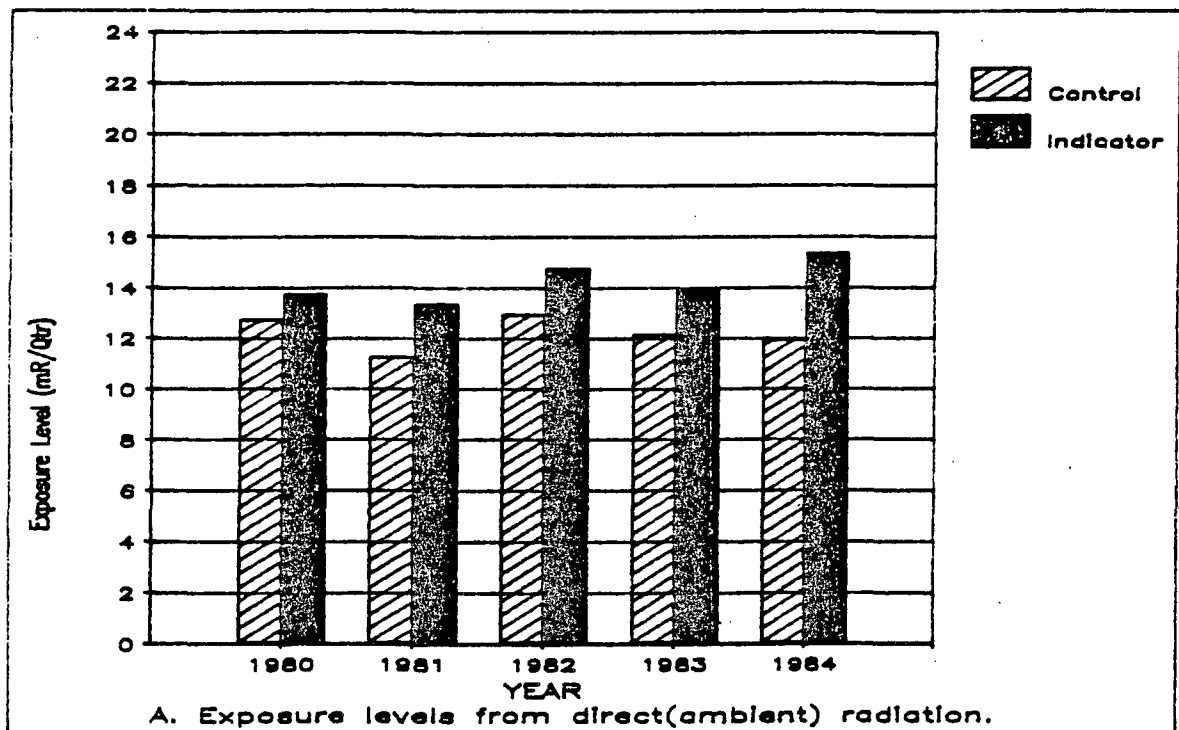


Figure 3.2-2 Levels of radioactivity in the environs of Dresden Nuclear Power Station for 1980 through 1984.

both control and indicator locations by year for the total time period covered by the trend analysis.

A summary of the highlights of results of the trend analysis of environmental radioactivity levels should be presented which includes the following:

- Comparison of the direct radiation level for the year reviewed with previous years for both control and indicator locations
- Comparison of the airborne gross beta activity for the year reviewed with previous years for both control and indicator locations
- Discussion of whether any increase in direct radiation level or airborne gross beta activity for the year reviewed might be due to the plant
- Discussion of general trends of the direct radiation level and the airborne gross beta activity for the total period of the trend analysis
- Discussion of the comparison of the levels of radionuclide concentrations measured in the environment during the year reviewed with the corresponding levels for previous years
- Discussion concerning any radionuclides that appeared in the environment during the year reviewed that were unexpected (because, for example, they did not appear during previous years, they are not radionuclide species that would be expected from a nuclear power plant, etc.)
- Discussion of any apparent inconsistencies observed in the trend of environmental radioactivity levels

In order to perform the above trend analysis, the reviewer(s) must have a working knowledge of environmental sampling and radiation measurement methods, identities and typical levels of naturally occurring radionuclides, pathway analysis methods, radionuclides due to a nuclear power plant that could be expected to be seen in the environment, and trend analysis methods.

3.2.7 Preparation of TER Section 2.7 - Information Contained in Licensee's Reports

The objective of this section is to summarize the review of the contents of Licensee's reports with respect to the information that is required by their technical specifications. A list of the reports (e.g., annual, semiannual) that were reviewed and had their contents compared with Licensee's report commitments {Appendix E of review TER} should be included.

To be able to perform the reviews and develop the documentation required in this section of the review TER, the reviewer(s) must have a working knowledge of all the RETS guidance documents, a familiarity with the Licensee's RETS, a familiarity with the structure and contents of RETS-required reports, and an ability to ferret out the required information from reports that are sometimes poorly written.

3.2.7.1 Preparation of TER Section 2.7.1 - Annual Radiological Environmental Monitoring Report. This section summarizes the comparison of the contents of the Licensee's annual report with the contents required by their technical specifications. It should include a general discussion of the contents of the annual report with respect to the required contents (i.e., environmental monitoring program, interlaboratory comparison program, land use census) and a general comment on the quality of the report. (Note: several Licensees' RETS require reporting of doses calculated from effluents to be reported in the annual reports instead of in the semiannual report for the second six months of the year.)

A tabulation of deficiencies found upon comparison of the reported information with the Licensee's commitments {contained in Appendix E of review TER} should be included. Details of the comparison are contained in Appendix F. Examples of deficiencies are:

- Missing or incomplete data or information
- Comparison with pre-operational studies missing

3.2.7.2 Preparation of TER Section 2.7.2 - Effluent and Waste Disposal Semiannual Reports. This section summarizes the comparison of the contents of the Licensee's semiannual reports with the contents required by their technical specifications {summarized in Appendix E of review TER}. It should include a general discussion of the contents of these semiannual reports with respect to the required contents (i.e., radioactive effluent release summary for liquid and gaseous effluents and solid radioactive waste disposal, abnormal releases, maximum annual site boundary gamma and beta air doses, maximum offsite organ dose due to gaseous effluents, maximum offsite whole-body dose due to liquid effluents) and a general comment on the quality of the reports

A tabulation of deficiencies (e.g., missing or incomplete data or information) found upon comparison of the reported information with the Licensee's commitments {contained in Appendix E of the review TER} should be included. Details of the comparison are to be contained in Appendix F of the review TER.

3.2.7.3 Preparation of TER Section 2.7.3 - Special Reports

This section contains the results of the reviews of special reports that the reviewer completed as part of his review of the Licensee's RETS-required reports. For each special report reviewed, a brief summary of the contents of the report and a summary of the review of that report are included here.

The various circumstances under which a special report is required are discussed below.

Calculated Doses Due to Liquids Exceeding a LCO

The Licensee is required to submit a special report within 30 days if the dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released to UNRESTRICTED AREAS exceeds the technical specifications limits.

If a special report was received for review, the reviewer should examine the report for the required contents and include a brief summary of the contents of the report together with the results of his review in this section of the review TER. If a special report was not received, the reviewer should examine the reported doses to determine if a special report was required during the reporting period. If calculated doses were reported for each reactor unit, there should be no problem in determining requirements for need for a special report. If, however, the calculated offsite doses are reported as one set of values for all units of a multi-unit site and exceeds the limit for a single unit, it will not be known if the LCO(s) was exceeded. In this case, if there is no appropriate discussion by the Licensee concerning relative contributions to the dose(s) by the different units, that fact should be noted by the reviewer.

Liquid Radwaste Treatment System Not Used as Required

If a special report is received for review, the reviewer should examine it for the required contents and report a brief summary of the report together with the results of his review in this section of the review TER. If no special report is received for review, the reviewer will have no way of determining from the other RETS-required reports if the dose projection required by Surveillance Specification 4.11.1.3 of NUREG-0473 indicated that one (or more) of the doses was exceeded and, therefore, that a special report of the type discussed above was

required. It must, therefore, be assumed that no special report of that type was required.

Calculated Air Doses Due to Noble Gases Exceeding a LCO

Any special report submitted by the Licensee as required when Specification 3.11.2.2 of NUREG-0473 is exceeded should be examined to determine if it has the required contents. The reviewer should include a brief summary of the report together with the results of his review in this section of the review TER. As a general principle, the reviewer should examine the RETS-required reports to determine if the calculated air doses due to noble gases were high enough to have required this special report. If the doses reported from a multi-unit site are not attributed to individual units, the determination of whether a special report was required cannot be made unless a reported dose was greater than the limiting level times the number of units.

Calculated Organ Doses Due to Gases Exceeding a LCO

Any special report submitted by the Licensee as required when Specification 3.11.2.3 of NUREG-0473 is exceeded should be examined to determine if it contains the required information. The reviewer should include a brief summary of the report together with the results of his review in this section of the review TER. In general, as a part of the review of RETS-required reports, the reviewer should examine them to determine if calculated doses due to gaseous effluents were high enough to exceed Specification 3.11.2.3 of NUREG-0473 and thereby require a special report to be submitted. If the dose(s) reported from a multi-unit site are not attributed to individual units, the determination of whether a special report was required cannot be made unless a reported dose was greater than the limiting level times the number of units. In this case, the fact that there was no appropriate discussion by the Licensee concerning relative contributions to the dose(s) by the different units should be noted by the reviewers.

Gaseous Radwaste Treatment System Not Used as Required

Any special report submitted by the Licensee as required when Specification 3.11.2.4 of NUREG-0473 is exceeded should be examined to determine if it contains the required information. The reviewer should include a brief summary of the report together with the results of his review in this section of the review TER. The reviewer has no way of determining from the RETS-required reports (other than this special report, if one was submitted) if the limiting condition of Specification 3.11.2.4 was violated. Therefore, if no special report was submitted by the Licensee, it must be assumed that none was required.

Ventilation Exhaust Treatment System Not Used as Required

Any special report submitted by the Licensee as required when Specification 3.11.2.5 of NUREG-0473 is exceeded should be examined to determine if it contains the required information. The reviewer should include a brief summary of the report together with the results of his review in this section of the review TER. The reviewer has no way of determining from the RETS-required reports (other than this special report, if one was submitted) if the limiting condition of Specification 3.11.2.5 was violated. Therefore, if no special report was submitted by the Licensee, it must be assumed that none was required.

Total Dose Exceeding 40 CFR 190 Limits

Any special report submitted by the Licensee as required when Specification 3.11.4 of NUREG-0473 is exceeded should be examined to determine if it contains the required information. The reviewer should include a brief summary of the report together with the results of his review.

Radioactivity Level in Environmental Media Exceeding Reporting Level

Any special report submitted by the Licensee as required when Specification 3.12.1 of NUREG-0473 is violated should be examined to determine if it contains the required information. The reviewer should include a brief summary of the report together with the results of his review.

3.3 Preparation of TER Section 3 - Conclusions

The objective of this section is to summarize the results of the review of the Licensee's reports. It should contain a general discussion of whether or not the Licensee's reports met essentially all of the reporting requirements of their RETS; a general discussion about any discrepancies found between the reporting requirements and what was reported; and a general discussion concerning any procedure changes, corrections, etc. made during the reporting year.

This summary section should also contain a tabulation of short descriptions of conclusions that may be drawn from the Licensee's reported data, such as:

1. Did the Licensee conduct an environmental monitoring program, participate in an approved interlaboratory comparison program, and perform a land-use census in accordance with the requirements of their RETS? If they did not, this should be briefly discussed.
2. Did analyses of samples taken in accordance with the Licensee's radiological environmental monitoring program indicate evidence of any plant effect on radioactivity levels in the environment? If they did, these effects should be discussed.
3. Fraction of the technical specification reporting levels attributable to radioactive effluents from the plant

4. Fraction of the 40 CFR 190 standards for whole-body and organ dose received by the most exposed member of the general public
5. Comparison of the releases of radioactivity during the year reviewed with those for previous years for:
 - Fission and activation products in liquid effluents
 - Fission and activation gases in liquid effluents
 - Iodine-131 and long-lived particulates in gaseous effluents
6. Comparison of the results of direct radiation measurements made by the Licensee and the NRC
7. Any other important observations or conclusions

3.4 Preparation of TER Section 4 - References

This section of the review TER contains a list all documents referred to in the review TER.

3.5 Preparation of TER Appendix A - Plant and Site Design Features

Appendix A of the review TER provides the reader of the review TER the opportunity to see the general plant layout, the plant's location with respect to communities and bodies of water, and a simplified view of both the radioactive liquid effluent treatment and release systems and the radioactive gaseous effluent treatment and release systems. This is accomplished by providing a minimum of four figures or diagrams that have been previously published on the subject plant. The plant's documents most likely to contain these figures are the Final Safety Analysis Report (FSAR) or one of its updates, the RETS, and the ODCM. The RETS TER is also a potential source of these figures.

Each figure in Appendix A of the review TER needs a caption that states the main features of the figure, the source of the figure, and the publication or implementation date of the source document. In general, BWR Licensees have put forth a fairly poor effort in providing good figures.

Ideally, the plant's figures should contain the items stated below in order to supplement or clarify their narrative descriptions of the radioactive gaseous and liquid effluent treatment systems.

One figure should be a general map to aid in locating the subject plant with reference to towns, roads, and rivers or other water bodies that can possibly be used for makeup water or liquid waste discharge. A more detailed map of the plant should also be included that shows property lines; location, size, and identification of pertinent structures; gaseous release points; liquid effluent discharge and water intake courses; and the site "boundary for gaseous and liquid effluents." Another figure should be a simplified diagram showing the liquid effluent treatment and release system(s), identifying the source of the liquid wastes and indicating liquid radwaste processing, flow rates (blowdown, etc.), monitors, samplers, alternate effluent flow routes, and discharge points. Also needed is a simplified schematic diagram of the gaseous radwaste effluent treatment and release system(s), indicating the process location(s) of holdup tanks, delay lines, release points [ground level or elevated (80 meters or higher)], and the location of various effluent monitors, samplers, and alternate effluent flow routes.

Appendix A of this report contains selected examples of figures similar to the ideal figures discussed above. The figures in Appendix A of this report are all actual figures from BWRs.

3.6 Preparation of TER Appendix B - Summary of Effluent Releases and Dose Calculations

Appendix B of the review TER contains summaries of all the effluent releases, solid radwaste shipments, and dose calculations for the plant for the year reviewed and the previous year {semiannual and annual reports}. In particular, it contains:

- Tables (in the format of Table B-1 of Appendix B) listing the radioactive liquid effluent release data for each unit at the plant for the two years (year reviewed and previous year)
- Tables (in the format of Table B-2 of Appendix B) listing the radioactive gaseous effluent release data for each unit at the plant for the two years
- Tables (in the format of Table B-3 of Appendix B) listing the solid radwaste and irradiated fuel shipments from the plant for the two years
- Tables (in the format of Table B-4 of Appendix B) summarizing the maximum individual doses for the plant for the two years

Appendix B of this report contains examples of the type of tables required in Appendix B of the review TER. These examples have been taken from actual review TERs.

3.7 Preparation of TER Appendix C - Radiological Environmental Monitoring Program Results

This appendix contains summaries of the results of the Licensee's radiological environmental monitoring program for the two previous years {annual reports}. In particular, it contains the following:

- A brief general description of the plant giving plant location, number and type(s) of units, main condenser cooling water system mode of operation, body into which water is discharged {FSAR, NUREG-0020, RETS TER}
- A general description of a Licensee's radiation environmental monitoring program's objectives {NUREG-0473}
- The date of initiation of the Licensee's current radiation environmental monitoring program and an assessment of how close it follows the model program {Licensee's RETS, NUREG-0473}
- A list of types of monitoring performed and types of samples collected {annual report}
- Figure(s) showing environmental monitoring and sampling locations {annual report, ODCM}
- A table (in the format of Table C-1 of Appendix C) listing each environmental monitoring location together with its identification code, sample type, location (distance and sector), and short description of the location {annual report, ODCM}
- Tables (in the format of Table C-2 of Appendix C) giving results of the radiological environmental monitoring program for the year reviewed and the previous year {annual report}
- A discussion of the direct radiation monitoring program conducted by the NRC, including: (a) a comparison of the NRC's program with the Licensee's program regarding number and location of monitors, control locations, and results; and (b) a table (in the format of Table C-3) listing each monitoring location used by the NRC, together with its identification code, distance, direction, and a short description of its location {annual report, NUREG-0837}

- A summary of the Licensee's general conclusion concerning the plant's impact on the environment and on the dose to the public {annual report}

3.8 Preparation of TER Appendix D - Evaluations of Changes to the ODCM, and Radwaste Treatment Systems

Appendix D of the review TER contains both general and detailed results of the review (if any was made) of changes to the the Licensee's ODCM, and radwaste treatment systems that were reported by the Licensee's.

3.8.1 Preparation of TER Appendix D, Section D.1 - Evaluation of Changes to the ODCM

This section contains a status or summary of the Licensees's ODCM. The summary identifies the most recent version of the ODCM approved by the NRC and the date of the NRC approval letter. The ODCM identity should include the revision number, the date of the revision, and the date of the Licensee letter reporting the change. The summary should also state if there have been any Licensee initiated changes, modifications, or revisions made to the approved version. If there have been changes, the revision number(s) of the change and the source of the change (e.g., the semiannual report) should also be identified. Finally, a statement concerning the status of the change(s) must be included: were the changes reviewed or are they going to be reviewed; by what company or organization; and if reviewed then reference the document containing the review (e.g., Supplement 1 to Appendix D of the review TER).

3.8.2 Preparation of TER Appendix D, Section D.2 - Reported Changes to the Radwaste Treatment Systems

This section is a convenient place to identify for the NRC, reported major changes made to the liquid, gaseous, or solid radwaste treatment systems. The purpose for this section is but to identify reported

change(s) and not to review or critique the change(s) for recommended approval (unless specifically requested to do so by the NRC) as this may be beyond the scope or level of expertise of the independent outside contractor. The technical specification requirement for reporting major changes to the radwaste treatment systems should be identified. If no technical specification exists, then it is assumed the changes will be reported as part of the annual FSAR update. If reported changes are identified, then the document reporting the change must be referenced and if possible the change should be briefly summarized.

3.8.3 Preparation of TER Appendix D Section D.3 - References

This section identifies all references made in Sections D.1 and D.2..

3.9 Preparation of Supplement 1 to Appendix D of TER- Evaluation of Changes to the ODCM

The following paragraphs describe the typical information required or expected in each section in a typical Supplement 1 to Appendix D of the review TER. Appendix D of this report contains an example of an actual Supplement 1 to Appendix D of a review TER. It documents the review of an ODCM which was recommended to be an acceptable reference.

3.9.1 Preparation of Supplement 1, Section 1 - Introduction

There are usually two paragraphs included in the introduction. The contents of these paragraphs are described below.

3.9.1.1 Preparation of Supplement 1, Section 1.1 - Purpose of Review. This paragraph states that the purpose of this supplement is to report the review of recent changes or the review of a recent version of the approved ODCM. The paragraph identifies the plant and the owner utility submitting the changes. The paragraph also identifies the ODCM in its relation to the hierarchy of documents supporting the plant's technical specifications.

3.9.1.2 Preparation of Supplement 1 Section 1.2 - Plant Specific Background This section contains a status or summary of the Licensees's ODCM. The summary identifies the most recent version of the ODCM approved by the NRC and the date of the NRC approval letter. The ODCM identity should include the revision number, the date of the revision, and the date of the Licensee letter reporting the change. The summary should also state if there have been any Licensee initiated changes, modifications, or revisions made to the approved version. If there have been changes, the revision number(s) of the change(s) and the source(s) of the change(s) (e.g., the semiannual report) should also be identified. Finally, the revision or changes that were reviewed by the independent review team are identified with a follow-on statement that the results of the review are contained in this supplement.

3.9.2 Preparation of Supplement 1, Section 2 - Review Criteria

This section identifies and references the criteria and recommended guidelines provided by the NRC for reviewing the ODCM. Additionally, this section contains a synopsis of the information required in an ODCM. The information in this section is generic in nature and should be applicable and fairly constant in all reports.

3.9.3 Preparation of Supplement 1, Section 3 - Evaluation

An introductory paragraph may be inserted containing general information concerning the plant or the ODCM which is beneficial to the reader but of little or no consequence to the reviewer. For example, the review may be of an ODCM to be used by only one of several plants located on the site, or several plants may exist but only one is operational as others may be under construction, or each plant has its own ODCM, etc.

Most of the remaining paragraphs in this section contain the results of the review of different topics in the ODCM. Although the review of each topic requires totally different review criteria, the information

expected or requested from the review can be couched in the same language as will be evident in the following paragraphs.

3.9.3.1 Preparation of Supplement 1, Section 3.1 - Liquid Effluent Pathways This section is a convenient location for providing a brief description of the liquid radwaste treatment system, the liquid effluent release pathways, the source of water for the dilution streams (e.g., the discharge canal for plants with once-through condenser cooling systems or the blowdown line for plants with forced draft or natural draft cooling towers), the receiving body of water, and other enlightening information regarding treatment or disposal of the liquid radwaste. Also, if the main body of the review TER does not contain a simplified block diagram of the radwaste treatment system, then a diagram is to be included in this section. The diagram should be obtained from plant documents with reference to the source of the diagram. If a plant-prepared diagram is not available, then a diagram should be prepared from the best available information including information from the plant's technical specifications, the ODCM, and the FSAR.

3.9.3.2 Preparation of Supplement 1, Section 3.2 - Liquid Effluent Monitor Setpoints This section contains the results of the review of the methods for determining the alarm/trip setpoints for the liquid effluent radiation monitors. It identifies and discusses major discrepancies in the methods as compared to the NRC guidelines and, if possible, discusses suggested solutions for eliminating the discrepancy. It must also discuss major deficiencies in the description in the text that are either unclear (mathematically or descriptively) or which leave the reviewer uncertain about the adequacy of the methods for ensuring compliance to the limits of the technical specifications. Deficiencies other than major deficiencies may be identified in the conclusions section of the supplement.

The technical specification containing the requirement for including the methodology for determining the alarm/trip setpoints in the ODCM is identified and the section of the ODCM containing the required methodology is also identified. The liquid radwaste effluent lines monitored for

radiation are identified and the functions provided by the radiation monitors are also identified (i.e., which monitors provide alarm and automatic termination of release and which monitors provide alarm only).

Section 4.1.1 of NUREG-0133 describes methods acceptable to the NRC position on information and conditions to be included in the ODCM for determining the alarm/trip setpoints and the Addendum to NUREG-0133 contains recommended methodology for determining the setpoints. The reviewer must be familiar with the contents of these guidelines to evaluate the initial submittal document or changes to the previously approved document.

When reviewing the setpoint methodology, the reviewer must be aware that the radiation monitor is not influenced by the liquid radwaste discharge flow, i.e., the monitor's response to a volume of radioactive liquid is the same regardless of whether or not the volume is flowing or is not flowing. Assurance that the liquid effluent discharge rate is within the concentration limits requires information from the discharge line flow monitor as well as the discharge line radiation monitor.

Frequently, the alarm/trip setpoint is determined for the maximum concentration of liquid radwaste permitted to be discharged that will not exceed the concentration limits. In accordance with the methodology in the addendum of NUREG-0133, the setpoints are determined using radioactivity concentration measurements from a prerelease grab sample obtained from the liquid radwaste sample tank to be released, the maximum liquid radwaste discharge flow, and the minimum onsite dilution flow. The setpoints must ensure that the instantaneous concentrations at the point of release to the UNRESTRICTED AREA are at all times within the concentration limits of the technical specifications.

The reviewer should be cautioned in the total acceptance of this approach. This setpoint should be considered to be the high alarm/trip setpoint which is the value at which the concentration limits will be exceeded. A lower level setpoint providing at least an alarm function

should be considered. The setpoint for this low level alarm should be set at slightly above the activity measured from the representative prerelease grab sample to prevent spurious alarms. This low level alarm would serve at least two functions. An unexpected alarm could alert the operator in the event a tank was discharged other than the tank that was intended to be discharged, and the low level alarm could alert the operator prior to reaching the high level alarm thus preventing the release from exceeding the concentration limits. Without a low level alarm, an incorrect tank could be released whose radionuclide mix could exceed the concentration limits but still be within the high level alarm setting.

If there is more than one holding tank that can be released to a common liquid radwaste discharge line, then there is a concern for the simultaneous release of more than one tank into the common line. An unplanned simultaneous release could result in concentrations at the point of release in excess of the concentration limits. The ODCM must provide assurance that an unplanned simultaneous release cannot occur. The assurance is provided through administrative controls and/or interlocks in the radwaste discharge system.

If there are several monitored environmental release points, then each discharge line and radiation monitor can be reviewed independently of the others. For this situation, there is no concern with simultaneous releases from the different discharge lines since the concentration limits must be satisfied at each environmental release point.

A final statement must be included expressing the opinion of the reviewer as to whether or not the methods are generally within the envelope of the NRC recommended guidelines and if the methods provide reasonable assurance that the limits of the technical specifications will not be exceeded.

3.9.3.3 Preparation of Supplement 1 Section 3.3 - Gaseous Effluent Pathways This section is a convenient location for providing a brief description of the gaseous radwaste treatment system, the gaseous effluent release pathways, the total number of gaseous effluent environmental release points from all nuclear units on the site, and other enlightening information regarding disposal of the gaseous radwaste. Also, if the main body of the review TER does not contain a simplified block diagram of the radwaste treatment system, then a diagram is to be included in this section. The diagram should be obtained from plant documents with reference to the source of the diagram. If a plant-prepared diagram is not available, then a diagram should be prepared from the best available information including information from the plant's technical specifications, the ODCM, and the FSAR.

3.9.3.4 Preparation of Supplement 1, Section 3.4 - Gaseous Effluent Monitor Setpoints This section contains the results of the review of the methods for determining the alarm/trip setpoints for the gaseous effluent radiation monitors. It identifies and discusses major discrepancies in the methods as compared to the NRC guidelines and, if possible, discusses suggested methods for eliminating the discrepancy. It must also discuss major deficiencies in the description in the text that are either unclear (mathematically or descriptively) or leave the reviewer uncertain about the adequacy of the methods for ensuring compliance to the limits of the technical specifications. Deficiencies other than major deficiencies may be identified in the conclusions section of the supplement.

The technical specification containing the requirement for including in the ODCM the methodology for determining the alarm/trip setpoints is identified and the section of the ODCM containing the required methodology is also identified. The gaseous radwaste effluent lines monitored for radiation are identified and the functions provided by the radiation monitors are also identified (i.e., which monitors provide alarm and automatic termination of release and which monitors provide alarm only).

Section 5.1.1 of NUREG-0133 describes methods acceptable to the NRC for determining the alarm/trip setpoints. The reviewer must be familiar with the contents of this guideline to evaluate the submittal document or changes to the previously approved document.

When reviewing the methodology in the submittals, the reviewer must be aware that the setpoints for the gaseous effluent radiation monitors are based on dose rates and not on concentration limits. The ODCM should identify and quantify the site specific parameters used in the dose rate calculations. A parameter of concern is X/Q. The X/Q value must be the highest calculated annual average X/Q at the controlling location. If the controlling locations for vent and elevated releases are different, then the X/Q for the vent or ground level release should be used. For ground level or vent releases, the X/Q values should be at the site boundary. It is not always possible to check the basis for the X/Q value, but the value should be included, and if a table of values is provided, then the table should be reviewed for possible discrepancies.

If there are several monitored environmental gaseous release points on the site (which includes all reactor units on the site), then each release point cannot be considered independently of the other release points. This is due to the fact that the important parameters are release rates with units of uCi/sec which are additive, and, consequently, effluents from each release point contribute to the single dose rate limit for the site. Therefore, there must be consideration for simultaneous releases in the form of an administrative factor for each release point.

A final statement must be included expressing the opinion of the reviewer as to whether or not the methods are generally within the envelope of the NRC recommended guidelines and if the methods provide reasonable assurance that the limits of the technical specifications will not be exceeded.

3.9.3.5 Preparation of Supplement 1, Section 3.5 - Concentrations in Liquid Effluents This section contains the results of the review of the methods for ensuring that the concentrations of radioactivity in liquid effluents at the point of release to the UNRESTRICTED AREA are within the limits of the technical specifications. It identifies and discusses major discrepancies in the methods as compared to the NRC guidelines and, if possible, discusses suggested methods for eliminating the discrepancy. It must also discuss major deficiencies in the description in the text that are either unclear (mathematically or descriptively) or leave the reviewer uncertain about the adequacy of the methods for ensuring compliance to the limits of the technical specifications. Deficiencies other than major deficiencies may be identified in the conclusion section of the supplement.

The technical specification containing the requirement for including in the ODCM the methodology for ensuring that the concentrations are within the limits is identified, and the section of the ODCM containing the required methodology is also identified.

Section 4.2 of NUREG-0133 describes methods acceptable to the NRC for demonstrating that the concentration limits are being met. The reviewer must be familiar with the contents of this guideline to evaluate the submittal document or changes to the previously approved document.

A final statement must be included expressing the opinion of the reviewer as to whether or not the methods are generally within the NRC recommended guidelines and if the methods provide reasonable assurance that the limits of the technical specification will not be exceeded.

3.9.3.6 Preparation of Supplement 1, Section 3.6 - Dose Rates in Gaseous Effluents This section contains the results of the review of the methods for ensuring that the dose rates at and beyond the site boundary due to the release of radioactive gaseous effluents from all environmental release points on the site are within the limits of the technical specifications. It identifies and discusses major discrepancies in the

methods as compared to the NRC guidelines and, if possible, discusses suggested methods for eliminating the discrepancy. It must also discuss major deficiencies in the description in the text that are either unclear (mathematically or descriptively) or leave the reviewer uncertain about the adequacy of the methods for ensuring compliance to the limits of the technical specifications. Deficiencies other than major deficiencies may be identified in the conclusion section of the supplement.

The technical specification containing the requirement for including in the ODCM the methodology for ensuring that the dose rates are within the limits is identified, and the section of the ODCM containing the required methodology is also identified.

Section 5.2 of NUREG-0133 describes methods acceptable to the NRC for demonstrating that the dose rate limits are not being exceeded. The reviewer must be familiar with the contents of these guidelines to evaluate the initial submittal document or changes to the previously approved document.

A final statement must be included expressing the opinion of the reviewer as to whether or not the methods are generally within the NRC recommended guidelines and if the methods provide reasonable assurance that the limits of the technical specification will not be exceeded.

3.9.3.7 Preparation of Supplement 1, Section 3.7 - Dose Due to Liquid Effluents This section contains the results of the review of the methods for ensuring that the dose or dose commitment to any MEMBER OF THE PUBLIC due to the release of radioactivity in liquid effluents to the UNRESTRICTED AREA is within the limits of the technical specification. It identifies and discusses major discrepancies in the methods as compared to the NRC guidelines and, if possible, discusses suggested methods for eliminating the discrepancy. It must also discuss major deficiencies in the description in the text that are either unclear (mathematically or descriptively) or leave the reviewer uncertain about the adequacy of the

methods for ensuring compliance to the limits of the technical specifications. Deficiencies other than major deficiencies may be identified in the conclusion section of the supplement.

The technical specification containing the requirement for including in the ODCM the methodology for ensuring that the dose is within the limits is identified, and the section of the ODCM containing the required methodology is also identified.

Section 4.3 of NUREG-0133 describes methods acceptable to the NRC for the dose calculation. Section 4.3.1 of NUREG-0133 contains recommended methodology to be used for calculating the site specific dose factors or default dose factors for the maximum exposed individual. The reviewer must be familiar with the contents of these guidelines to evaluate the submittal document or changes to the previously approved document.

A final statement must be included expressing the opinion of the reviewer as to whether or not the methods are generally within the NRC recommended guidelines and if the methods provide reasonable assurance that the limits of the technical specification will not be exceeded.

3.9.3.8 Preparation of Supplement 1, Section 3.8 - Dose Due to Gaseous Effluents This section contains the results of the review of the methods for ensuring that the dose or dose commitment to any MEMBER OF THE PUBLIC due to the release of radioactivity in gaseous effluents at and beyond the site boundary is within the limits of the technical specification. This section identifies and discusses major discrepancies in the methods as compared to the NRC guidelines and, if possible, discusses suggested methods for eliminating the discrepancy. It must also discuss major deficiencies in the description in the text that are either unclear (mathematically or descriptively) or leave the reviewer uncertain about the adequacy of the methods for insuring compliance to the limits of the technical specifications. Deficiencies other than major deficiencies may be identified in the conclusion section of the supplement.

The technical specification containing the requirement for including in the ODCM the methodology for ensuring that the dose is within the limits is identified, and the section of the ODCM containing the required methodology is also identified.

Section 5.3 of NUREG-0133 describes methods acceptable to the NRC for the dose calculations. Sections 5.3.1.1 through 5.3.1.5 contain recommended methodology for calculating the site specific dose factors or the default dose factors for the maximum exposed individual in all four age groups. The reviewer must be familiar with the content of these guidelines to evaluate the initial submittal document or changes to the previously approved document.

A final statement must be included expressing the opinion of the reviewer as to whether or not the methods are generally within the NRC recommended guidelines and if the methods provide reasonable assurance that the limits of the technical specification will not be exceeded.

3.9.3.9 Preparation of Supplement 1, Section 3.9 - Dose Projections

This part of the report contains two independent sections. One section contains the results of the review of the methods for projecting the dose due to the anticipated release of radioactive liquids, and the other section contains the results of the review for projecting the dose due to the anticipated release of radioactive gases. Each section identifies and discusses major discrepancies in the methods and, if possible, discusses suggested methods for eliminating the discrepancy. Each section must also discuss major deficiencies in the description in the text that are either unclear (mathematically or descriptively) or leave the reviewer uncertain about the adequacy of the methods for ensuring compliance to the limits of the technical specifications. Deficiencies other than major deficiencies may be identified in the conclusion section of the supplement.

In each section, the technical specification containing the requirement for including dose projection methodology in the ODCM is identified, and the section of the ODCM containing the required methodology is also identified.

In each section, a final statement must be included expressing the opinion of the reviewer as to whether or not the method will adequately project the dose and meet the intent of the requirements of the technical specification.

3.9.3.10 Preparation of Supplement 1, Section 3.10 - Diagrams of Effluent Pathways This section identifies the figures in the ODCM that contain simplified diagrams of the liquid and gaseous radwaste treatment systems and effluent pathways. Deficiencies or possible errors in the figures or inconsistencies between the information in the figures and the information in the text must be identified. Also, the omission of a figure is identified as a deficiency in the ODCM. The omission of a figure illustrating the solid radwaste treatment system is also identified as a deficiency.

3.9.3.11 Preparation of Supplement 1, Section 3.11 - Total Dose This section contains the results of the review of the methods for ensuring that the dose or dose commitment to any MEMBER OF THE PUBLIC due to the releases of radioactivity and to radiation from the plant and from other uranium fuel cycle sources is within the limits of the technical specification. It identifies and discusses discrepancies in the methods and, if possible, discusses suggested methods for eliminating the discrepancy. Usually the deficiency will be the omission of a description of the method or approach to be taken to consider the direct radiation component to the total dose. Other deficiencies may be identified in the conclusion section of the supplement.

The technical specification containing the requirement for including in the ODCM the methodology for ensuring that the dose is within the limits is identified, and the section of the ODCM containing the required methodology is also identified.

A final statement must be included expressing the opinion of the reviewer as to whether or not the method will provide reasonable assurance of meeting the reporting requirement of the technical specification.

3.9.3.12 Preparation of Supplement 1, Section 3.12 - Radiological Environmental Monitoring Program This section contains the results of the review of the radiological environmental monitoring program described in the ODCM. It must include a statement that the distance and direction sector for each and every sample identified in the technical specification is included in the ODCM. If the information is not included, then the specific sample must be identified as a discrepancy. A statement must be included concerning the adequacy and legibility of the maps showing locations of the environmental samples. A discussion should be included concerning the locations of the samplers with respect to meeting the intent of an environmental monitoring program.

The technical specification containing the requirement for including in the ODCM this information on the radiological environmental monitoring program and the section of the ODCM containing the required methodology is also identified.

3.9.3.13 Preparation of Supplement 1, Section 3.13 - Summary This section contains the expressed opinion of the reviewer concerning whether or not the methods in the ODCM are within the NRC guidelines. It also includes an opinion concerning whether the submittal or changes should be recommended for acceptance or whether another revision should be submitted to address the discrepancies or deficiencies identified in the review.

3.9.4 Preparation of Supplement 1, Section 4. - Conclusions

This is the concluding statement for the review. The initial paragraph should identify which version or what changes were reviewed and include an opinion concerning whether or not the version or changes should be recommended for acceptance or if another revision should be submitted to address the deficiencies. Following the initial paragraph is a listing of all the major and other discrepancies and a list of recommended changes that are not deficiencies but would improve either the ODCM or the technical specifications. Each listed discrepancy must identify its location in the ODCM and, if necessary, its associated technical

specification. Each listed discrepancy should be a stand alone description for ease of transmitting the discrepancy from the NRC to the Licensee.

3.9.5 Preparation of Supplement 1, Section 5. - References

This section identifies all references made in Supplement 1.

3.10 Preparation of TER Appendix E - Tables of RETS-Required Report Commitments

This section should contain a table of the Licensee's RETS-required report commitments in the format of the tables in Appendix E of this report. Since each Licensee's RETS are different, the commitments shown in the example (i.e., Appendix E of this report) were prepared from NUREG-0473. The table in Appendix E of the review TER should follow the subject order shown in Appendix E of this report, even though the order in the Licensee's RETS may be significantly different.

Entries should generally be in the exact wording of the Licensee's RETS. (This will prevent any misunderstanding of the meaning of the report requirements arising from rewording by the reviewer.) If a report commitment recommended in NUREG-0473 is not included in the Licensee's RETS, the item should still be included in Appendix E of the review TER, and "None" should be entered under "Report Commitments." If a subject is reported in a report other than that recommended in NUREG-0473, a notation should be made in the place where the commitment would be recorded in RETS which follow NUREG-0473, and the commitment recorded in the Table E section where the Licensee commits to report the information (e.g., for Licensees reporting doses calculated from effluents in the annual report, a notation would be made in the routine report commitments section of the semiannual report table and the actual report commitment recorded in the annual report section).

3.11 Preparation of TER Appendix F - Checklist of RETS-Required Reports

Appendix F of the review TER contains a checklist of the form shown in Appendix F of this report. It should be filled out and used to ensure that the Licensee's reports are checked for all items that are required to be reported. The checklist is nearly self-explanatory. However since there are no word-by-word instructions as to the exact requirements for some of the items to be reported, a degree of judgement on the part of the reviewer is required on many items.

Footnotes to the tables of the checklist should be used to discuss any entries that are shown as "Partial" or "Not Addressed" unless the "Not Applicable/Not Required" column is also checked. Items with "Partial" or "Not Addressed" checked, but without a "Not Applicable/Not Required" entry should be discussed in Section 2.7 of the text of the review document as well as in the footnotes.

3.12 Required Expertise of Personnel Reviewing and Evaluating RETS-Required Reports

Persons reviewing Licensee's reports and preparing the review TERs must have a working knowledge of a fairly wide range of subjects associated with nuclear power plants and radioactive materials. Some areas of familiarity are listed below:

- Nuclear power plants and their subsystems, especially radwaste treatment and effluent release systems
- Sources of radioactive materials within the power plant
- Pathways by which radioactive materials can reach the environment

- Treatment normally given plant liquids and gases before release to the environment
- Radionuclides most likely to be released to the environment
- Sampling and radiation monitoring
- Pathways of various radionuclides through the environment to MEMBERS OF THE PUBLIC
- Ability to evaluate what is reasonable in terms of radioactivities released in liquids and gases, and shipped offsite in solid wastes
- RETS guidance documents

In addition, the reviewer should have the ability to understand reports that are not particularly well written, find topics and information in reports that are not particularly well structured, and write coherent and accurate reports.

4. SUMMARY

The Nuclear Regulatory Commission (NRC) staff has prepared model radioactive effluent technical specifications (model RETS) dealing with the release of radioactive effluents, shipment of solid radioactive waste offsite, calculated offsite radiation doses, and monitoring of radioactive materials in the plant environs. The model RETS consolidates the recommendations of various earlier guides, either by restating their requirements or, referring to them for detailed guidance. Licensees' technical specifications meeting the intent of the model RETS are considered by the NRC staff to satisfy the requirements of Federal regulations for reporting radioactive effluents and solid waste shipments and or maintaining releases of radioactive effluents as low as is reasonably achievable (ALARA).

The first sections of this report give detailed guidance as to what the reports required by the model RETS should contain. Licensees whose technical specifications meet the intent of the model RETS are expected to submit reports whose contents can be evaluated by comparison with the detailed description of report contents given here.

The letter part of this report contains detailed guidance for preparation of a technical evaluation report (TER) evaluating a Licensee's compliance with plant specific technical specifications meeting the intent of the model RETS. It contains, for each category listed earlier in the report, insights for the reviewer(s) concerning what information to look for, where to look for it, and how to evaluate the information and data found. The format of the proposed TER is described in detail by giving section headings, brief descriptions of the information to be included under each heading, and examples of all proposed figures and tables.

5. BIBLIOGRAPHY

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2. U.S. Nuclear Regulatory Commission, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," USNRC Report NUREG-0133, Washington, D.C. 20555, October 1978.
3. U.S. Nuclear Regulatory Commission, "Methods for Demonstrating Compliance with the EPA Uranium Fuel Cycle Standard (40 CFR Part 190)," USNRC Report NUREG-0543, Washington, D. B. 20555, February 1980.
4. U.S. Nuclear Regulatory Commission, "Lower Limit of Detection: Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements," USNRC Report NUREG/CR-4007, Washington, D.C. 20555, September 1984.
5. Title 10, "Energy, Chapter I, Code of Federal Regulations; Part 20, U.S. Government Printing Office, Washington, D.C. 20402, January 1981.
6. Title 10, "Energy," Chapter I, Code of Federal Regulations; Part 50, U.S. Government Printing Office, Washington, D.C. 20402, January 1981.
7. Title 10, "Energy," Chapter I, Code of Federal Regulations; Part 61, U.S. Government Printing Office, Washington, D.C. 20402, December 1982.

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9. Title 40, "Protection of Environment," Chapter I, Code of Federal Regulations, Part 141, U.S. Government Printing Office, Washington, D.C. 20402, July 1, 1984.
10. Title 40, "Protection of Environment," Chapter I, Code of Federal Regulations, Part 190, U.S. Government Printing Office, Washington, D.C. 20402, July 1, 1984.
11. Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," Revision 1, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, June 1974.
12. Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, October 1977.
13. Regulatory Guide 4.1, "Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants," Revision 1, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, April 1975.
14. Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment," Revision 1, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, February 1979.

15. Regulatory Guide 4.8, "Environmental Technical Specifications for Nuclear Power Plants," U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, December 1975.
16. Radiological Assessment Branch Technical Position, "An Acceptable Radiological Environmental Monitoring Program," Revision 1, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, November 1979.
17. U.S. Nuclear Regulatory Commission, "Licensed Operating Reactors," USNRC Report NUREG-0020, Washington, D.C. 20555, (month) (year).
18. U.S. Nuclear Regulatory Commission, "NRC TLD Direct Radiation Monitoring Network," USNRC Report NUREG-0837, Washington, D.C. 20555, (month 1-month 2) (year).
19. "Nucleonics Week," published weekly, McGraw-Hill Inc., 1221 Ave of the Americas, NY, NY 10020.
20. Technical specifications for (plant name) Appendix A to Licensee No. (licensee number of plant), through amendment No. (number of latest amendment), (date of amendment).
21. "Semiannual Radioactive Effluent Release Report", January 1 through June 30, (year), (utility name), (date submitted), available in NRC Public Document Room).
22. "Semiannual Radioactive Effluent Release Report", July 1 through December 31, (year), (utility name), (date submitted), (available in NRC Public Document Room).
23. "Annual Radiological Environmental Operating Report for (calendar year)," (plant), (utility name), (date submitted), (available in NRC Public Document Room).

APPENDIX A

Plant and Site Design Features

Figure A-1 (Area Map) - Cooper Nuclear Station

Figure A-2 (Facilities Map) - Duane Arnold Energy Center

Figure A-3 (Liquid Radwaste System) - LaSalle County Station

Figure A-4 (Gaseous Radwaste System) - Monticello Nuclear Generating Plant

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The following figures are examples taken from the Licensee's various documents and are used in the reviewers technical **evaluation** TER.

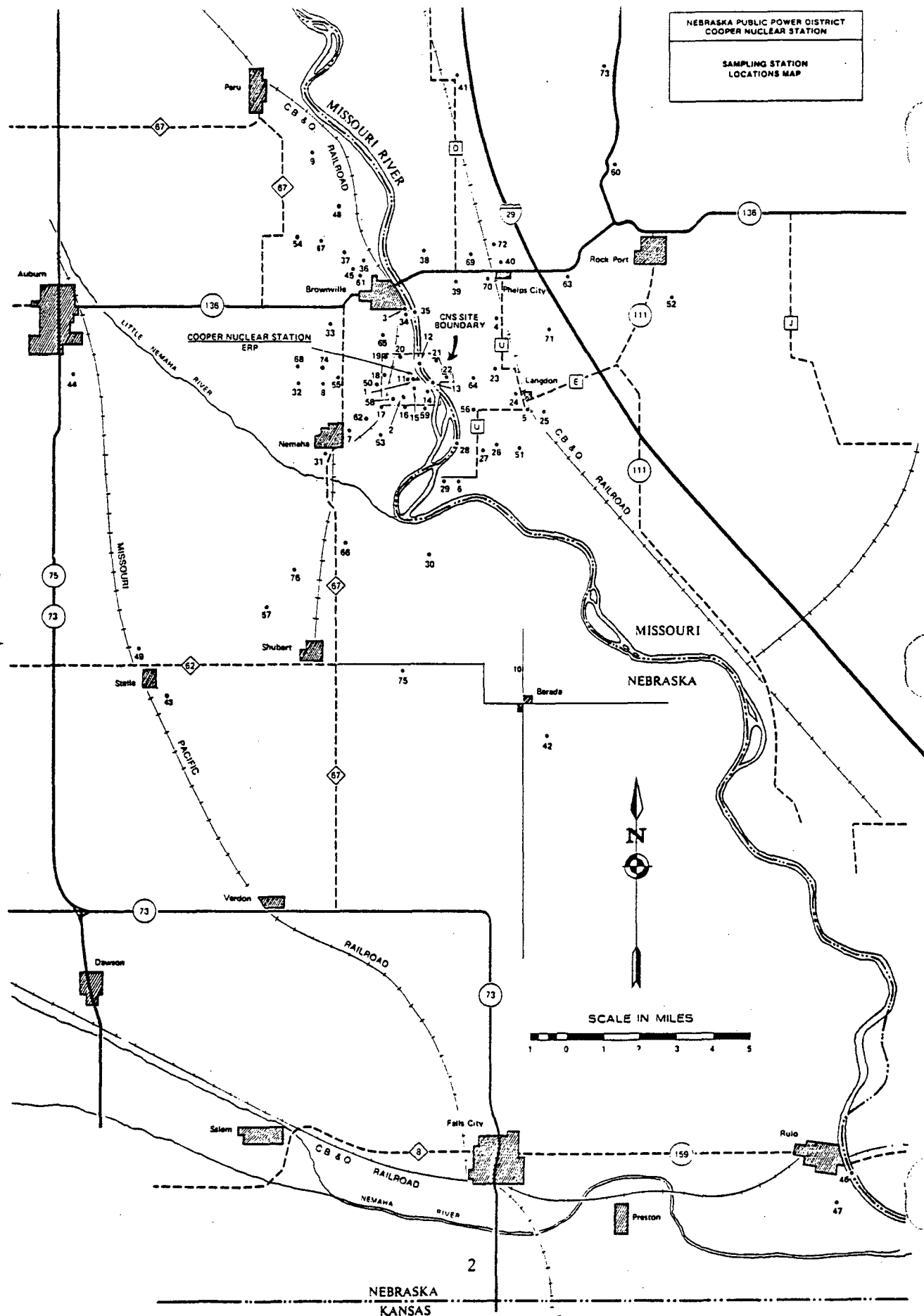
Figure A-1 shows the general area of Cooper Nuclear Station which is in Brownsville, NB 7 1/2 miles east of Auburn, NB and is located on the west bank of the Missouri River.

Figure A-2 is a map of the Duane Arnold facilities arrangement, showing the plant road system and the off-gas elevated stack. Missing from this map but shown on two other Duane Arnold figures are the property boundary, liquid effluent and water intake courses, and "boundary for gaseous and liquid effluents."

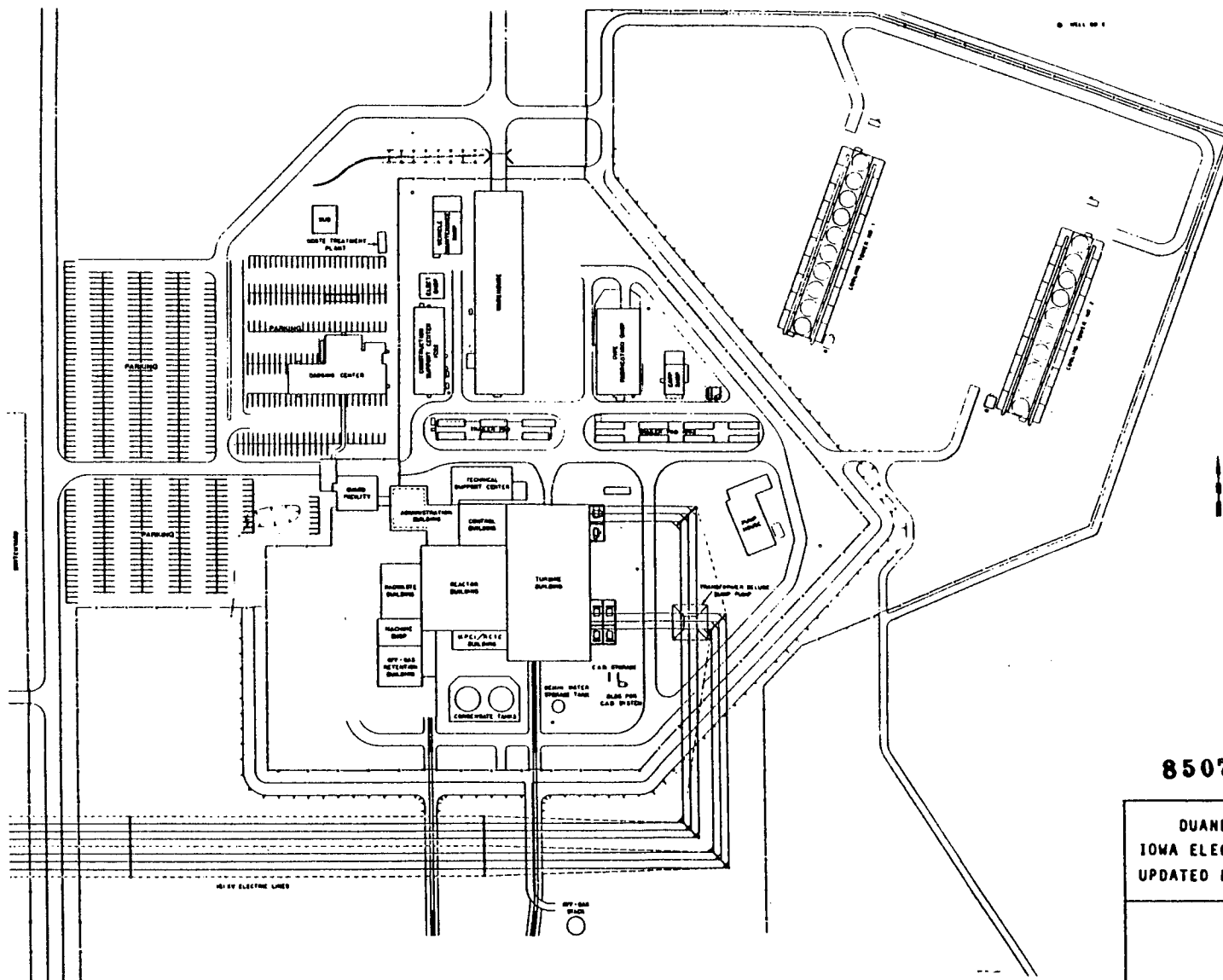
Figure A-3 is a simplified schematic block diagram of the liquid radwaste processing at La Salle County Station, and was taken from Revision II of their ODCM (November, 1985). Another La Salle diagram from their ODCM (not included here) shows the radioactive liquid effluent discharge to the Illinois River, and also shows a cooling pond. There is no indication on either diagram of effluent flow rates.

Figure A-4 shows the Monticello Nuclear Generating Plant Gaseous Radwaste Treatment System. This schematic diagram was taken from the Monticello ODCM Revision 5, dated November 1, 1985. The height of the elevated-release plant stack is not given in this diagram, but is provided in another figure taken from the Licensee's RETS.

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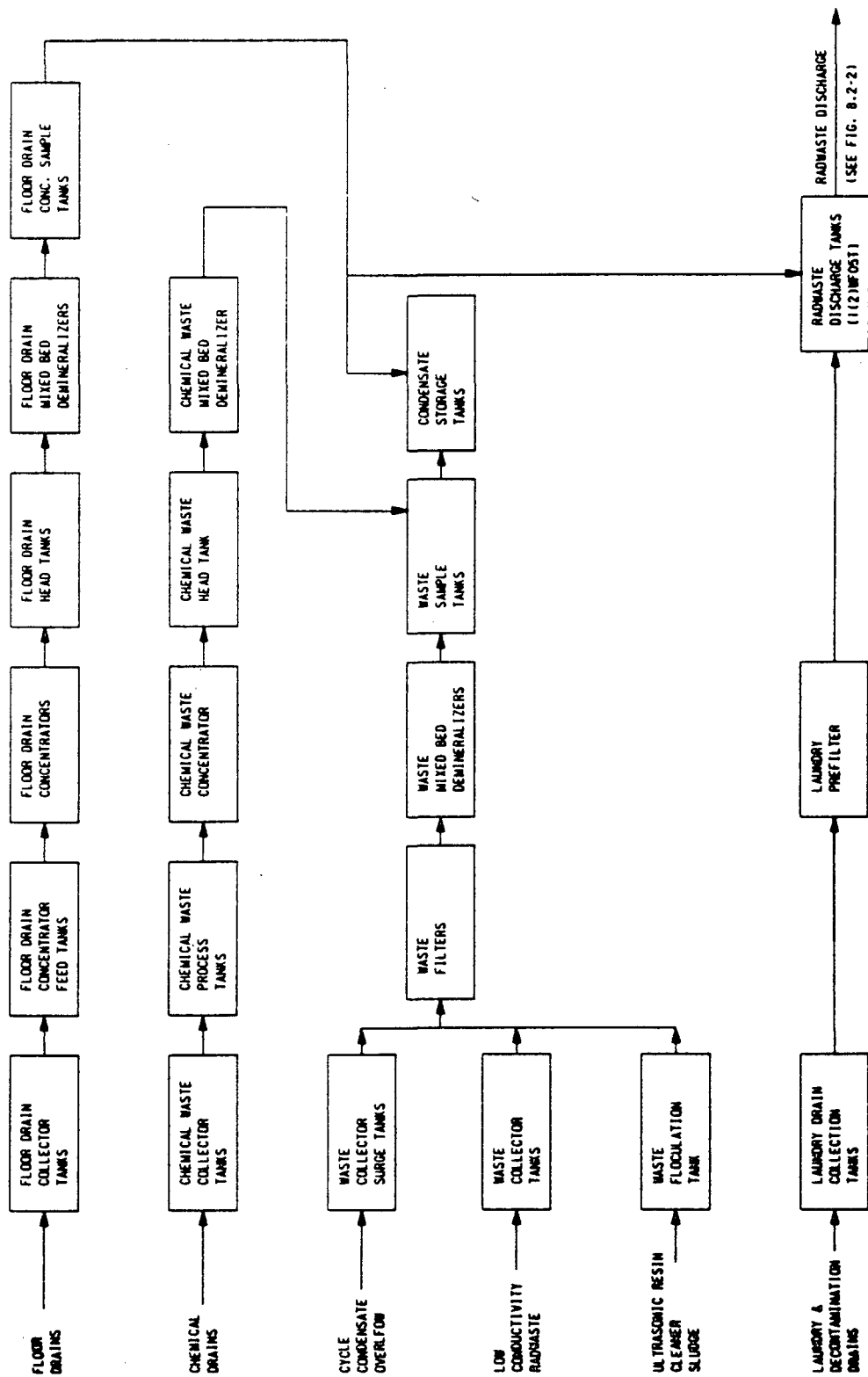
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DUANE ARNOLD ENERGY CENTER
IOWA ELECTRIC LIGHT & POWER COMPANY
UPDATED FINAL SAFETY ANALYSIS REPORT

DAEC Facilities Plan
Figure 1.2-2

Revision 3 - 6/85

Figure A-2. Duane Arnold Energy Center Facilities Map. Figure Reproduced from Licensee's Updated Final Safety Analysis Report.



LA SALLE COUNTY STATION

Figure A-3. Simplified Liquid Radwaste Processing Diagram. (Taken from Licensee's ODCM, Revision 11, November 1985.)

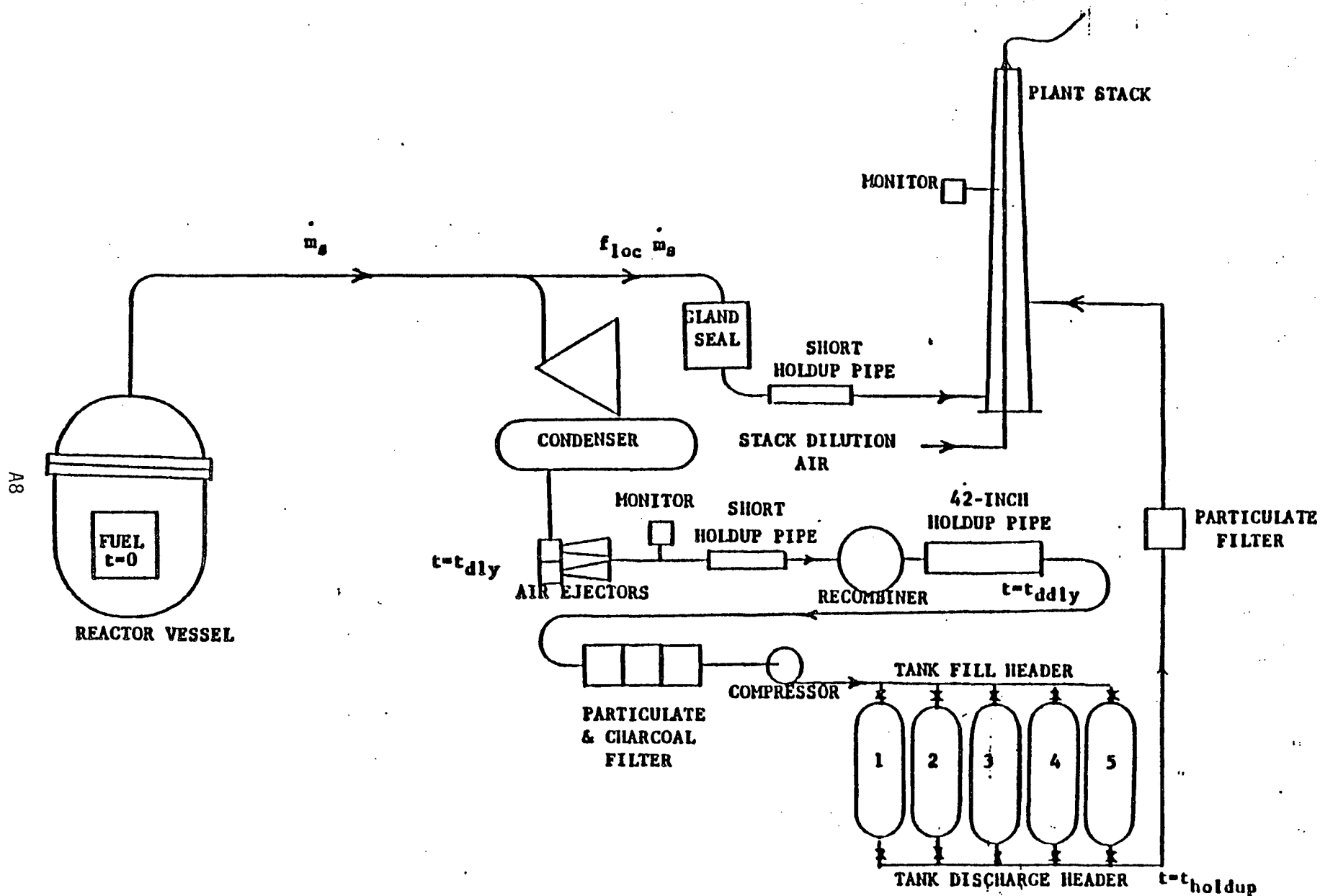


Figure A-4. Monticello Nuclear Generating Plant Gaseous Radwaste Treatment System.
(from Appendix D of the Monticello plant's Off-site Dose Calculation Manual
as revised through Rev. 5, dated November 1, 1985).

APPENDIX B

Summary of Effluent Releases and Dose Calculations

(Liquid Effluents, Gaseous Effluents and Dose)
(Dresden Nuclear Power Station, Units 2 and 3)

(Solid Waste and Irradiated Fuel Shipments)
(Edwin I. Hatch Nuclear Plant, Units 1 and 2)

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The following tables are examples of effluent tables for liquids, gases, solid waste, and dose tables that are assembled from data in the Licensee's semiannual reports.

TABLE B-6. 1984 RADIOACTIVE GASEOUS EFFLUENT RELEASE DATA FOR DRESDEN NUCLEAR POWER STATION UNITS 2 AND 3
(Taken from the Licensee's 1984 Semiannual Effluent Release Reports)

													Total Releases			
		Unit	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Annual	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Annual	Annual (All Releases)	Dominant Isotopes		
			Batch Releases					Continuous Releases						Isotope	Ci	%
A. Radioactivity Releases																
1. Noble Gases (Total)	Ci		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E+01	9.94E+01	9.00E+02	7.58E+02	1.81E+03	1.81E+03	Xe-135	1.25E+03	69.3
(Elevated)	Ci		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.14E+01	9.89E+01	9.00E+02	7.58E+02	1.81E+03	1.81E+03	Xe-133	2.83E+02	15.6
(Ground Level)	Ci		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E+00	5.05E-01	0.00E+00	0.00E+00	1.66E+00	1.66E+00	Kr-88	1.69E+02	9.4
														Kr-85m	6.56E+01	3.6
														Total	1.77E+03	97.9
2. Iodines (Total)	Ci		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-01	1.31E-01	2.06E-01	1.47E-01	5.91E-01	5.91E-01	I-135	3.48E-01	58.9
(Elevated)	Ci		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.01E-01	1.24E-01	1.77E-01	1.11E-01	5.12E-01	5.12E-01	I-133	2.10E-01	35.6
(Ground Level)	Ci		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.12E-03	7.60E-03	2.90E-02	3.68E-02	7.85E-02	7.85E-02	I-131	3.27E-02	5.5
														Total	5.91E-01	100.0
3. Particulates (Total)	Ci		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.62E-02	2.07E-02	2.75E-02	2.27E-02	9.71E-02	9.71E-02	Co-60	3.73E-02	38.5
(Elevated)	Ci		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.82E-02	9.36E-03	1.58E-02	1.16E-02	5.50E-02	5.50E-02	Ba-140	3.36E-02	34.6
(Ground Level)	Ci		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.97E-03	1.13E-02	1.17E-02	1.11E-02	4.21E-02	4.21E-02	Sr-89	7.99E-03	8.2
														I-131	4.97E-03	5.1
														Cr-51	4.65E-03	4.8
														Total	8.86E-02	91.3
													All Releases			
4. Tritium (Total)	Ci							2.16E+01	3.61E+00	1.77E+01	3.85E+01	8.15E+01	8.15E+01			
B. Average Rate of Releases																
1. Noble Gases	uCi/s							6.68E+00	1.26E+01	1.13E+02	9.53E+01	5.70E+01	5.70E+01			
2. Iodine-131	uCi/s							5.27E-04	6.45E-04	1.86E-03	1.09E-03	1.03E-03	1.03E-03			
3. Particulates	uCi/s							3.33E-03	2.63E-03	3.50E-03	2.89E-03	3.09E-03	3.09E-03			
4. Tritium	uCi/s							2.75E+00	4.59E-01	2.23E+00	4.85E+00	2.57E+00	2.57E+00			
C. Length and Frequency of Batch Releases																
1. Number of Releases	No.		0	0	0	0	0									0
2. Length of Releases	Min.		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00									0.00E+00
D. Abnormal Releases																
1. Number of Releases	No.							0	0	0	0	0	0			
2. Activity Released	Ci							0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00			

TABLE B-23. 1985 SOLID WASTE AND IRRADIATED FUEL SHIPMENTS FOR EDWIN J. HATCH NUCLEAR PLANT, UNITS 1 AND 2
(Taken from Licensee's 1985 Semiannual Radioactive Effluent Release Reports)

	FIRST SIX MONTHS				SECOND SIX MONTHS				ANNUAL TOTAL	
	Waste Volume (cu. m)	Activity (Ci)	Major Nuclei Composition		Waste Volume (cu. m)	Activity (Ci)	Major Nuclei Composition		Waste Volume (cu. m)	Activity (Ci)
1. Kind of Waste										
a. Spent Resins, Filter Sludges, Evaporator Bottoms, etc.	232	513	Zn-65	41.6%	253	1320	Zn-65	42.7%	485	1833
			Cs-137	18.7%			Cr-51	21.9%		
			Cs-134	14.2%			Co-60	12.5%		
			Other	25.4%			Other	22.9%		
			Total	99.9%			Total	100.0%		
b. Dry Compressible Waste, Contaminated Equipment, etc.	582	11.3	Co-60	40.0%	784	14.8	Co-60	42.1%	1366	26.1
			Zn-65	37.2%			Zn-65	26.1%		
			Cs-137	11.3%			Cs-137	12.9%		
			Other	11.5%			Other	18.9%		
			Total	100.0%			Total	100.0%		
c. Irradiated Components, Control Rods, etc.	2.23	2.85	Co-60	47.1%	1.48	7970	Co-60	52.5%	3.71	7972.85
			Fe-55	44.1%			Fe-55	41.8%		
			Mn-54	4.2%			Mn-54	2.9%		
			Other	4.6%			Other	2.8%		
			Total	100.0%			Total	100.0%		
d. Other	83.7	0.518	Co-60	55.1%	103	3.29	Co-60	65.0%	186.7	3.808
			Zn-65	32.5%			Zn-65	25.1%		
			Cs-137	4.4%			Mi-63	3.7%		
			Total	92.0%			Total	94.6%		
2. Solid Waste Disposition										
	Shipping Destination	Mode of Transportation	Number of Shipments		Shipping Destination	Mode of Transportation	Number of Shipments		Shipping Destination	Number of Shipments
	Barnwell, SC	Cask	46		Barnwell, SC	Cask	47		Barnwell, SC	120
	Hanford, WA	Van	29		Hanford, WA	Van	27		Hanford, WA	34
						Van	5			
3. Type of Packaging Used for Shipment	Not Identified				LSA					
4. Solidification Agent	Not Identified				Not Identified					
5. Irradiated Fuel	None				None					

TABLE B-8. 1984 SUMMARY OF MAXIMUM INDIVIDUAL DOSES FOR DRESDEN STATION, UNITS 2 AND 3
(Taken from Licensee's 1984 Radioactive Waste and Environmental Monitoring Annual Report)

	Liquid Effluent Doses		Gaseous Effluent Doses			Direct Radiation
	Liquid, Whole Body	Liquid, Organ	Gamma Air	Beta Air	Iodines, Particulates, and Tritium - Organ	Total Body
Annual Dose	0.000463 arem (Adult-Total Body)	0.000563 arem (Adult-Liver)	0.0404 arad	0.0127 arad	0.968 arem (Infant-Thyroid)	No Plant Effect
Annual Limit (10 CFR 50, Appendix I)	6 arem	20 arem	20 arad	40 arad	30 arem	---
% of Annual Limit	0.008	0.003	0.2	0.03	3.2	---
Maximum Offsite Dose						
Sector	a	a	NE	NNE	NNE	
Distance (mi)	a	a	a	a	Dairy Farm (Not Stated)	
Pathways	a	a	N/A	N/A	Grass-Cow-Milk	
Total Dose	Numerical values were not reported by the Licensee. If there are no uranium fuel cycle facilities in the vicinity of the Plant and the direct radiation exposure due to the Plant is negligible, the total body or organ dose to the maximum exposed individual was less than the sum of the numerical values of the whole body, organ, and air doses given on the first line of this table (i.e., less than 1.022 arem, or 4.1% of the total body and 1.4% of the organ (thyroid) dose limits of 40 CFR 190 (25 arem total body and 75 arem thyroid).					

a. Not reported.						

APPENDIX C

Radiological Environmental Monitoring Program Results

(Edwin I. Hatch Nuclear Plant Units 1 and 2)

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The following figures are taken from the various licensee's documents and reports, and the tables are constructed from the Licensee's annual environmental report, and are part of the reviewers technical evaluation TER.

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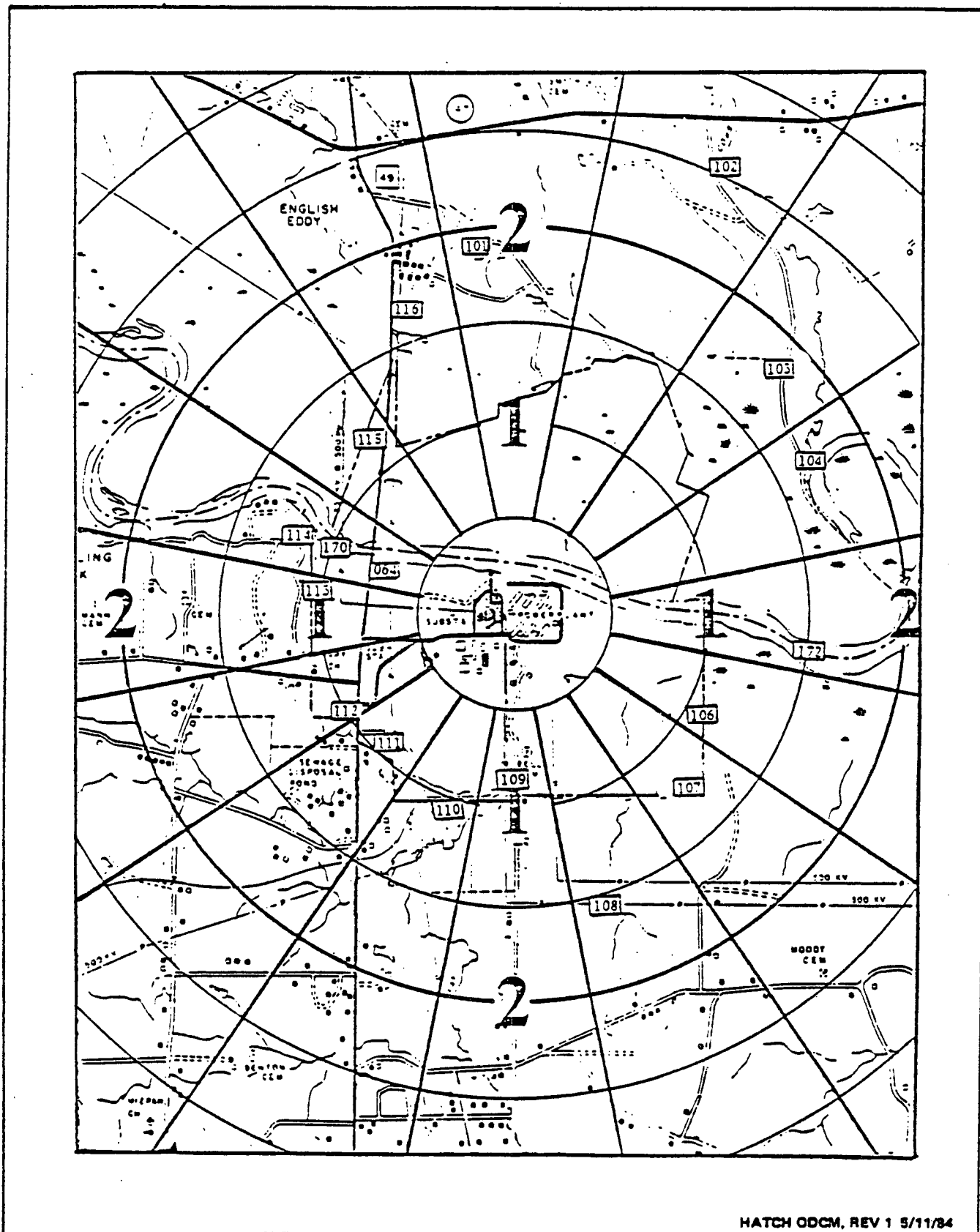
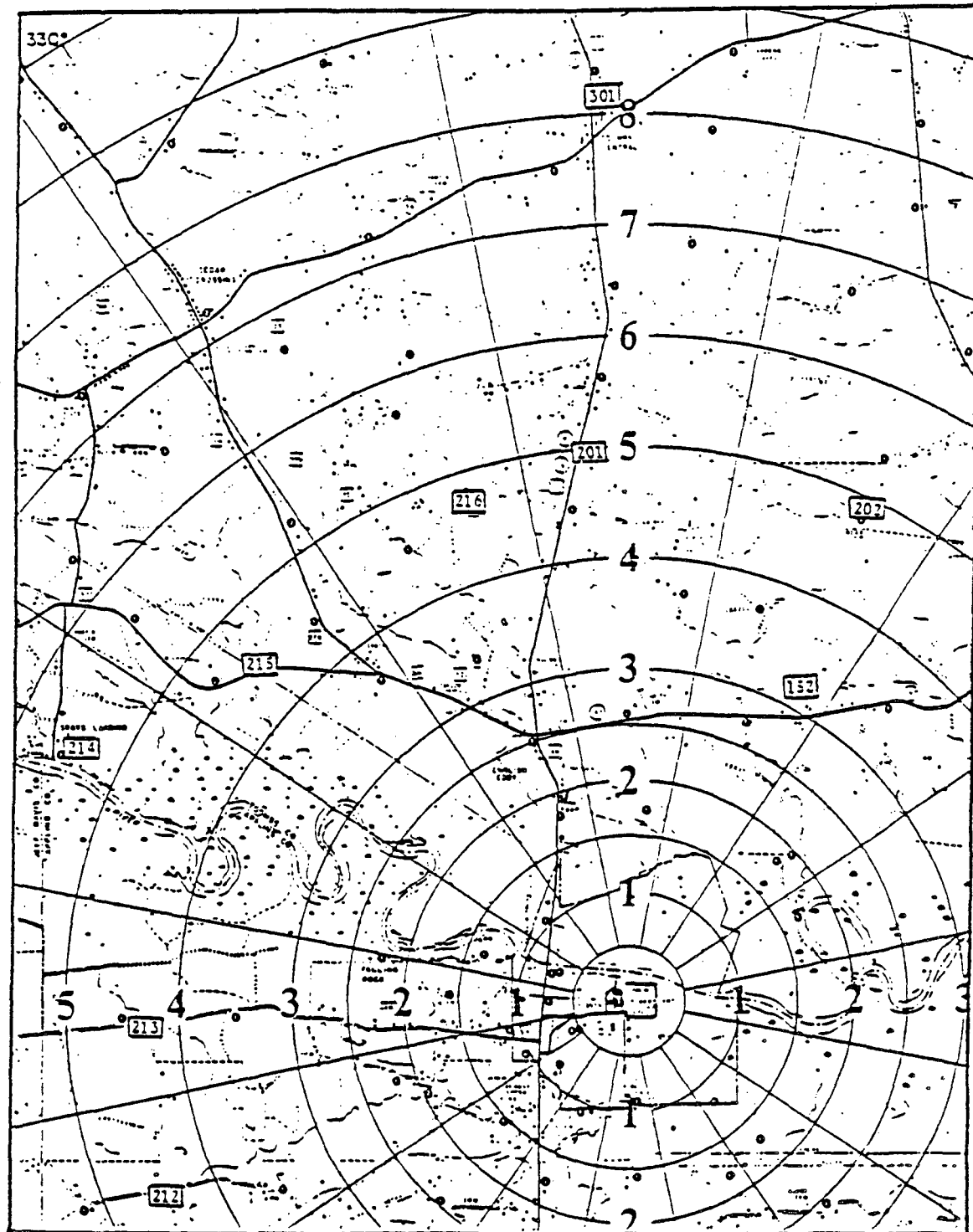


Figure C-1. Edwin I. Hatch Plant Radiological Environmental Sampling Locations - Site Periphery. (Figure reproduced from the Hatch Offsite Dose Calculation Manual, Revision 1, May 11, 1984.)



HATCH ODCM, REV 1 5/11/84

Figure C-2. Edwin I. Hatch Plant Radiological Environmental Sampling Locations - Beyond Site Vicinity (North). (Figure reproduced from the Hatch Offsite Dose Calculation Manual, Revision 1, May 11, 1984.)

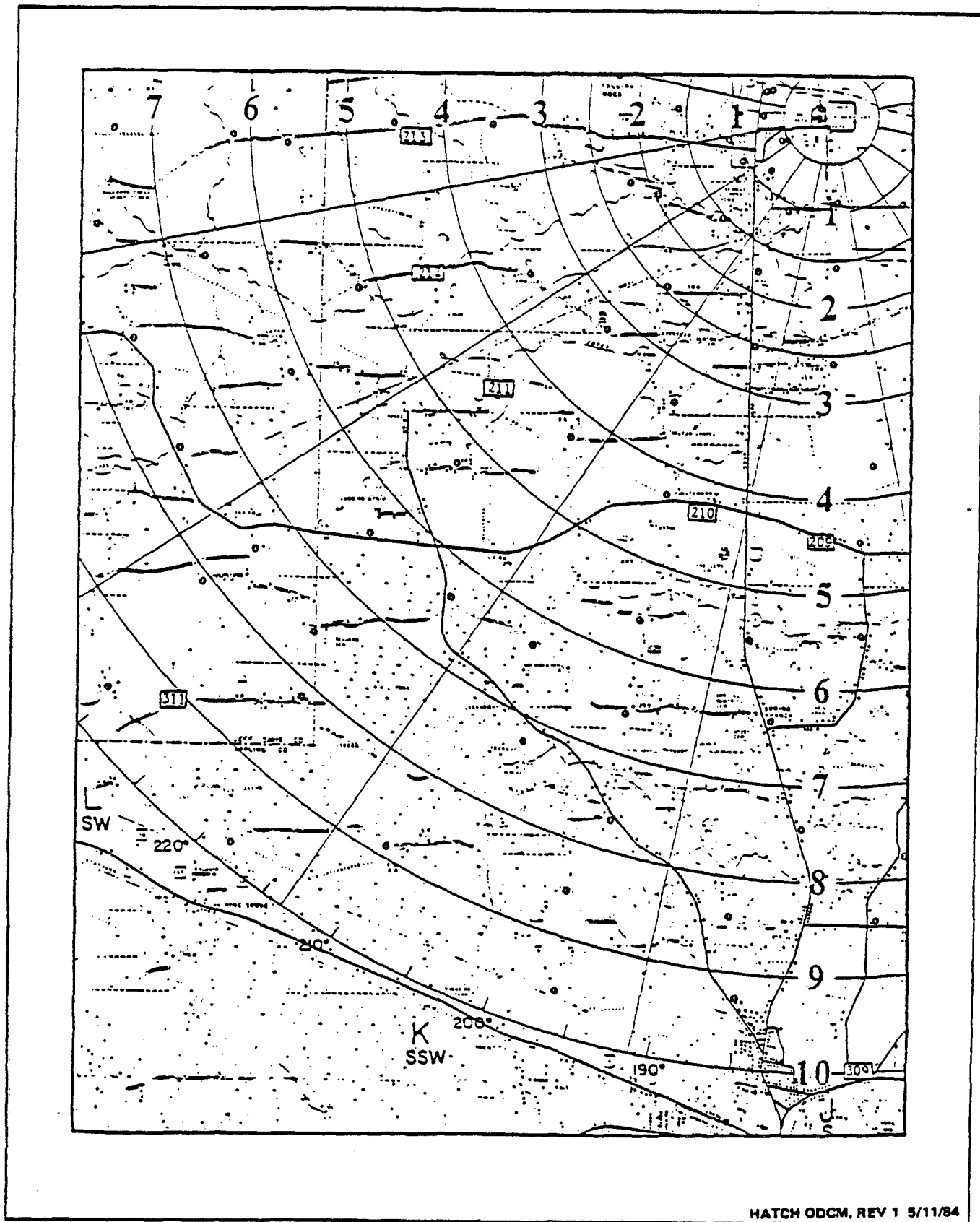
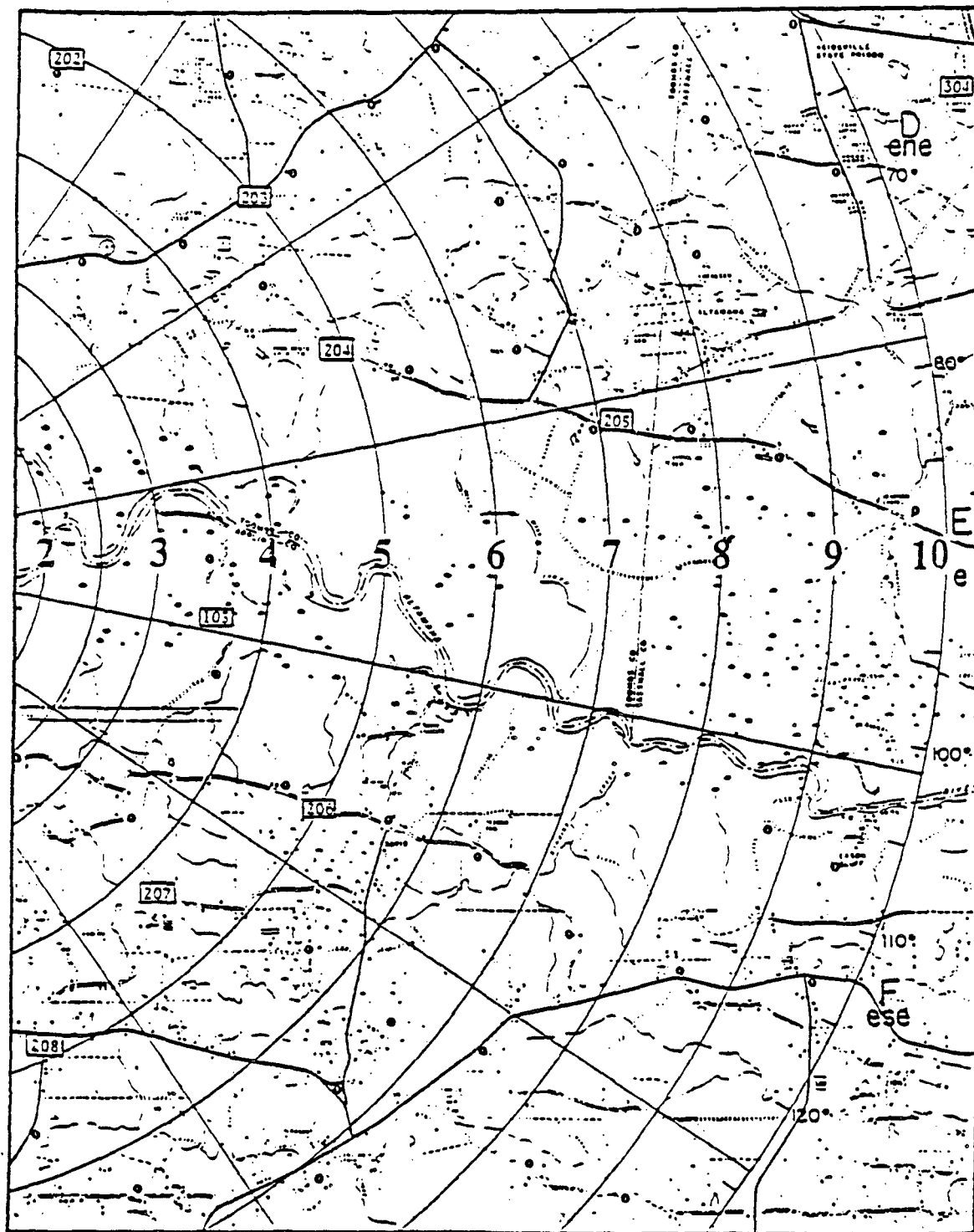


Figure C-3. Edwin I. Hatch Plant Radiological Environmental Sampling Location Map (Southwest). (Figure reproduced from the Hatch Offsite Dose Calculation Manual, Revision 1, May 11, 1984.)



HATCH ODCM, REV 1 5/11/84

Figure C-4. Edwin I. Hatch Plant Radiological Environmental Sampling Locations - Beyond Site Vicinity (East). (Figure reproduced from the Offsite Dose Calculation Manual, Revision 1, May 11, 1984.)

TABLE C-1. LICENSEE'S RADIOLOGICAL ENVIRONMENTAL MONITORING LOCATIONS

Location	Code(a,b)					
Before	Starting				Location	
Jun 28	Jun 28				Distance	Sector
1985	1985	Sample Type(s)	Description	Of Location	(mi.)	
15	064	TLD,	Roadside Park		0.8	WNW
19	101	TLD	Inner Ring		1.9	N
26	102	TLD	Inner Ring		2.5	NNE
9	103	TLD, Airborne	Inner Ring		1.8	NE
27	104	TLD	Inner Ring		1.6	ENE
105	105	TLD	Inner Ring		3.6	E
119	106	TLD, Vegetation	Inner Ring		1.1	ESE
17	107	TLD, Airborne, Vegetation	Inner Ring		1.2	SE
13	108	TLD	Inner Ring		1.6	SSE
126	109	TLD	Inner Ring		0.9	S
14	110	TLD	Inner Ring		1.1	SSW
16	111	TLD	Inner Ring		0.9	SW
21	112	TLD, Airborne, Vegetation	Inner Ring		1.0	WSW
133	113	TLD	Inner Ring		1.1	W
2	114	TLD	Inner Ring		1.2	WNW
18	115	TLD	Inner Ring		1.1	NW
	116	TLD, Airborne	Inner Ring		1.6	NNW
	152	Milk	Williamson's		3.2	NNE
170	170(C)	River Water, Fish, Sediment	Upriver		0.8-1.1	WNW
171		Clams, Fish, Sediment	Discharge Area		0	
172	172	River Water, Fish, Sediment	Downriver		0.5-2.3	E
25	201	TLD	Outer Ring		5.0	N
28	202	TLD	Outer Ring		4.9	NNE
29	203	TLD	Outer Ring		5.0	NE
30	204	TLD	Outer Ring		4.9	ENE
205	205	TLD	Outer Ring		7.2	E
12	206	TLD	Outer Ring		5.0	ESE
11	207	TLD	Outer Ring		4.3	SE
10	208	TLD	Outer Ring		4.7	SSE
8	209	TLD	Outer Ring		4.4	S
7	210	TLD	Outer Ring		4.3	SSW
6	211	TLD	Outer Ring		4.5	SW

TABLE C-1. LICENSEE'S RADIOLOGICAL ENVIRONMENTAL MONITORING LOCATIONS (CONT)

Location Before Jun 28 1985	Code(a,b) Starting Jun 28 1985		Sample Type(s)	Description Of Location	Location	
					Distance (mi.)	Sector
4	212	TLD		Outer Ring	4.4	WSW
3	213	TLD		Outer Ring	4.3	W
23	214	TLD		Outer Ring	5.4	WNW
22	215	TLD		Outer Ring	4.5	NW
24	216	TLD		Outer Ring	4.8	NNW
31	301	TLD		Toombs Central.	8.2	N
1	304(C)	TLD, Airborne		State Prison	11.3	ENE
	304(C)	Milk		State Prison	10.8	ENE
5	309(C)	TLD, Airborne, Vegetation		Baxley Subst.	10.0	S
	311	Milk		Johnson Bros.	9.1	SW

- a. (C) indicates a control location, as identified in the text of the 1985 environmental monitoring report.
- b. Figures C-1 through C-4 show the new sampling location numbers, (effective June 28, 1985.) The following are the significant changes from the monitoring program reported for 1984: The movement of the grass (vegetation) sample control location from new location 304 (11.3 mi ENE) to new location 309 (10.0 mi S). The movement of grass sampling station at new location 107 to new location 106; and the airborne sample station at new location 064 to new location 116 (outside the site boundary). (The sampling reported at old location 171 is not specifically required by the Technical Specifications effective June 28, 1985.)
- c. Station 170 is located at approximately 0.8 miles for river water, 1.1 miles for sediment and clams, and 0.9 miles for fish. Station 172 is located at approximately 2.3 miles for river water, 0.5 miles for sediment and clams, and 1.7 miles for fish.

TABLE C-2. RESULT OF ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM OF EDWIN I. HATCH NUCLEAR PLANT UNITS 1 AND 2 FOR 1984

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analy- ses Performed	Lower Limit of Detection (LLD) ^a	Indicator Locations	Location with Highest Annual Mean		Control Locations	No. of NR Rptd Measurements ^d
			Mean ^b (Frac.) ^c Range ^b	Name: Distance (Direction)	Mean ^b (Frac.) ^c Range ^b	Mean ^b (Frac.) ^c Range ^b	
1. DIRECTION RADIATION (TLD Measurements)							
On Site (mrem/13 weeks)	Gamma Dose 18	---	13.3 (14/14) 10.3-17.7	#133: 1.1 mi (W)	17.6 (2/2) 17.5-17.7	12.9 (4/4) 12.1-13.7	---
Site Boundary (mrem/13 weeks)	Gamma Dose 32	---	12.8 (32/32) 10.3-17.7	#14: 1.1 mi (SSW)	15.2 (2/2) 15.3-15.7	See above	---
4.5 Mile Radius (mrem/13 weeks)	Gamma Dose 29	---	11.9 (29/29) 9.4-16.4	#29: 5.0 mi (NE)	16.4 (1/1) 16.4-16.4	See above	---
2. AIRBORNE							
Particulates (pCi/m ³)	Gross Beta 304	Not Reported	.026 (200/200) .008-.053	#9, Dead River Road: 1.8 mi (NE)	.028 (51/51) .011-.053	.028 (104/104) .005-.128	---
	Gamma Spec 24 Be-7	Approx. 0.0005	0.0558 (16/16) 0.0376-0.0891	Not Reported	---	0.0623 (818) 0.0472-0.0755	0
	K-40	Approx. 0.0005	None detected	Not Reported	---	0.0065 (218) 0.0049-0.0080	0
	Mn-54	Approx. 0.0005	None detected	Not Reported	---	1.1 (1/8) 0.0011-0.0011	0
	Co-60	Approx. 0.0005	0.0010 (3/16) 0.0005-0.0017	Not Reported	---	0.0065 (1/8) 0.0065-0.0065	0
	Zn-65	Approx. 0.0005	0.0022 (1/16) 0.0022-0.0022	Not Reported	---	0.0072 (1/8) 0.0072-0.0072	0
	Zr-95	Approx. 0.0005	0.0008 (1/16) 0.0008-0.0008	Not Reported	---	None detected	0
	Nb-95	Approx. 0.0005	0.0015 (1/16) 0.0015-0.0015	Not Reported	---	None detected	0

TABLE C-2. RESULT OF ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM OF EDWIN I. HATCH NUCLEAR PLANT UNITS 1 AND 2 FOR 1984 (Cont.)

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analy- ses Performed	Lower Limit of Detection (LLD) ^a	Indicator Locations	Location with Highest Annual Mean		Control Locations	No. of NR Rptd Measurements ^d
			Mean ^b (Frac.) ^c Range ^b	Name: Distance (Direction)	Mean ^b (Frac.) ^c Range ^b	Mean ^b (Frac.) ^c Range ^b	
Iodine (pCi/m ³)	I-131 Approx. 304	≤ 0.050	None detected	---	---	None detected	0
3. WATERBORNE							
River Water (pCi/L)	Gamma Spec 24 K-40	Generally 50-100	None detected	#170, upstream: 1 mi (upstream)	0.063 (1/12) 0.063-0.0633	0.063 (1/12) 0.063-0.063	0
	Tritium h ^e	Not reported	437 (3/3) 370-470	#172, downstream: 2 mi (downstream)	437 (3/3) 370-470	327 (3/3) 210-500	0
Sediment	Gamma Spec 5						
	Be-7	Not reported (0.8 required)	0.617 (3/3) 0.20-1.35	#172, Downstream: 2 mi (downstream)	0.825 (2/2) 0.30-1.35	0.775 (2/2) 0.30-1.25	0
	K-40	Same as above	8.20 (3/3) 4.18-10.70	Same as above	10.21 (2/2) 9.72-10.7	6.86 (2/2) 5.78-7.93	0
	Cs-134	Same as above	0.130 (3/3) 0.02-0.22	Same as above	0.185 (2/2) 0.15-0.22	0.04 (2/2) 0.03-0.05	0
	Cs-137	Same as above	0.34 (3/3) 0.02-0.73	Same as above	0.50 (2/2) 0.27-0.73	0.26 (2/2) 0.03-0.49	0
	Ra-226	Same as above	2.16 (3/3) 0.40-3.06	Same as above	3.04 (2/2) 3.03-3.06	1.50 (2/2) 0.77-3.23	0
	Th-228	Same as above	1.31 (3/3) 0.14-1.93	Same as above	1.90 (2/2) 1.87-1.93	1.43 (2/2) 1.18-1.68	0
4. INGESTION							
Milk (pCi/L)	Iodine-131 71	Not reported (0.8 required)	None detected	---	---	None detected	0
	Gamma Spec 71 CS-137	Usually 0.7 (15 required)	9.8 (15/45) 7.3-13.8	State Prison: 10.8 mi (ENE)	10.2 92/26) 7.6-12.8	10.2 (2/26) 7.6-12.8	0
	K-40	Not reported	--- (71/71) 749-1730	Not reported	Not reported	Included with Indicator Locations	0

TABLE C-2. RESULT OF ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM OF EDWIN I. HATCH NUCLEAR PLANT UNITS 1 AND 2 FOR 1984 (Cont.)

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analy- ses Performed	Lower Limit of Detection (LLD) ^a	Indicator	Location with Highest Annual Mean		Control	No. of NR Rptd Measurements ^d
			Locations	Location with Highest Annual Mean	Locations		
			Mean ^b (Frac.) ^c Range ^b	Name: Distance (Direction)	Mean ^b (Frac.) ^c Range ^b	Mean ^b (Frac.) ^c Range ^b	
4. INGESTION (Cont.)							
Grass (pCi/kg, wet)	Gamma Spec ^f 22 Cs-137	Not reported	149 (9/13) 8-682	#5, Bakley: 10.0 mi (S)	388 (9/9) 34-1380	388 (9/9) 34-380	0
	I-131 ^g	<44 (25 required) ^g	None detected	---	---	None detected	0
Clams-Fish (pCi/g, wet)	Gamma Spec 29 Cs-134	≤0.05	0.036 (1/2) 0.036-0.036	#171, Discharge Area: <1/2 mi (Discharge Area)	0.036 (1/4) 0.036-0.036	0.026 (1/15) 0.026-0.026	0
	Cs-137 29	Not reported (0.13 required)	0.041 (14/18) 0.037-0.144	#172, Downstream: 2 mi (Downstream)	0.084 (11/14) 0.037-0.144	0.053 (11/11) 0.037-0.088	0
	K-40 29	Not reported	Not rptd (29/29) 1.49-4.57	Not reported	---	Not reported	0
Fish (American Shad) (pCi/g, wet)	K-40 1	Not reported	3.39 (1/1) 3.39-3.39	Not reported	3.39 (1/1) 3.39-3.39	No control sample	0

a. LLD = Lower limit of detection as defined in the Licensee's technical specifications. LLDs shown as "required" are values the Licensee stated as being required by the technical specifications. The qualifiers, "approx.", "generally", and "usually" shown below are the Licensee's terminology.

b. Mean and range are based on detectable measurements only.

c. "Frac." = Ratio of number of analyses giving detectable measurements to total number of analyses. (Although not specifically stated by the Licensee it was assumed that all airborne particulate samples contained detectable gross beta activity.)

d. The Licensee defines the reporting level as the lowest concentration which would render all annual design objective dose of Appendix I to 10 CFR 50 to some individual when so exposed for a period of one year.

e. Monthly samples were apparently inadvertently analyzed instead of the quarterly composite sample, which accounts for the analyses of only 3 quarterly samples for each location.

f. The naturally occurring radionuclides Be-7, K-40, Pb-214, Bi-214, Tl-208, Pb-212, and Ac-228 were also detected in some of the samples. (Be-7 and K-40 were detected in all samples.)

g. No results of I-131 analyses were reported except for the discussion of failure to meet the LLDs required by the technical specifications due to the dry condition of the grasses.

TABLE C-3. RESULT OF ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM OF EDWIN I. HATCH NUCLEAR PLANT UNITS 1 AND 2 FOR 1985

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analy- ses Performed	Lower Limit of Detection (LLD) ^a	Indicator Locations	Location with Highest Annual Mean		Control Locations	No. of NR Rptd Measurements ^d
			Mean ^b (Frac.) ^c Range ^b	Name: Distance (Direction)	Mean ^b (Frac.) ^c Range ^b	Mean ^b (Frac.) ^c Range ^b	
1. DIRECTION RADIATION							
TLDs (mrem/91 days)	Gamma Dose 142	---	14.7 (---/---) 5.5-28.2	#133: 1.1 mi (W)	19.8 (4/4) 13.2-2.3	14.7 (4/4) 6.2-19.3	---
2. AIRBORNE							
Particulates (pCi/m ³)	Gross Beta 334	0.010	.022 (---/---) .007-.060	#064, Roadside Park: 0.8 mi (WNW)	.023 (26/26) .015-.046	.021 (---/---) .006-.055	0
	Gamma Spec [®] 26 Cs-137	0.060	0.733 (---/---) 0.733-0.733	#116, Inner Ring: 1.6 mi (NNW)	.733 (1/4) .733-.733	<LLD	0
Iodine (pCi/m ³)	I-131 334	0.070	<LLD	---	---	<LLD	0
3. WATERBORNE							
River Water (pCi/L)	Gamma Spec [®] 8 All Nuclides	20-60	<LLD	---	---	<LLD	0
	Tritium 8	3000	288 (---/---) 120-600	#172, down- river: 2.1 mi (W)	288 (4/4) 120-600	220 (---/---) 100-390	0
Sediment	Gamma Spec [®] 2 Cs-137	200	76.5 (---/---) 76.5-76.5	#170, Upriver: 1.2 mi (WNW)	269 (1/1) 269-269	269 (---/---) 269-269	0
4. INGESTION							
Milk (pCi/L)	Iodine-131 78	1	<LLD	---	---	<LLD	0
	Gamma Spec [®] 78 Cs-137	20	9.14 (---/---) 5.97-12.4	#152, Williamson's: 3.2 mi (NNE)	9.14 (5/26) 5.97-12.4	5.35 (---/---) 4.26-6.44	0

TABLE C-3. RESULT OF ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM OF EDWIN I. HATCH NUCLEAR PLANT UNITS 1 AND 2 FOR 1985 (Cont.)

Medium or Pathway (Frac.) ^c Sampled (Unit of Measurement)	Type and Total No. of Number of Analy- ses Performed	Lower Limit of Detection (LLD) ^a	Indicator Locations	Location with Highest Annual Mean		Control Locations	Mean ^b NR Rptd Measurements ^d
			Mean ^b (Frac.) ^c Range ^b	(Direction)	Name: Distance Range ^b	Mean ^b (Frac.) ^c Range ^b	
4. INGESTION (Cont.)							
Grass (pCi/kg, wet)	Gamma Spec ^e 78						
	Cs-134	60	12.0 (--/--) 12.0-12.0	#106 Inner Ring: 1.1 mi (ESE)	12.0 (1/25) 12.0-12.0	<LLD	0
	Cs-137	80	60.9 (--/--) 9.0-1.33	#309, Baxley: 10 mi. (S)	113.3 (11/12) 14-815	113.3 (--/--) 14-815	0
	I-131	60	30.3 (3/34) 27-35	#17(old location): 1.2 mi (SE)	35(--/--) 35-35	<LLD	0
Fish (pCi/kg, wet)	Gamma Spec ^e 7						
	Cs-134	100	46.7 (--/--) 19.8-97.1	#172, Downriver: 1.7 mi (W)	46.7 (3/4) 19.8-97.1	21.1 (--/--) 21.1-21.1	0
	Cs-137	200	117 (--/--) 64.5-197	#172, Downriver: 1.7 mi (W)	117 (3/4) 65.4-197	63.3 (--/--) 41.5-85.3	0

a. LLD = Lower limit of detection as defined in the Licensee's technical specifications. LLDs shown as "required" are values the Licensee stated as being required by the technical specifications. The qualifiers, "approx.", "generally", and "usually" shown below are the Licensee's terminology.

b. Mean and range are based on detectable measurements only.

c. "Frac." = Ratio of number of analyses giving detectable measurements to total number of analyses. (The "--" indicates the Licensee did not report this data.)

d. The Licensee heads this column "Number of REPORTABLE OCCURRENCES".

e. The Licensee's report of gamma isotopic analyses also indicates <LLD concentrations for the environmental media and nuclides shown below:

	Cs-134	Ba-140	La-140	I-131	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Nb-95	Cs-137
Airborne Particulates	X										
Milk	X	X	X								
Grass				X							
River Water	X	X	X	X	X	X	X	X	X	X	X
Fish					X	X	X	X	X		
Sediment	X										

APPENDIX D

Evaluation of Changes to the ODCM, PCP, and Radwaste
Treatment Systems

(Edwin I. Hatch Nuclear Plant Units 1 and 2)

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D.1 EVALUATION OF CHANGES TO THE ODCM

The Georgia Power Company (GPCo), the Licensee for the Hatch Nuclear Power Plant Units 1 and 2, prepared an Offsite Dose Calculation Manual (ODCM) for both units at the site. Normally changes to the ODCM are submitted by the Licensee in the Semiannual Effluent Release Reports. However, Revision 1 to the ODCM was submitted to the NRC with letter dated March 24, 1986.^[1] Revision 1 was a complete ODCM and superceded the previous version of the ODCM. Follow-on changes to Revision 1 were reported by the Licensee in the Semiannual Radioactive Effluent Release Reports for January-June 1986^[2], and for July-December 1986.^[3] The ODCM Revision 1 and the reported changes were transmitted by the NRC to the Idaho National Engineering Laboratory (INEL) for review.

The ODCM Revision 1 and the reported changes were reviewed as a whole. The result of the evaluation is intended to be a stand-alone document and is given in Supplement 1 to Appendix D.

D.2 REPORTED CHANGES TO THE RADWASTE TREATMENT SYSTEMS

A technical specification does not exist requiring the licensee to report to the NRC major changes made to the liquid, gaseous, or solid radwaste treatment systems. Therefore, if changes are made to these systems, they are reported to the NRC in the annual FSAR updates.

D.4 REFERENCES

1. Letter from L. T. Gucwa (GPCo) to D. Muller (NRC), Subject: Edwin I. Hatch Nuclear Plant Units 1, 2 Offsite Dose Calculation Manual and Process Control Program Revisions, SL-445 2113B, March 24, 1986.
2. Letter from L. T. Gucwa (GPCo) to J. N. Grace (NRC), Subject: Semiannual Radioactive Effluent Release Report, January-June 1986, September 2, 1986.
3. Letter from L. T. Gucwa (GPCo) to J. N. Grace (NRC), Subject: Semiannual Radioactive Effluent Release Report, June-December 1986, February 27, 1987.
4. Letter from L. T. Gucwa (GPCo) to J. F. Stolz (NRC), Subject: OFFSITE DOSE CALCULATION MANUAL AND PROCESS CONTROL PROGRAM SUBMITTAL, NED-84-488, October 1, 1984.
5. Letter from G. Rivenbark (NRC) to J. T. Beckham, Jr. (GPCo), June 28, 1985.

SUPPLEMENT 1

to

APPENDIX D

EVALUATION OF CHANGES TO THE ODCM

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INTRODUCTION

Purpose of Review

The purpose of this document is to report the review and evaluation of Revision 1 of the Offsite Dose Calculation Manual (ODCM) and a subsequent change to Revision 1 submitted by the Georgia Power Company (GPCo), the Licensee for the Hatch Nuclear Power Plant Units 1 and 2. The ODCM is a supplementary document for implementing the Radiological Effluent Technical Specifications (RETS) in compliance with 10 CFR 50, Appendix I^[1] requirements.

Scope of Review

As specified in NUREG-0472^[2] and NUREG-0473^[3], the ODCM is to be developed by the Licensee to document the methodology and approaches used to calculate offsite doses and maintain the operability of the radioactive effluent systems. As a minimum, the ODCM should provide equations and methodology for the following topics:

- o Alarm and trip setpoints on effluent instrumentation
- o Liquid effluent concentrations in unrestricted areas
- o Gaseous effluent dose rates at or beyond the site boundary
- o Liquid and gaseous effluent dose contributions
- o Liquid and gaseous effluent dose projections.

In addition, the ODCM should contain flow diagrams, consistent with the systems being used at the station, defining the treatment paths and the components of the radioactive liquid, gaseous, and solid waste management systems. A description and the location of samples in support of the environmental monitoring program are also needed in the ODCM.

Plant-Specific Background

On behalf of Hatch Nuclear Power Plant (HNP), the Georgia Power Company submitted Revision 1 of the HNP ODCM to the NRC with letter dated March 24, 1986.^[4] Subsequent changes to Revision 1 were reported by the Licensee in the Semiannual Radioactive Effluent Release Reports for January-June 1986^[5], and for July-December 1986.^[6] The revised ODCM and the reported changes were transmitted to an independent review team at the Idaho National Engineering Laboratory (INEL) for review. A review of the ODCM Revision 1 and the reported changes were conducted and the results and conclusions of the review are presented in this supplement.

REVIEW CRITERIA

Review criteria for the ODCM were provided by the NRC in three documents:

NUREG-0472, RETS for PWRs^[2]

NUREG-0473, RETS for BWRs^[3]

NUREG-0133, Preparation of RETS for Nuclear Power Plants.^[7]

In the ODCM review, the following NRC guidelines were also used: "General Contents of the Offsite Dose Calculation Manual," Revision 1^[8], and Regulatory Guide 1.109.^[9] The ODCM format is left to the Licensee and may be simplified by tables and grid printouts.

EVALUATION

The Licensee has followed the methodology of NUREG-0133^[6] to determine the alarm and trip setpoints for the liquid and gaseous effluent monitors, to provide reasonable assurance that the maximum permissible concentrations (MPCs), as specified in 10 CFR 20,^[10] will not be exceeded by discharges from various liquid or gaseous release points.

The HNP is located on the Altamaha River which supplies make-up water to the circulating water systems and receives decant from the cooling towers. Each of the two units on the site is served by its own liquid radwaste system which releases each unit's liquid radwaste to separate discharge lines from the circulating water systems. Therefore, each unit has separate radwaste systems, independent liquid effluent radiation monitors, and separate dilution streams. Since each unit is served by a separate dilution stream, liquid radwaste releases may be made independently from each of the two units.

Although there are but two radioactive liquid release points, there are three liquid release pathways monitored for radioactivity at the two-unit site: discharges from the Unit 1 radwaste treatment system, discharges from the Unit 2 radwaste treatment system, and discharges from the service water system. Effluents from each unit's radwaste treatment systems are released to each unit's cooling tower blowdown before release offsite to the Altamaha River. Effluents from the plant service water system are released onsite to the main condenser circulating flume or to a unit's cooling tower blowdown when needed for additional dilution. The monitors for the radwaste discharges provide both alarm and automatic termination of release whereas the monitor for the service water discharge provides alarm function only. Simplified flow diagrams for the liquid radwaste treatment systems for Units 1 and 2 are shown in Figures 1.5-1 and 1.5-2 of the ODCM, respectively. The Licensee's methodology described in Section 1.1 of the ODCM to determine the setpoints for the liquid effluent monitors is in general in agreement with the guidelines of NUREG-0133 to provide reasonable assurance that the concentration limits of 10 CFR 20 will not be exceeded.

There are four radioactive gaseous effluent release pathways for the two-unit site: the 120 meter main stack which serves both units, the Unit 1 reactor building vent stack, the Unit 2 reactor building vent stack, and the Unit 1 recombiner building vent. The Unit 2 recombiner is located in the Unit 2 turbine building and the turbine building effluents are monitored at the Unit 2 reactor building vent. The main stack serves as the discharge point for the mechanical vacuum pumps, the off-gas system, the gland seal exhaust, and the standby gas treatment system through which drywell purges are discharged, and discharges from the waste gas treatment building. Each reactor building vent stack serves as the discharge point for each unit's reactor building, refueling floor ventilation, turbine building, and the radwaste building. Noble gases are monitored at each of the four release points and an administrative factor has been included in the methodology to determine the monitor's setpoints to assure that release limits will not be exceeded by simultaneous releases. Simplified diagrams for the two units illustrating the gaseous radwaste treatment systems and the gaseous effluent flow pathways are not included in the ODCM. The Licensee's methodology described in Section 2.1 of the ODCM to determine the setpoints for the gaseous effluent monitors is, in general, in agreement with the guidelines of NUREG-0133 to provide reasonable assurance that the dose rate limits of NUREG-0473 will not be exceeded.

The Licensee's ODCM contains the methodology used to assure that the limiting concentrations of 10 CFR 20 Appendix B Table II Column 2 in liquid effluents are not exceeded at the point of discharge. The methodology is, in general, in agreement with the guidelines of NUREG-0133.

Noble gas discharges are assured to be within the NUREG-0473 dose rate limits of 500 mrem/yr to the total body and 3000 mrem/yr to the skin by correctly determining the setpoints for the noble gas monitors.

Section 2.2.1.b of the ODCM contains the methodology used to determine the dose rate to an organ of a child via the inhalation pathway due to

I-131, I-133, tritium, and all radioactive materials in particulate form with half-lives greater than 8 days. Additionally, Section 2.2.1.b contains the method to assure the combined dose rates due to simultaneous releases will not exceed 1500 mrem per year. The Licensee's Dose Rate Technical Specifications identify I-131 and I-133 whereas Section 2.2.1.b of the ODCM states "radioiodines" which implies all radioiodines. The dose rate due to the release of I-131, I-133, tritium, and particulates with half-lives greater than eight days is assured to be within the NUREG-0473 limit of 1500 mrem per year by calculating the dose rate to any organ of a child via the inhalation pathway using the highest calculated annual average relative concentration X/Q for both the ground and elevated release points. The methodology for the dose rate calculations is, in general, in agreement with the guidelines of NUREG-0133.

Doses to the maximum exposed member of the public due to radionuclides identified in liquid effluents are calculated to show compliance with the limits of 10 CFR 50 Appendix I. No drinking water is taken from the Altamaha River downstream from the plant and the Licensee identifies the fish consumption pathway for the dose calculations assuming the adult as the maximum exposed individual. The near-field average dilution factor is defined in Section 1.2 as the ratio of the radwaste flow to the dilution flow during the time of release. The Licensee should be cautioned that the dilution factor should be the ratio of the radwaste flow during the time of release to the average dilution flow during the reporting period. Additionally the bioaccumulation factor for P-32 in Table 1.2-1 of the ODCM could be 3×10^3 instead of 2.5×10^4 pCi/kg per pCi/liter. The methodology for the dose calculations due to radioactive liquid effluents is, in general, in agreement with the guidelines of NUREG-0133.

Doses resulting from the release of noble gases and I-131, I-133, tritium, and particulates with half lives greater than eight days are calculated to show compliance with the limits of 10 CFR 50 Appendix I. The highest calculated annual average relative concentrations X/Q for both ground and elevated releases are used to calculate the maximum air doses. The dose to an individual is calculated and at the Hatch Nuclear Power

Plant the controlling receptor is an infant exposed to the inhalation, the ground-plane, and the grass-cow-milk pathways. Section 2.2.2.b of the ODCM states "radioiodines" which implies all radioiodines, whereas the Licensee's technical specifications identify I-131 and I-133. The methodology for the dose calculations due to radioactive gaseous effluents is, in general, in agreement with the guidelines of NUREG-0133.

Methodology, based on dose projections, to determine required use of the liquid radwaste treatment system is described in the ODCM. The projections are based on the calculated dose due to radioactive liquid effluents which satisfy the guidelines in NUREG-0133. Projections are not required for the gaseous radwaste treatment system as the technical specifications require the system to be in operation whenever the main condenser air ejector system is in operation. Dose projections to determine use of a ventilation exhaust treatment system are not included in the ODCM since a requirement to use the ventilation exhaust treatment system is not included in the technical specifications.

The ODCM contains simplified flow diagrams illustrating treatment paths and components of the radioactive liquid waste treatment systems for both units in Figures 1.5-1 and 1.5-2. Comparable diagrams for the gaseous radwaste treatment systems are not included in the ODCM. However, Figure 2.5-1 illustrating the condenser offgas treatment system is included in the ODCM. Also, a simplified diagram illustrating the solid waste treatment system is not included in the ODCM.

Methodology for demonstrating compliance to 40 CFR 190 is described in Section 4.0 of the ODCM.

Environmental Monitoring Table 3.16.1-1 in Technical Specification 3.16.1 identifies the approximate number of sample locations for the environmental monitoring program. Table 3.0-1 in the ODCM identifies specific parameters of distance and the direction sector from the site and additional information for the available sample locations. The Technical Specification identifies approximately four milk locations with a footnote

stating "as available" and only three locations were available. Due to the unavailability of samples, the number of milk sample locations has been further reduced from three to two and one of the two had to be relocated as reported in the Semiannual Radioactive Effluent Release Report for the second half of 1986. The Environmental Monitoring Program described in the ODCM remains consistent with the requirements of the Licensee's technical specifications.

In summary, the Licensee's ODCM as revised uses documented and approved methods that are generally consistent with the methodology and guidance in NUREG-0133, and therefore should be considered to be an acceptable reference.

CONCLUSIONS

The Licensee's Revision 1 to the ODCM for Hatch Nuclear Power Plant Units 1 and 2 submitted to the NRC with letter dated March 24, 1986 and the subsequent change to the ODCM submitted with the Semiannual Radioactive Effluent Release Report for the second half of 1986 uses documented and approved methods that are consistent with the guidelines of NUREG-0133 with the following exceptions:

- o Simplified flow diagrams for the gaseous radwaste and gaseous effluent flow pathways are not included in the ODCM.
- o A simplified diagram illustrating the solid waste treatment system is not included in the ODCM.

The following are not discrepancies in the ODCM, but are suggestions that should be brought to the attention of the Licensee.

- o The Licensee's Dose Rate Technical Specifications identify I-131 and I-133 whereas Section 2.2.1.b of the ODCM states "radioiodines" which implies all radioiodines.
- o The Licensee should be cautioned that the dilution factor identified in Section 1.2 should be the ratio of the radwaste flow during the time of release to the average dilution flow during the reporting period.
- o A dose projection to determine use of a ventilation exhaust treatment system is not included in the ODCM. This is due to the fact that a specification for use of the Ventilation Exhaust Treatment System is not included in the Licensee's Technical Specifications.

- o The bioaccumulation factor for P-32 in Table 1.2-1 of the ODCM could be changed to 3×10^3 instead of 2.5×10^4 pCi/kg per pCi/liter.
- o The Licensee's dose Technical Specifications identify "I-131 and I-133" whereas Section 2.2.2.b of the ODCM states "radioiodines" which implies all radioiodines.

REFERENCES

1. Title 10, Code of Federal Regulations, Part 50, Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion, 'As Low As Is Reasonably Achievable,' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents".
2. "Radiological Effluent Technical Specifications for Pressurized Water Reactors," Rev. 3, Draft 7", intended for contractor guidance in reviewing RETS proposals for operating reactors, NUREG-0472, September 1982.
3. "Radiological Effluent Technical Specifications for Boiling Water Reactors," Rev. 3, Draft 7", intended for contractor guidance in reviewing RETS proposals for operating reactors, NUREG-0473, September 1982.
4. Letter from L. T. Gucwa (GPCo) to D. Muller (NRC), Subject: Edwin I. Hatch Nuclear Plant Units 1,2 Offsite Dose Calculation Manual and Process Control Program Revisions, SL-445 2113B, March 24, 1986.
5. Letter from L. T. Gucwa (GPCo) to J. N. Grace (NRC), Subject: Semiannual Radioactive Effluent Release Report, January-June 1986, September 2, 1986.
6. Letter from L. T. Gucwa (GPCo) to J. N. Grace (NRC), Subject: Semiannual Radioactive Effluent Release Report, June-December 1986, February 27, 1987.
7. "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants, A Guidance Manual for Users of Standard Technical Specifications," NUREG-0133, October 1978.
8. "General Contents of the Offsite Dose Calculation Manual," Revision 1 Branch Technical Position, Radiological Assessment Branch, NRC, February 8, 1979.

9. "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR 50, Appendix I," Regulatory Guide 1.109, Rev. 1, October 1977.
10. Title 10, Code of Federal Regulations, Part 20, "Standards for Protection Against Radiation."

APPENDIX E

Tables of Licensee's Report Commitments

(Standard Radiological Effluent Technical Specifications for BWRs
- NUREG-0473 Rev. 3, Draft 7")

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Similar report commitment tables to the following tables are assembled from the Licensee's current radiological effluent technical specifications, and are used in the reviewers technical evaluation TER.

The specific commitment tables here were assembled using the NRC's model technical specifications for BWR's (NUREG-0473, Revision 3, Draft 7".)

TABLE I. STANDARD RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS FOR BOILING WATER REACTORS:
COMMITMENTS OF ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT[†]

Part I - Routine Reporting Requirements

Technical Specifications -- LCO/Surveillance			
Title	Licensee RETS No.	Specific Comments	Report Commitments
A. Radiological Environmental Monitoring Program			
1. Monitoring Program	3.12.1	The radiological environmental monitoring program shall be conducted as specified in Table 3.12.1.	The (Annual Radiological Environmental Operating) reports shall... include a summary description of the radiological environmental monitoring program. (6.9.11)
2. Sampling Locations	Table 3.12-1 Notation a,	Specific parameters of distance and direction sector from the centerline of one reactor, and additional description where pertinent, shall be provided for each and every sample location in Table 3.12-1 in a table and figure(s) in the ODCM. Refer to NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants", October 1978, and to Radiological Effluent Technical Branch Technical Position, Revision 1, November 1979.	The (Annual Radiological Environmental Operating) reports shall... include at least two legible maps** covering all sampling locations keyed to a table giving distances and directions from the centerline of one reactor. (6.9.1.11) **One map shall cover stations near the site boundary; a second shall include the more distant stations.
B. Radiological Environmental Monitoring Program Surveillance			
Monitoring Program	4.12.1	The radiological environmental monitoring samples shall be collected pursuant to Table 3.12-1 from the specific locations given in the table and figure(s) in the ODCM, and shall be analyzed pursuant to the requirements of Tables 3.12-1 and the detection capabilities required by Table 4.12-1.	The Annual Radiological Environmental Operating Reports shall include summaries, interpretations, and an analysis of trends of the results of the radiological environmental surveillance activities for the report period, including a comparison with preoperational studies, operational controls (as appropriate) and previous environmental surveillance reports, and an assessment of the observed impacts of the plant operation on the environment. (6.9.1.11) The Annual Radiological Environmental Operating Reports shall include the results of analysis of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in

[†] Routine Radiological Environmental Operating Reports covering the operation of the unit during the previous calendar year shall be submitted prior to May 1 of each year. The initial report shall be submitted prior to May 1 of the year following initial criticality. (6.9.1.11)

TABLE I. STANDARD RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS FOR BOILING WATER REACTORS:
COMMITMENTS OF SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORTS (Cont.)

Part I - Routine Reporting Requirements

Technical Specifications -- LCO/Surveillance			
Title	Licensee RETS No.	Specific Comments	Report Commitments
Monitoring Program (Cont.)			<p>the Table and Figures in the ODCM, as well as summarized and tabulated results of these analyses and measurements in the format of the table in the Radiological Assessment Branch Technical Position, Revision 1, November 1979. In the event that some individual results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted as soon as possible in a supplementary report. (6.9.1.11)</p> <p>This list does not mean that only these nuclides are to be considered. Other peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Annual Radiological Environmental Operating Report pursuant to Specification 6.9.1.11. (Notation a, Table 4.12-1)</p>
C. Land Use Census	3.12.2	<p>A land use census shall be conducted and shall identify within a distance of 8 km (5 miles) the location in each of the 16 meteorological sectors of the nearest milk animal, the nearest residence and the nearest garden* of greater than 50 m² (500 ft²) producing broad leaf vegetation. (For elevated releases as defined in Regulatory Guide 1.111, Revision 1, July 1977, the land use census shall also identify within a distance of 5 km (3 miles) the locations in each of the 16 meteorological sectors of <u>all</u> milk animals and <u>all</u> gardens of greater than 50 m² producing broad leaf vegetation.) (3.12.2)</p> <p>Broad leaf vegetation sampling of at least three different kinds of vegetation may be performed at the site boundary in each of two different direction sectors with the highest predicted D/Qs in lieu of the garden census. Specifications for broad leaf vegetation sampling in Table 3.12-1 4c shall be followed, including analysis of control samples.</p>	<p>The (Annual Radiological Environmental Operating) reports shall... include the results of land use census required by Specification 3.12.2 (6.9.1.11)</p>

TABLE I. STANDARD RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS FOR BOILING WATER REACTORS:
COMMITMENTS OF ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT (Cont.)

Part I - Routine Reporting Requirements

Technical Specifications -- LCO/Surveillance			
Title	Licensee RETS No.	Specific Comments	Report Commitments
C. Land Use Census (Cont.)	4.12.2	The land use census shall be conducted during the growing season at least once per 12 months using that information that will provide the best results, such as by a door-to-door survey, aerial survey, and by consulting local agriculture authorities.	The results of the land use census shall be included in the Annual Radiological Environmental Operating Report pursuant to Specification 6.9.1.11. (4.12.1)
D. Interlaboratory Comparison Program	3.12.3	Analyses shall be performed on radioactive materials supplied as part of an Interlaboratory Comparison Program which has been approved by the Commission.	A summary of the results obtained as part of the above required Interlaboratory Comparison Program shall be included in the Annual Radiological Environmental Operating Report pursuant to Specification 6.9.1.11.
	4.12.3	The Interlaboratory Comparison Program shall be described in the ODCM.	The (Annual Radiological Environmental Operating) reports shall also include the results of licensee participation in the Interlaboratory Comparison Program, required by Specification 3.12.3. (6.9.1.11)

TABLE I. STANDARD RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS FOR BOILING WATER REACTORS:
COMMITMENTS OF ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT (Cont.)

Part II - Reporting Requirements Subject to Conditions

Technical Specifications -- LCO/Surveillance			
Title	Licensee RETS No.	Specific Comments	Report Commitments
A. Radiological Environmental Monitoring Program	3.12.1.a	With the radiological environmental monitoring program not being conducted as specified in Table 3.12-1,...	In lieu of a Licensee Event Report, prepare and submit to the Commission, in the Annual Radiological Operating Report required by Specification 6.9.11.1, a description of the reasons for not conducting the program as required and the plans for preventing a recurrence. (3.12.1.a)
	Table 3.12.1	Deviations are permitted from the required sampling schedule if specimens are unobtainable due to hazardous conditions, seasonal unavailability, malfunction of automatic sampling equipment and other legitimate reasons. If specimens are unobtainable due to sampling equipment malfunction, every effort shall be made to complete corrective action prior to the end of the next sampling period.	All deviations from the sampling schedule shall be documented in the Annual Radiological Environmental Operating Report pursuant to Specification 6.9.1.11. (Table 3.12.1, Notation a.)
B. Radiological Environmental Monitoring Program Surveillance			
1. Reporting Levels	3.12.1.b	With the level of radioactivity,... (not the) result of plant effluents in an environmental sampling medium exceeding the reporting levels of Table 3.12-2 when averaged over any calendar quarter,...	The condition shall be reported and described in the Annual Radiological Environmental Operating Report. (3.12.1.b)
		When more than one of the radionuclides in Table 3.12-2 are detected in the sampling medium, this report shall be submitted if: $\frac{\text{Concentration 1}}{\text{Reporting Level 1}} + \frac{\text{Concentration 2}}{\text{Reporting Level 2}} + \dots \geq 1.0$	
2. Lower Limit of Detection (LLD)	Table 4.12-1, Notation c.	Occasionally background fluctuations, unavoidable small sample sizes, the sizes, the presence of interfering negligees, or other uncontrollable circumstances may render these LLDs unachievable. In such cases,...	the contributing factors shall be identified and described in the Annual Radiological Environmental Operating Report pursuant to Specification 6.9.1.11. (Table 4.12-1, Notation c.)

TABLE I. STANDARD RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS FOR BOILING WATER REACTORS:
COMMITMENTS OF ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT (Cont.)

Part II - Reporting Requirements Subject to Conditions

Title	Technical Specifications -- LCO/Surveillance		
	Licensee RETS No.	Specific Comments	Report Commitments
C. Interlaboratory Comparison Program	3.12.3	Analyses shall be performed on radioactive materials supplied as part of an Interlaboratory Comparison Program which has been approved by the Commission.	
	3.12.3.a	With analyses not being performed as required above,...	Report the corrective actions taken to prevent a recurrence to the Commission in the Annual Radiological Environmental Operating Report pursuant Specification 6.9.1.11. (3.12.3.1.)

TABLE 2. STANDARD RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS FOR BOILING WATER REACTORS:
COMMITMENTS OF SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT⁺

Part I - Routine Reporting Requirements

Technical Specifications -- LCO/Surveillance			
Title	Licensee RETS No.	Specific Comments	Report Commitments
A. Radioactive Effluent Releases			
1. Effluent Release Summary Liquid Gaseous	10 CFR 50.36a	<p>§ 50.36a Technical specifications on effluents from nuclear power reactors.</p> <p>(a) In order to keep releases of radioactive materials to unrestricted areas during normal reactor operations, including expected operational occurrences, as low as is reasonably achievable, each license authorizing operation of a nuclear power reactor will include technical specifications that, in addition to requiring compliance with applicable provisions of § 20.106 of this chapter, require:</p> <p>(1) That operating procedures developed pursuant to § 50.34a(c) for the control of effluents be established and followed and that equipment installed in the radioactive waste system, pursuant to § 50.34(a) be maintained and used.</p> <p>(2) The submission of a report to the appropriate NRC Regional Office shown in Appendix D of Part 20 of this chapter within sixty (60) days after January 1 and July 1 of each year specifying the quantity of each of the principal radionuclides released to unrestricted areas in liquid and in gaseous effluents during the previous six (6) months of operation, and such other information as may be required by the Commission to estimate maximum potential annual radiation doses to the public resulting from effluent releases. Copies of such report shall be sent to the Director of Inspection and Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555.</p> <p>If quantities of radioactive materials released during the reporting period are significantly above design objectives, the report shall cover this specifically. On the basis of such reports and any additional information the Commission may obtain from the licensee or others, the Commission may from time to time require the licensee to take such action as the Commission deems appropriate.</p>	<p>The Radioactive Effluent Release Reports shall include a summary of the quantities of radioactive liquid and gaseous effluents,... released from the unit as outlined in Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," Revision 1, June 1974, with data summarized on a quarterly basis following the format of Appendix B thereof. (6.9.1.12)</p> <p>The principal gamma emitters for which the LLD specification applies exclusively are the following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141 and Ce-144. This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Semiannual Radioactive Effluent Release Reports pursuant to Specification 6.9.1.12. (Notation C, Table 4.11-1)</p> <p>The principal gamma emitters for which the LLD specification applies exclusively are the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 for gaseous emissions and Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141 and Ce-144 for particulate emissions. This list does not mean that only these nuclides are to be considered. Other gamma peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Semiannual Radioactive Effluent Release Report pursuant to Specification 6.9.1.12. (Notation b of Table 4.11-2)</p>

⁺Routine radioactive effluent release reports covering the operating of the unit during the previous 6 months of operation shall be submitted within 60 days after January 1 and July 1 of each year. The period of the first report shall begin with the date of initial criticality. A single submittal may be made for a multiple unit station. The submittal should combine those sections that are common to all units at the station; however, for units with separate radwaste systems, the submittal shall specify the releases of radioactive material from each unit. (6.9.1.12)

TABLE 2. STANDARD RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS FOR BOILING WATER REACTORS:
COMMITMENTS OF SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Part I - Routine Reporting Requirements

Title	Technical Specifications -- LCO/Surveillance		Report Commitments
	Licensee RETS No.	Specific Comments	
2. Unplanned Effluent Releases			
Liquid Gaseous	10 CFR 50.36a	See A.1 above.	The Radioactive Effluent Release Reports shall include a list and description of unplanned releases from the site to UNRESTRICTED AREAS of radioactive materials in gaseous and liquid effluents made during the reporting period. (6.9.1.12)
B. Solid Radioactive Waste	10 CFR 50.36a	See A.1 above.	<p>The Radioactive Effluent Release Reports shall include a summary of the quantities of radioactive, ... solid waste released from the unit as outlined in Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," Revision 1, June 1974 with data summarized on a quarterly basis following the format of Appendix B thereof. (6.9.1.12)</p> <p>The Radioactive Effluent Release Reports shall include the following information for each class of solid waste (as defined by 10 CFR Part 61) shipped offsite during the report period:</p> <ol style="list-style-type: none"> Container volume. Total curie quantity (Specify whether determined by measurement or estimate), Principal radionuclides (specify whether determined by measurement or estimate), Source of waste and processing employed (e.g., dewatered spent resin, compacted dry waste, evaporator bottoms), Type of container (e.g., LSA, Type A, Type B, Large Quantity), and Solidification agent or absorbent (e.g., cement, urea formaldehyde). <p>(6.9.1.12)</p>

TABLE 2. STANDARD RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS FOR BOILING WATER REACTORS:
COMMITMENTS OF SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Part I - Routine Reporting Requirements

Technical Specifications -- LCO/Surveillance			
Title	Licensee RETS No.	Specific Comments	Report Commitments
C. Radiological Dose Assessment			
1. Doses from Radioactive Effluents	10 CFR 50.36a	See A.1 above	<p>The Radioactive Effluent Release Report to be submitted within 60 days after January 1 of each year shall include an annual summary of hourly meteorological data collected over the previous year. This annual summary may be either in the form of an hour-by-hour listing on magnetic tape of wind speed, wind direction, and atmospheric stability, and precipitation (if measured), or in the form of joint frequency distributions of wind speed, wind direction, and atmospheric stability.** This same report shall include an assessment of the radiation doses due to the radioactive liquid and gaseous effluents released from the unit or station during the previous calendar year. This same report shall also include an assessment of the radiation doses from radioactive liquid and gaseous effluents to MEMBERS OF THE PUBLIC due to their activities inside the SITE BOUNDARY (Figure 5.1-3) during the report period. All assumptions used in making these assessment, i.e., specific activity, exposure time and location, shall be included in these reports. The meteorological conditions concurrent with the time of release of radioactive materials in gaseous effluents, as determined by sampling frequency and measurement, shall be used for determining the gaseous pathway doses. [For ORs: approximate and conservative approximate methods are acceptable.] The assessment of radiation doses shall be performed in accordance with the methodology and parameters in the OFFSITE DOSE CALCULATION MANUAL (ODCM).</p>

**In lieu of submission with the first half year Radioactive Effluent Release Report, the licensee has the option of retaining this summary of required meteorological data on site in a file that shall be provided to the NRC upon request.

TABLE 2. STANDARD RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS FOR BOILING WATER REACTORS:
COMMITMENTS OF SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Part I - Routine Reporting Requirements

Technical Specifications -- LCO/Surveillance			
Title	Licensee RETS No.	Specific Comments	Report Commitments
C. Radiological Dose Assessment (Cont.)			
2. Total Dose	10 CFR 50.36a	See A.1 above	The Radioactive Effluent Release Report to be submitted 60 days after January 1 of each year shall also include an assessment of radiation doses to the likely most exposed MEMBER OF THE PUBLIC from reactor releases and other nearby uranium fuel cycle sources, including doses from primary effluent pathways and direct radiation, for the previous calendar year to show conformance with 40 CFR Part 190, Environmental Radiation Protection Standards for Nuclear Power Operation. Acceptable methods for calculating the dose contribution from liquid and gaseous effluents are given in Regulatory Guide 1.109, Revision 1, October 1977. (6.9.1.12)

TABLE 2. STANDARD RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS FOR BOILING WATER REACTORS:
COMMITMENTS OF SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Part II - Reporting Requirements Subject to Conditions

Technical Specifications -- LCO/Surveillance			
Title	Licensee RETS No.	Specific Comments	Report Commitments
A. Monitoring Instrumentation			
1. Liquid Effluents	3.3.3.10.b	With less than the minimum number of radioactive liquid effluent monitoring instrumentation channels OPERABLE, take the ACTION shown in Table 3.3-12. Exert best efforts <u>to return</u> the instruments to OPERABLE status within 30 days and, if unsuccessful,...	Explain in the next Semiannual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner. (3.3.3.10.b)
2. Gaseous Effluents	3.3.3.11.b	With less than the minimum number of radioactive gaseous effluent monitoring instrumentation channels OPERABLE, take the ACTION shown in Table 3.3-13. Exert best efforts <u>to return</u> the instruments to OPERABLE status within 30 days and, if unsuccessful,...	Explain in the next Semiannual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner. (3.3.3.11.b)
B. Radioactive Material Inventory			
Liquid Holdup Tanks	3.11.1.4	<p>The quantity of radioactive material contained in each of the following unprotected outdoor tanks shall be limited to less than or equal to ____ curies, excluding tritium and dissolved or entrained noble gases.</p> <p>a. _____ b. _____ c. _____ d. <u>Outside temporary tank</u></p> <p>With the quantity of radioactive material in any of the above listed tanks exceeding the above limit, immediately suspend all additions of radioactive material to the tank, within 48 hours reduce the tank contents to within the limit, and</p>	describe the events leading to this condition in the next Semiannual Radioactive Effluent Release Report. (3.11.1.4.a)

TABLE 2. STANDARD RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS FOR BOILING WATER REACTORS:
COMMITMENTS OF SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Part II Reporting Requirements Subject to Conditions

Technical Specifications -- LCO/Surveillance			
Title	Licensee RETS No.	Specific Comments	Report Commitments
C. Radiological Environmental Monitoring Program			
1. Sampling Relocation	3.12.1.c	With milk or fresh leafy vegetable samples unavailable from one or more of the sample locations required by Table 3.12-1, identify locations for obtaining replacement samples and add them to the radiological environmental monitoring program within 30 days. The specific locations from which samples were unavailable may then be deleted from the monitoring program.	In lieu of a Licensee Event Report and pursuant to Specification 6.9.1.12, identify the cause of the unavailability of samples and identify the new location(s) for obtaining replacement samples in the next Semiannual Radioactive Effluent Release Report and also include in the report a revised figure(s) and table for the ODCM reflecting the new location(s). (3.12.1.c)
	Table 3.12.1, Notation a	It is recognized that, at times it may not be possible or practicable to continue to obtain samples of the media of choice at the most desired location or time. In these instances suitable alternative media and locations may be chosen for the particular pathway in question and appropriate substitutions made within 30 days in the radiological environmental monitoring program.	In lieu of a Licensee Event Report and pursuant to Specification 6.9.1.12, identify the cause of the unavailability of samples for that pathway and identify the new location(s) for obtaining replacement samples in the next Semiannual Radioactive Effluent Release Report and also include in the report a revised figure(s) and table for the ODCM reflecting the new location(s). (Table 3.12-1, Notation a)
2. Land Use Census	3.12.1.a	With a land use census identifying a location(s) that yields a calculated dose or dose commitment greater than the values currently being calculated in Specification 4.11.2.3,	in lieu of a Licensee Event Report, identify the in the next Semiannual Radioactive Effluent Release Report, pursuant to Specification 6.9.1.12. (3.12.1.a)
	3.12.2.b	With a land use census identifying a location(s) that yields a calculated dose or dose commitment (via the same exposure pathway) 20 percent greater than at a location from which samples are currently being obtained in accordance with Specification 3.12.1, add the new location(s) to the radiological environmental monitoring program within 30 days. The sampling location(s), excluding the control station location, having the lowest calculated dose or dose commitment(s), via the same exposure pathway, may be deleted from this monitoring program after (October 31) of the year in which this change was made.	In lieu of a Licensee Event Report and pursuant to Specification 6.9.1.12, identify the new location(s) in the next Semiannual Radioactive Effluent Release Report and also include in the report a revised figure(s) and table for the ODCM reflecting the new location(s). (3.12.2.b)

TABLE 2. STANDARD RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS FOR BOILING WATER REACTORS:
COMMITMENTS OF SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Part II - Reporting Requirements Subject to Conditions

Technical Specifications -- LCO/Surveillance			
Title	Licensee RETS No.	Specific Comments	Report Commitments
1. ODCM (Cont.)			The Radioactive Effluent Release Reports shall include any changes made during the reporting period... to the OFFSITE DOSE CALCULATION MANUAL (ODCM), as well as a listing of new locations for dose calculations, and/or environmental monitoring identified by the land use census pursuant to Specification 3.12.2. (6.4.1.12).
2. Radwaste Treatment Systems	6.15.1	Licensee-initiated major change to the radioactive waste system (liquid, gaseous and solid) shall be reported to the Commission in the Semiannual Radioactive Effluent Release Report for the period in which the evaluation was reviewed by the (Unit Review Group).	The discussion of each change shall contain:
	6.15	Licensees may chose to submit the the information called for in this Specification as part of the annual FSAR update.	<ul style="list-style-type: none"> a. A summary of the evaluation that led to the determination that the change could be made in accordance with 10 CFR 50.59, b. Sufficient detailed information to totally support the reason for the change without benefit of additional or supplemental information; c. A detailed description of the equipment, components and processes involved and the interfaces with other plant systems; d. An evaluation of the change which shows the predicted releases of radioactive materials in liquid and gaseous effluents and/or quantity of solid waste that differ from those previously predicted in the license application and amendments thereto; e. An evaluation of the change which shows the expected maximum exposures to individual in the UNRESTRICTED AREA and to the general population that differ from those previously estimated in the license application and amendments thereto; f. A comparison of the predicted releases of radioactive materials, in liquid and gaseous effluents and in solid waste, to the actual releases for the period prior to when the changes are to be made;

TABLE 2. STANDARD RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS FOR BOILING WATER REACTORS:
COMMITMENTS OF SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Part II - Reporting Requirements Subject to Conditions

Technical Specifications -- LCO/Surveillance			
Title	Licensee RETS No.	Specific Comments	Report Commitments
2. Radwaste Treatment Systems (Cont.)			<p>g. An estimate of the exposure to plant operating personnel as a result of the change; and</p> <p>h. Documentation of the fact that change was reviewed and found acceptable by the (URSG). (6.15.1)</p>

TABLE 3. STANDARD RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS FOR BOILING WATER REACTORS:
COMMITMENTS OF SPECIAL 30-DAY REPORTS[†]

Technical Specifications -- LCO/Surveillance			
Title	Licensee RETS No.	Specific Comments	Report Commitments
A. Liquid Effluent Doses	3.11.1.2	<p>With the calculated dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released, from (any) reactor unit, to UNRESTRICTED AREAS (see Figure 5.1-3) exceeding:</p> <ol style="list-style-type: none"> 1.5 mrem to the total body or 5 mrem to any organ during any calendar quarter, or 3 mrem to the total body or 10 mrem 50 any organ during any calendar year, 	<p>In lieu of a Licensee Event Report, prepare and submit to the Commission within 30 days, pursuant to Specification 6.9.2, a Special Report that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits. This Special Report shall also include (1) the results of radiological analyses of drinking water source and (2) the radiological impact on finished drinking water supplies with regard to the requirements of 40 CFR Part 141.*</p> <p>*Applicable only if drinking water supply is taken from the receiving water body within 3 miles of the plant discharge. In the case of river sited plants this is 3 miles downstream only. (3.11.1.2)</p>
B. Liquid Radwaste Treatment System	3.11.1.3	<p>With radioactive liquid waste being discharged without treatment when the projected doses due to the liquid effluent, from any reactor unit, to UNRESTRICTED AREAS (see Figure 5.1-3), in a 31-day period exceeds 0.06 mrem to the total body or 0.2 mrem to any organ,...</p>	<p>In lieu of a Licensee Event Report, prepare and submit to the Commission within 30 days pursuant to Specification 6.9.2, a Special Report which includes the following information:</p> <ol style="list-style-type: none"> Explanation of why liquid radwaste was being of discharged without treatment, identification of and inoperable equipment or subsystems, and the reason for inoperability. Action(s) taken to restore the inoperable equipment to OPERABLE status, and Summary description of action(s) taken to prevent a recurrence. (3.11.1.3)

[†]Special Reports shall be submitted to the Director of the NRC Regional Office listed in Appendix D, 10 CFR Part 20, with a copy to the Director, Office of Inspection and Enforcement, U. S. Nuclear Regulatory Commission, Washington, D.C. 20555 within the time period specified for each report. (6.9.2)

TABLE 3. STANDARD RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS FOR BOILING WATER REACTORS:
COMMITMENTS OF SPECIAL 30-DAY REPORTS (Cont.)

Title	Technical Specifications -- LCO/Surveillance		
	Licensee RETS No.	Specific Comments	Report Commitments
C. Noble Gas Effluent Doses	3.11.2.2	<p>With the calculated air dose from radioactive noble gases in gaseous effluents, from any reactor unit, to areas at and beyond the SITE BOUNDARY (see Figure 5.1-3) exceeding:</p> <ul style="list-style-type: none"> a. 5 mrad for gamma radiation or 10 mrad for beta radiation during any calendar quarter, or b. 10 mrad for gamma radiation or 20 mrad for beta radiation during any calendar year, 	<p>Prepare and submit to the Commission within 30 days, pursuant to Specification 6.9.2, a Special Report which identifies the cause(s) for exceeding the limit(s) and defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with Specification 3.11.2.2. (3.11.2.2)</p>
D. Iodine-131, Iodine-133, Tritium and Radionuclides in Particulate Form Doses	3.11.2.3	<p>With the calculated dose from iodine-131, iodine-133, tritium, and all radionuclides in particulate form with half lives greater than 8 days in gaseous effluents released, from any reactor unit, to areas at and beyond the SITE BOUNDARY (see Figure 5.1-3) exceeding:</p> <ul style="list-style-type: none"> a. 7.5 mrem to any organ during any calendar quarter, or b. 15 mrem to any organ during any calendar year, 	<p>In lieu of a Licensee Event Report, prepare and submit to the Commission within 30 days, pursuant to Specification 6.9.2, a Special Report which identifies the cause(s) for exceeding the limit and defines the corrective actions taken to reduce releases and the proposed actions to be taken to assure that subsequent releases will be in compliance with Specification 3.11.2.3. (3.11.2.3)</p>
E. Gaseous Radwaste Treatment System	3.11.2.4	<p>With gaseous radwaste from the main condenser air ejector system being discharged without treatment for more than 7 days,</p>	<p>In lieu of a Licensee Event Report, prepare and submit to the Commission within 30 days, pursuant to Specification 6.9.2, a Special Report that includes the following information:</p> <ul style="list-style-type: none"> 1. Identification of the inoperable equipment or subsystems and the reason for inoperability, 2. Action(s) taken to restore the inoperable equipment to OPERABLE status, and 3. Summary description of action(s) taken to prevent a recurrence. (3.11.2.4)

TABLE 3. STANDARD RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS FOR BOILING WATER REACTORS:
COMMITMENTS OF SPECIAL 30-DAY REPORTS (Cont.)

Technical Specifications -- LCO/Surveillance			
Title	Licensee RETS No.	Specific Comments	Report Commitments
F. Ventilation Exhaust Treatment System	3.11.2.5	With gaseous waste being discharged from the VENTILATION EXHAUST TREATMENT SYSTEM (at any time other than when the VENTILATION EXHAUST TREATMENT SYSTEM is undergoing routine maintenance) without treatment when the projected dose due to gaseous effluent releases, from any reactor unit, to areas at and beyond the SITE BOUNDARY (see Figure 5.1.3-1) in a 31-day period exceeds 0.3 mrem to any organ,...	In lieu of a Licensee Event Report, prepare and submit to the Commission within 30 days pursuant to Specification 6.9.2, a Special Report which includes the following information: 1. Explanation of why gaseous radwaste was being discharged without treatment, identification of the inoperable equipment or subsystem and the reason for inoperability, 2. Action(s) taken to restore the inoperable equipment to OPERABLE status, and 3. Summary description of action(s) taken to prevent a recurrence. (3.11.2.4)
G. Total Dose	3.11.4	With the calculated dose or dose commitment to any member of the public, due to releases of radioactivity and radiation, from uranium fuel cycle sources including the release of radioactive materials in liquid or gaseous effluents exceeding 25 mrem to the total body or any organ, except the thyroid, which shall be limited to 75 mrem, during any calendar year;	In lieu of a Licensee Event Report, prepare and submit to the Commission within 30 days, pursuant to Specification 6.9.2, a Special Report that defines the corrective action to be taken to reduce subsequent releases to prevent recurrence of exceeding the above limits and includes the schedule for achieving conformance with the above limits. This Special Report, as defined in 10 CFR Part 20.405c, shall include an analysis that estimates the radiation exposure (dose) to a MEMBER OF THE PUBLIC from uranium fuel cycle sources, including all effluent pathways and direct radiation, for the calendar year that includes the release(s) covered by this report. It shall also describe levels of radiation and concentrations of radioactive material involved, and the cause of the exposure levels or concentrations. If the estimated dose(s) exceeds the above limits, and if the release condition resulting in violation of 40 CFR Part 190 has not already been corrected, the Special Report shall include a request for a variance in accordance with the provisions of 40 CFR Part 190. Submittal of the report is considered a timely request, and a variance is granted until staff action on the request is complete. (3.11.4.a)

TABLE 3. STANDARD RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS FOR BOILING WATER REACTORS:
COMMITMENTS OF SPECIAL 30-DAY REPORTS (Cont.)

Title	Technical Specifications -- LCO/Surveillance		Report Commitments
	Licensee RETS No.	Specific Comments	
H. Radiological Environmental Monitoring			
1. Reporting Levels	3.12.1.b	<p>With the level of radioactivity as the result of plant effluents in an environmental sampling medium at a specified location exceeding the reporting levels of Table 3.12.2 when averaged over any calendar quarter,...</p> <p>When more than one of the radio-nuclides in Table 3.12-2 are detected in the sampling medium, this report shall be submitted if:</p> $\frac{\text{Concentration 1}}{\text{Reporting Level 1}} + \frac{\text{Concentration 2}}{\text{Reporting Level 2}} + \dots \geq 1.0$ <p>When radionuclides other than those in Table 3.12-2 are detected and are the result of plant effluents, this report shall be submitted if the potential annual dose* to A MEMBER OF THE PUBLIC is equal to or greater than the calendar year limits of Specifications 3.11.1.2, 3.11.2.2 and 3.11.2.3.</p> <p>*See footnote under "Report Commitments"</p>	<p>In lieu of a Licensee Event Report, prepare and submit to the Commission within 30 days, pursuant to Specification 6.9.2, a Special Report that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions to be taken to reduce radioactive effluents so that the potential annual dose* to A MEMBER OF THE PUBLIC is less than the calendar year limits of Specifications 3.11.1.2, 3.11.2.2, and 3.11.2.3. (3.12.1.b)</p> <p>This report is not required if the measured level of radioactivity was not the result of plant effluents; however, in such an event, the condition shall be reported and described in the Annual Radiological Environmental Operating Report. (3.12.1.b)</p> <p>*The methodology and parameters used to estimate the potential annual dose to a MEMBER OF THE PUBLIC shall be indicated in this report.</p>

TABLE 4. STANDARD RADIOLOGICAL EFFLUENT TECHNICAL SPECIFICATIONS FOR BOILING WATER REACTORS:
COMMITMENTS OF LICENSEE EVENT REPORTS, REPORTABLE OCCURRENCES, ABNORMAL OCCURRENCES

Technical Specifications -- LCO/Surveillance			
Title	Licensee RETS No.	Specific Comments	Report Commitments
None required by "Standard Radiological Effluent Technical Specifications for Boiling Water Reactors," NUREG-0473, Draft 7" (12-7-83)			

APPENDIX F

Checklist of RETS-Required Reports

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The following Appendix F tables are checklists used by the reviewer in evaluating how well the Licensee's annual and semiannual reports conform to the reporting commitments in the Licensee's RETS. These checklists are part of the reviewer's technical evaluation TER.

Table F-1. CHECKLIST FOR ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT⁺

Plant Name:

Report Period: 01-01-86 to 12-31-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
A. Radiological Environmental Monitoring Program (Summary Description)				
1. Direct Radiation (NUREG-0472/0473, Table 3.12-1)				
a. TLD Locations (# =)				
b. Sampling method and collection frequency				
c. Type and frequency of analysis				
2. Airborne (NUREG-0472/0473, Table 3.12-1)				
a. Sample location for radiiodine and particulates (# =)				
b. Sampling methods and collection frequency				
c. Type and frequency of analysis				
3. Waterborne (NUREG-0472/0473, Table 3.12-1)				
a. Surface Water				
o Sample locations for surface water (# =)				
o Sampling method and collection frequency				
o Type and frequency of analysis				
b. Ground Water				
o Sample locations for ground water (# =)				
o Sampling method				
o Type and frequency of analysis				

⁺ Licensee's specific report title if different:

Date:

Table F-1. CHECKLIST FOR ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 12-31-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
A. Radiological Environmental Monitoring Program (Cont.)				
3. Waterborne (NUREG-0472/0473, Table 3.12-1) (Cont.)				
c. Drinking water				
o Sample locations for drinking water (# =)	_____	_____	_____	_____
o Sampling method and collection frequency	_____	_____	_____	_____
o Type and frequency of analysis	_____	_____	_____	_____
d. Sediment from Shoreline				
o Sample locations for shoreline water (# =)	_____	_____	_____	_____
o Sampling method and collection frequency	_____	_____	_____	_____
o Type and frequency of analysis	_____	_____	_____	_____
4. Ingestion (NUREG-0472/0473, Table 3.12-1)				
a. Milk				
o Sample locations for milk (# =)	_____	_____	_____	_____
o Sampling method and collection frequency	_____	_____	_____	_____
o Type and frequency of analysis	_____	_____	_____	_____
b. Fish and Invertebrates				
o Sample locations for fish and invertebrates (# =)	_____	_____	_____	_____
o Sampling method and collection frequency	_____	_____	_____	_____
o Type and frequency of analysis	_____	_____	_____	_____

Date:

Table F-1. CHECKLIST FOR ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 12-31-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
A. Radiological Environmental Monitoring Program (Cont.)				
4. Ingestion (NUREG-0472/0473, Table 3.12-1) (Cont.)				
c. Food products				
o Sample locations for food products (# =)	_____	_____	_____	_____
o Sampling method and collection frequency	_____	_____	_____	_____
o Type and frequency of analysis	_____	_____	_____	_____
5. Table and Maps for Sample Locations (NUREG-0472/0473, Specification 6.9.1.11)				
a. Table and map of sample locations near the site, giving distance and directions from the centerline of the reactor	_____	_____	_____	_____
b. Table and map of other sample locations at more distant stations, giving distances and direction from the centerline of the reactor	_____	_____	_____	_____
B. Radiological Environmental Monitoring Program Surveillance				
1. Direct Radiation (NUREG-0472/0473, Specification 4.12.1)				
o Results of quarterly TLD gamma doses for all sample locations (# mmts =)	_____	_____	_____	_____
o Comparison with previous operational results and analysis of trend	_____	_____	_____	_____
o Comparison with control location results	_____	_____	_____	_____
o Comparison with preoperational studies	_____	_____	_____	_____
o Assessment of the observed impact of plant operation on the environment	_____	_____	_____	_____

Date:

Table F-1. CHECKLIST FOR ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT (Cont.)

Plant Name:

Reporting Period: 01-01-86 to 12-31-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
B. Radiological Environmental Monitoring Program Surveillance (Cont.)				
2. Airborne (NUREG-0472/0473, Specification 4.12.1)				
o Results of weekly iodine-131 analysis (# anal =)	_____	_____	_____	_____
o Results of weekly gross beta radioactivity analysis (# anal =)	_____	_____	_____	_____
o Comparison with previous operational results and analysis of trend	_____	_____	_____	_____
o Comparison with control location results	_____	_____	_____	_____
o Comparison with preoperational studies	_____	_____	_____	_____
o Assessment of the observed impact on the environment	_____	_____	_____	_____
3. Waterborne (NUREG-0472/0473, Specification 4.12.1)				
a. Surface Water				
o Results of monthly gamma isotopic composite analysis (# anal =)	_____	_____	_____	_____
o Results of quarterly tritium composite analysis (# anal =)	_____	_____	_____	_____
o Comparison with previous operational results and analysis of trend	_____	_____	_____	_____
o Comparison with control location results	_____	_____	_____	_____
o Comparison with preoperational studies	_____	_____	_____	_____
o Assessment of the observed impact on the environment	_____	_____	_____	_____

Date:

Table F-1. CHECKLIST FOR ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 12-31-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
B. Radiological Environmental Monitoring Program Surveillance (Cont.)				
3. Waterborne (NUREG-0472/0473, Specification 4.12.1) (Cont.)				
b. Ground Water				
o Results of quarterly gamma isotopic analysis (# anal =)	_____	_____	_____	_____
o Results of quarterly tritium composite analysis (# anal =)	_____	_____	_____	_____
o Comparison with previous operational results and analysis of trend	_____	_____	_____	_____
o Comparison with control location results	_____	_____	_____	_____
o Comparison with preoperational studies	_____	_____	_____	_____
o Assessment of the observed impact on the environment	_____	_____	_____	_____
c. Drinking Water				
o Results of biweekly iodine-131 composite analysis (# anal =)	_____	_____	_____	_____
o Results of monthly gross beta composite analysis (# anal =)	_____	_____	_____	_____
o Results of monthly gamma isotopic composite analysis (# anal =)	_____	_____	_____	_____
o Results of quarterly tritium composite analysis (# anal =)	_____	_____	_____	_____
o Comparison with previous operational results and analysis of trend	_____	_____	_____	_____
o Comparison with control location results	_____	_____	_____	_____
o Comparison with preoperational studies	_____	_____	_____	_____
o Assessment of the observed impact on the environment	_____	_____	_____	_____

Table F-1. CHECKLIST FOR ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 12-31-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
B. Radiological Environmental Monitoring Program Surveillance (Cont.)				
3. Waterborne (NUREG-0472/0473, Specification 4.12.1) (Cont.)				
d. Sediment from Shoreline				
o Results of semiannual gamma isotopic analysis (# anal =)	_____	_____	_____	_____
o Comparison with previous operational results and analysis of trend	_____	_____	_____	_____
o Comparison with control location results	_____	_____	_____	_____
o Comparison with preoperational studies	_____	_____	_____	_____
o Assessment of observed impact on the environment	_____	_____	_____	_____
4. Ingestion (NUREG-0472/0473, Specification 4.12.1)				
a. Milk				
o Results of semimonthly/monthly iodine-131 analysis (# anal =)	_____	_____	_____	_____
o Results of semimonthly/monthly gamma isotopic analysis (# anal =)	_____	_____	_____	_____
o Comparison with previous operational results and analysis of trend	_____	_____	_____	_____
o Comparison with control location results	_____	_____	_____	_____
o Comparison with preoperational studies	_____	_____	_____	_____
o Assessment of the observed impact on the environment	_____	_____	_____	_____

Date:

Table F-1. CHECKLIST FOR ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT (Cont.)

Plant Name:

Reporting Period: 01-01-86 to 12-31-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
B. Radiological Environmental Monitoring Program Surveillance (Cont.)				
4. Ingestion (NUREG-0472/0473, Specification 4.12.1) (Cont.)				
b. Fish and Invertebrates				
o Results of semiannual gamma isotopic analysis on edible portions (# anal =)	_____	_____	_____	_____
o Comparison with previous operational results and analysis of trend	_____	_____	_____	_____
o Comparison with control location results	_____	_____	_____	_____
o Comparison with preoperational studies	_____	_____	_____	_____
o Assessment of the observed impact on the environment	_____	_____	_____	_____
c. Food Products (Irrigation)				
o Results of gamma isotopic analysis (# anal =)	_____	_____	_____	_____
o Comparison with previous operational results and analysis of trend	_____	_____	_____	_____
o Comparison with control location results	_____	_____	_____	_____
o Comparison with preoperational studies	_____	_____	_____	_____
o Assessment of the observed impact on the environment	_____	_____	_____	_____
d. Food Products (Broad Leaf Vegetation)				
o Results of monthly iodine-131 analysis during growing season (# anal =)	_____	_____	_____	_____
o Results of monthly gamma isotopic analysis during growing season (# anal =)	_____	_____	_____	_____

Date:

Table F-1. CHECKLIST FOR ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 12-31-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
B. Radiological Environmental Monitoring Program Surveillance (Cont.)				
4. Ingestion (NUREG-0473, Specification 4.12.1) (Cont.)				
d. Food Products (Broad Leaf Vegetation) (Cont.)				
o Comparison with previous operational results and analysis of trend	_____	_____	_____	_____
o Comparison with control location results	_____	_____	_____	_____
o Comparison with preoperational studies	_____	_____	_____	_____
o Assessment of observed impact on the environment	_____	_____	_____	_____
C. Land Use Census (NUREG-0472/0473, Specification 4.12.2)				
o Results of the land use census for the past 12 months	_____	_____	_____	_____
D. Interlaboratory Comparison Program (NUREG-0472/0473, Specification 4.12.2)				
o Results of Licensee participation in the Interlaboratory Comparison Program	_____	_____	_____	_____

Date:

Table F-1. CHECKLIST FOR ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 12-31-86

Part II - Reporting Requirements Subject to Conditions

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
Radiological Environmental Monitoring Program				
1. Were there any deviations from the monitoring program of Table 3.12-1 of the Technical Specifications? Yes _____ No _____ If yes, discuss reasons and plans for preventing recurrences. (NUREG-0472/0473, Specification 3.12.1)	_____	_____	_____	_____
2. Is the potential annual dose to a MEMBER OF THE PUBLIC equal to or greater than the calendar year limits of Specifications 3.11.1.2, 3.11.2.2, and 3.11.2.3? Yes _____ No _____ If yes, is it the result of plant effluents? Yes _____ No _____ If no, the condition should be reported and described. (NUREG-0472/0473, Specification 3.12.1)	_____	_____	_____	_____
3. Were any LLDs required by Table 4.12-1 of the Technical Specifications unachievable? Yes _____ No _____ If yes, identify and describe the factors contributing to not achieving the required LLDs. (NUREG-0472/0473, Specification 4.12.1)	_____	_____	_____	_____
4. Was there failure to perform analyses on radioactive materials in accordance with an interlaboratory comparison program during the reporting period? Yes _____ No _____ If yes, state corrective actions taken to prevent a recurrence of the failure. (NUREG-0472/0473, Specification 3.12.3)	_____	_____	_____	_____

Date:

Table F-1. CHECKLIST FOR ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 12-31-86

Part III - Other Special RETS-Related Reporting Commitments of the Licensee*

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>

*The requirements are those of the Licensee's RETS-related reporting commitments which are different from those of the model RETS.

Date:

Table F-2. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT*

Plant Name:

Report Period: 01-01-86 to 06-30-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
A. Supplemental Report Information				
1. Technical Specification limits for radioactive materials released in liquid and gaseous effluents (Regulatory Guide 1.21, Appendix B, Section A)	_____	_____	_____	_____
2. Maximum permissible concentrations (MPCs) used in determining allowable release rates or concentrations (Regulatory Guide 1.21, Appendix B, Section A)				
a. Fission and activation gases:	_____	_____	_____	_____
b. Iodines:	_____	_____	_____	_____
c. Particulates, half-lives greater than 8 days:	_____	_____	_____	_____
d. Liquid effluents:	_____	_____	_____	_____
3. Average energy (E) of the radionuclide mixture in releases of fission and activation gases (Regulatory Guide 1.21, Appendix B, Section A)	Superseded by NUREG-0473 dose calculations			
4. Methods used to determine effluent total radioactivity, the radionuclide composition, and overall errors in measurement (Regulatory Guide 1.21, Appendix B, Section A)				
a. Fission and activation gases:	_____	_____	_____	_____
b. Iodines:	_____	_____	_____	_____
c. Particulates:	_____	_____	_____	_____
d. Liquid effluents:	_____	_____	_____	_____

*Licensee's specific title if different:

Date:

Table F-2. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 06-30-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
A. Supplemental Report Information (Cont.)				
5. Information relating to batch releases of radioactive materials in liquid and gaseous effluents (Regulatory Guide 1.21, Appendix B, Section A)				
a. Liquid				
1. Number of batch releases:	_____	_____	_____	_____
2. Total time period for batch releases:	_____	_____	_____	_____
3. Maximum time period for a batch release:	_____	_____	_____	_____
4. Average time period for batch releases:	_____	_____	_____	_____
5. Minimum time period for a batch release:	_____	_____	_____	_____
6. Average stream flow during period of release of effluent into a flowing stream:	_____	_____	_____	_____
b. Gaseous				
1. Number of batch releases:	_____	_____	_____	_____
2. Total time period for batch releases:	_____	_____	_____	_____
3. Maximum time period for a batch release:	_____	_____	_____	_____
4. Average time period for batch releases:	_____	_____	_____	_____
5. Minimum time period for a batch release:	_____	_____	_____	_____
6. Abnormal Releases (Regulatory Guide 1.21, Appendix B, Section A)				
a. Liquid				
1. Number of releases:	_____	_____	_____	_____
2. Total activity released:	_____	_____	_____	_____

Date:

Table F-2. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 06-30-86

Part I - Routine Reporting Requirements

Reporting Contents	Information in Licensee's Submittal			
	Complete	Partial	Not Addressed	Not Applicable/ Not Required
A. Supplemental Report Information (Cont.)				
6. Abnormal Releases (Regulatory Guide 1.21, Appendix B, Section A) (Cont.)				
b. Gaseous				
1. Number of releases:	_____	_____	_____	_____
2. Total activity released:	_____	_____	_____	_____
B. Radioactive Effluent Releases				
B-1. Liquid Effluent Release Summary				
1. Mixed Fission and Activation Products (Regulatory Guide 1.21, Appendix B, Section C)				
a. Quarterly sums of total curies of radioactive material determined to be released in liquid effluents and estimated error (not including tritium, dissolved and entrained gases, and alpha-emitting material). (Table 2A of Regulatory Guide 1.21)	_____	_____	_____	_____
b. Average concentrations (uCi/ml) of mixed fission and activation products released to unrestricted areas, averaged over the quarterly periods covered by the report	_____	_____	_____	_____
c. Percent of applicable limit of average concentrations released to unrestricted areas. Include the limit used and the bases in the supplemental report information	_____	_____	_____	_____
	Superseded by NUREG-0473 dose limits			
d. Quarterly sums of total curies for each of the radionuclides determined to be released in liquid effluents, based on analyses performed. Data should be separated by type of release mode, i.e., continuous or batch	_____	_____	_____	_____

Date:

Table F-2. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 06-30-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
B. Radioactive Effluent Releases (Cont.)				
B-1. Liquid Effluent Release Summary (Cont.)				
2. Tritium (Regulatory Guide 1.21, Appendix B, Section C)				
a. Quarterly sums of total curies of tritium determined to be released in liquid effluents and estimated error	_____	_____	_____	_____
b. Average concentrations (uCi/ml) of tritium released in liquid effluents to unrestricted areas, averaged over the quarterly periods covered by the report	_____	_____	_____	_____
c. Percent of applicable limit of average concentrations released to unrestricted areas, i.e., percent of 3×10^{-3} uCi/ml. Include the limit and the bases in the supplemental report information	Superseded by NUREG-0473 dose limits			
3. Dissolved and Entrained Gases (Regulatory Guide 1.21, Appendix B, Section C)				
a. Quarterly sums of total curies of gaseous radioactive material determined to be released in liquid effluents and estimated error	_____	_____	_____	_____
b. Average concentrations (uCi/ml) of dissolved and entrained gaseous radioactive material released to unrestricted areas, averaged over the quarterly periods covered by the report	_____	_____	_____	_____
c. Percent of technical specification limit of average concentrations released to unrestricted areas. Include the limit used and the bases in the supplemental report information	Superseded by NUREG-0473 dose limits			
d. Quarterly sums of total curies for each of the radionuclides determined to be released as dissolved and entrained gases in liquid effluents	_____	_____	_____	_____

Date:

Table F-2. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 06-30-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
B. Radioactive Effluent Releases (Cont.)				
B-1. Liquid Effluent Release Summary (Cont.)				
4. Alpha Radioactivity and estimated error, (Regulatory Guide 1.21, Appendix B, Section C)				
Quarterly sums of total curies of gross alpha-emitting material determined to be released in liquid effluents	_____	_____	_____	_____
5. Volumes (Regulatory Guide 1.21, Appendix B, Section C)				
a. Quarterly sums, in liters, of total measured volume, prior to dilution of liquid effluent released and estimated error	_____	_____	_____	_____
b. Quarterly sums of total determined volume, in liters, of dilution water used during the period of the report and estimated error	_____	_____	_____	_____
B-2. Gaseous Effluent Release Summary				
1. Gases (Regulatory Guide 1.21, Appendix B, Section B)				
a. Quarterly sums of total curies of fission and activation gases released and estimated error	_____	_____	_____	_____
b. Average release rates (uCi/sec) of fission and activation gases for the quarterly periods covered by the report	_____	_____	_____	_____

Date:

Table F-2. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 06-30-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/Not Required</u>
B. Radioactive Effluent Releases (Cont.)				
B-2. Gaseous Effluent Release Summary (Cont.)				
1. Gases (Regulatory Guide 1.21, Appendix B, Section B) (Cont.)				
c. Percent of technical specification limit for releases of fission and activation gases. This should be calculated in accordance with technical specification limits				Superseded by NUREG-0473 dose limits
d. Quarterly sums of total curies for each of the radionuclides determined to be released, based on analyses of fission and activation gases. The data should be categorized by (1) elevated releases, batch and continuous modes, and (2) ground-level releases, batch and continuous modes. (Tables 1B and 1C of Regulatory Guide 1.21)	_____	_____	_____	_____
2. Iodines (Regulatory Guide 1.21, Appendix B, Section B)				
a. Quarterly sums of total curies of iodine-131 released and estimated error	_____	_____	_____	_____
b. Average release rate (uCi/sec) of iodine-131	_____	_____	_____	_____
c. Percent of technical specification limit for iodine-131				Superseded by NUREG-0473 dose limits
d. Quarterly sums of total curies of each of the isotopes, iodine-131, iodine-133, and iodine-135 determined to be released. (Tables 1B and 1C of Regulatory Guide 1.21)	_____	_____	_____	_____

Date:

Table F-2. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 06-30-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
B. Radioactive Effluent Releases (Cont.)				
B-2. Gaseous Effluent Release Summary (Cont.)				
3. Particulates (Regulatory Guide 1.21, Appendix B, Section B)				
a. Quarterly sums of total curies of radioactive material in particulate form with half-lives greater than 8 days determined to be released and estimated error	_____	_____	_____	_____
b. Average release rate (uCi/sec) of radioactive material in particulate form with half-lives greater than 8 days	_____	_____	_____	_____
c. Percent of technical specification limit for radioactive material in particulate form with half-lives greater than 8 days	_____	_____	_____	_____
d. Quarterly sums of total curies for each of the radionuclides in particulate form determined to be released based on analyses performed. (Tables 1B and 1C of Regulatory Guide 1.21)	_____	_____	_____	_____
e. Quarterly sums of total curies of gross alpha radioactivity determined to be released	_____	_____	_____	_____
4. Tritium (Regulatory Guide 1.21, Appendix B, Section B)				
a. Quarterly sums of total curies of tritium determined to be released in gaseous effluents and estimated error	_____	_____	_____	_____
b. Average release rate (uCi/sec) of tritium	_____	_____	_____	_____

Date:

Table F-2. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 06-30-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
B. Radioactive Effluent Releases (Cont.)				
B-2. Gaseous Effluent Release Summary (Cont.)				
4. Tritium (Regulatory Guide 1.21, Appendix B, Section B) (Cont.)				
c. Percent of appropriate technical specification or MPC limits for tritium	_____	_____	_____	_____
B-3. Unplanned Effluent Releases				
Did any of the following unplanned releases occur during the reporting period?				
1. Liquid Releases Yes _____ No _____				
2. Gaseous Releases Yes _____ No _____				
If any unplanned releases occurred, the report shall include a list and description of the release(s)	_____	_____	_____	_____

Date:

Table F-2. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 06-30-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
C. Solid Radioactive Waste				
1. The semiannual total quantity in cubic meters and the semiannual total radioactivity in curies, and estimated error, for the categories or types of waste. (Regulatory Guide 1.21, Table 3) These categories should be reported separately for each class of waste in C.5 below.	_____	_____	_____	_____
a. Spent resins, filter sludges, evaporator bottoms	_____	_____	_____	_____
b. Dry compressible waste, contaminated equipment, etc.	_____	_____	_____	_____
c. Irradiated components, control rods, etc.	_____	_____	_____	_____
d. Other, (furnish description)	_____	_____	_____	_____
2. An estimate of the major nuclide composition in the waste categories. (Regulatory Guide 1.21, Appendix B, Section D)	_____	_____	_____	_____
3. The disposition of solid waste shipments. (Identify the number of shipments, the mode of transport, and the destination.) (Regulatory Guide 1.21, Appendix B, Section D)	_____	_____	_____	_____
4. The disposition of irradiated fuel shipments. (Identify the number of shipments, its mode of transportation, and the destination.) (Regulatory Guide 1.21, Appendix B, Section D)	_____	_____	_____	_____
5. Provide the following information for each class of solid waste (as defined by 10CFR Part 61) shipped offsite during the report period:	_____	_____	_____	_____
a. Container volume, in liters	_____	_____	_____	_____
b. Total curie quantity (specify whether determined by measurement or estimate). (Sum of categories in C.1 above.)	_____	_____	_____	_____

Date:

Table F-2. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 06-30-86

Part I - Routine Reporting Requirements

Reporting Contents	Information in Licensee's Submittal			
	Complete	Partial	Not Addressed	Not Applicable/ Not Required
C. Solid Radioactive Waste (Cont.)				
5. Provide the following information for each class of solid waste (A, B, C, as defined by 10CFR Part 61) shipped offsite during the report period: (Cont.)				
c. Principal nuclides (specify whether determined by measurement or estimate). [Sum of quantities in C.2 above for each class (A, B, C).]	_____	_____	_____	_____
d. Source of waste and processing employed (e.g., dewatered spent resin, compact dry waste, evaporator bottoms). (Sources are categories a, b, c, d in C.1 above.)	_____	_____	_____	_____
e. Type of container (e.g., LSA, Type A, Type B, Large Quantity). (Should be specified for each category in C.1 above.)	_____	_____	_____	_____
f. Solidification agent or absorbent (e.g., cement, urea formaldehyde). (Usually applicable only to category C.1.a above.)	_____	_____	_____	_____
(NUREG-0472/0473, 6.9.1.12)				
D. Radiological Dose Assessment (Regulatory Guide 1.21, Appendix B, Section E)				
D-1.				
1. Total body and significant organ doses to individuals in unrestricted areas from receiving-water-related exposure pathways	_____	_____	_____	_____
2. Total body and skin doses to individuals exposed at the point of maximum offsite ground-level concentrations of radioactive materials in gaseous effluents	_____	_____	_____	_____

Date:

Table F-2. CHECK LIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 06-30-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
D. Radiological Dose Assessment (Regulatory Guide 1.21, Appendix B, Section E) (Cont.)				
D-1 (Cont.)				
3. Organ doses to individuals in unrestricted areas from radioactive iodine and radioactive material in particulate form from all pathways of exposure	_____	_____	_____	_____
4. Total body doses of individuals and populations in unrestricted areas from direct radiation from the facility	_____	_____	_____	_____
5. Total body doses to the population and average doses to individuals in the population from all receiving-water-related pathways	_____	_____	_____	_____
6. Total body doses to the population and average doses to individuals in the population from gaseous effluents to a distance of 50 miles from the site. If a significantly large population area is located just beyond 50 miles from the site, the dose to this population group should be considered	_____	_____	_____	_____
D-2. An assessment of radiation doses due to radioactive liquid and gaseous effluents released from the unit or station during the previous calendar year. (NUREG-0473, Specification 6.9.1.12)	_____	_____	_____	_____
1. The dose or dose commitment to a MEMBER OF OF THE PUBLIC from radioactive materials in liquid effluents released, from each reactor unit, to UNRESTRICTED AREAS.				
2. The (gamma and beta) air doses due to noble gases released in gaseous effluents, from each reactor unit, to areas at and beyond the SITE BOUNDARY.				

Date:

Table F-2. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 06-30-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
D-2. (Cont.)				
3. The dose to a MEMBER OF THE PUBLIC from iodine-131, iodine-133, tritium, and all radionuclides with half-lives greater than 8 days in gaseous effluents released, from each reactor unit, to areas at and beyond the SITE BOUNDARY.				
4. An assess of radiation doses from liquid and gaseous effluents to MEMBERS OF THE PUBLIC due to their activities inside the SITE BOUNDARY during the report period.				
5. An assessment of radiation doses to the likely most exposed MEMBER OF THE PUBLIC from reactor releases and other nearby fuel cycle sources, including doses from primary effluent pathways and direct radiation for the previous calendar year to show conformance with 40 CFR Part 190.				
E. Meteorological Data* (Regulatory Guide 1.23 and Tables 4A and 4B in Appendix B of Regulatory Guide 1.21)				
*The report should include the cumulative joint frequency distribution of wind speed, wind direction, and atmospheric stability for the quarterly periods. Similar data should be reported separately for the meteorological conditions during batch releases. In lieu of submission with the first half year Radioactive Effluent Release Report the Licensee has the option of retaining this summary of required meteorological data on site in a file that shall be provided to the NRC upon request.				

Date:

Table F-2. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 06-30-86

Part II - Reporting Requirements Subject to Conditions

Reporting Contents	Is the Subject Reported in the Submittal?			If Yes, Information in Licensee's Submittal	
	Yes	No	Not Applicable/ Not Required	Complete	Partial
A. Monitoring Instrumentation					
Explanation of why inoperability was not corrected in a timely manner for:					
1. Liquid Effluent (NUREG-0472/0473, Specification 3.3.3.10)	—	—	—	—	—
2. Gaseous Effluent (NUREG-0472/0473, Specification 3.3.3.11)	—	—	—	—	—
B. Radioactivity Inventory (NUREG-0472/0473, Specification 3.11.1.4)					
Description of event(s) leading to exceeding curie limit for liquid holdup tanks	—	—	—	—	—
C. Radiological Environmental Monitoring Program					
1. Sampling Relocation (NUREG-0472/0473 Specification 3.12.2)					
o Causes of unavailability of milk and fresh leafy vegetable samples	—	—	—	—	—
o Revised figure(s) and table for the ODCM reflecting the new location(s)	—	—	—	—	—
o Identification of the new location(s)	—	—	—	—	—
2. Land Use Census (NUREG-0472/0473 Specification 3.12.2)					
o Identification of the new location(s) as a result of land use census	—	—	—	—	—
o Revised figure(s) and table for the ODCM reflecting the new location(s) as a result of land use census	—	—	—	—	—

Date:

Table F-2. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 06-30-86

Part II - Reporting Requirements Subject to Conditions

Reporting Contents	Is the Subject Reported in the Submittal?			If Yes, Information in Licensee's Submittal	
	Yes	No	Not Applicable/ Not Required	Complete	Partial
D. Licensee-Initiated Changes to the ODCM/Radwaste					
1. ODCM (NUREG-0472/0473, Specification 6.14)					
o Rationale for changes	—	—	—	—	—
o Compliance with existing ODCM criteria	—	—	—	—	—
o Review and acceptance by the plant URG	—	—	—	—	—
2. Radwaste Systems (NUREG-0472/0473, Specification 6.15)					
o Detailed rationale for changes	—	—	—	—	—
o Compliance with 10 CFR 50.59	—	—	—	—	—
o Review and acceptance by the plant URG	—	—	—	—	—

*No change made during period. (NA)

**To be reported in _____ per _____ . (NR)

Date:

Table F-2. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENTS RELEASE REPORT (Cont.)

Plant Name:

Report Period: 01-01-86 to 06-30-86

Part III - Other Special RETS-Related Reporting Commitments of the Licensee*

<u>Reporting Contents</u>	<u>Is the Subject Reported in the Submittal?</u>			<u>If Yes, Information in Licensee's Submittal</u>	
	<u>Yes</u>	<u>No</u>	<u>Not Applicable/ Not Required</u>	<u>Complete</u>	<u>Partial</u>

* The requirements are those of the licensee's RETS-related reporting commitments which are different from those of the model RETS.

Date:

Table F-3. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT*

Plant Name:

Report Period: 07-01-86 to 12-31-86

Part 1 - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			<u>Not Applicable/ Not Required</u>
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	
A. Supplemental Report Information				
1. Technical Specification limits for radioactive materials released in liquid and gaseous effluents (Regulatory Guide 1.21, Appendix B, Section A)	_____	_____	_____	_____
2. Maximum permissible concentrations (MPCs) used in determining allowable release rates or concentrations (Regulatory Guide 1.21, Appendix B, Section A)				
a. Fission and activation gases:	_____	_____	_____	_____
b. Iodines:	_____	_____	_____	_____
c. Particulates, half-lives greater than 8 days:	_____	_____	_____	_____
d. Liquid effluents:	_____	_____	_____	_____
3. Average energy (E) of the radionuclide mixture in releases of fission and activation gases (Regulatory Guide 1.21, Appendix B, Section A)	Superseded by NUREG-0473 dose calculations			
4. Methods used to determine effluent total radioactivity, the radionuclide composition, and overall errors in measurement (Regulatory Guide 1.21, Appendix B, Section A)				
a. Fission and activation gases:	_____	_____	_____	_____
b. Iodines:	_____	_____	_____	_____
c. Particulates:	_____	_____	_____	_____
d. Liquid effluents:	_____	_____	_____	_____

*Licensee's specific title if different:

Date:

Table F-3. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 07-01-86 to 12-31-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
A. Supplemental Report Information (Cont.)				
5. Information relating to batch releases of radioactive materials in liquid and gaseous effluents (Regulatory Guide 1.21, Appendix B, Section A)				
a. Liquid				
1. Number of batch releases:	_____	_____	_____	_____
2. Total time period for batch releases:	_____	_____	_____	_____
3. Maximum time period for a batch release:	_____	_____	_____	_____
4. Average time period for batch releases:	_____	_____	_____	_____
5. Minimum time period for a batch release:	_____	_____	_____	_____
6. Average stream flow during period of release of effluent into a flowing stream:	_____	_____	_____	_____
b. Gaseous				
1. Number of batch releases:	_____	_____	_____	_____
2. Total time period for batch releases:	_____	_____	_____	_____
3. Maximum time period for a batch release:	_____	_____	_____	_____
4. Average time period for batch releases:	_____	_____	_____	_____
5. Minimum time period for a batch release:	_____	_____	_____	_____
6. Abnormal Releases (Regulatory Guide 1.21, Appendix B, Section A)				
a. Liquid				
1. Number of releases:	_____	_____	_____	_____
2. Total activity released:	_____	_____	_____	_____

Date:

Table F-3. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 07-01-86 to 12-31-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
A. Supplemental Report Information (Cont.)				
6. Abnormal Releases (Regulatory Guide 1.21, Appendix B, Section A) (Cont.)				
b. Gaseous				
1. Number of releases:	_____	_____	_____	_____
2. Total activity released:	_____	_____	_____	_____
B. Radioactive Effluent Releases				
B-1. Liquid Effluent Release Summary				
1. Mixed Fission and Activation Products (Regulatory Guide 1.21, Appendix B, Section C)				
a. Quarterly sums of total curies of radioactive material determined to be released in liquid effluents and estimated error (not including tritium, dissolved and entrained gases, and alpha-emitting material). (Table 2A of Regulatory Guide 1.21)	_____	_____	_____	_____
b. Average concentrations (uCi/ml) of mixed fission and activation products released to unrestricted areas, averaged over the quarterly periods covered by the report	_____	_____	_____	_____
c. Percent of applicable limit of average concentrations released to unrestricted areas. Include the limit used and the bases in the supplemental report information				
	Superseded by NUREG-0473 dose limits			
d. Quarterly sums of total curies for each of the radionuclides determined to be released in liquid effluents, based on analyses performed. Data should be separated by type of release mode, i.e., continuous or batch	_____	_____	_____	_____

Date:

Table F-3. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 07-01-86 to 12-31-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
B. Radioactive Effluent Releases (Cont.)				
B-1. Liquid Effluent Release Summary (Cont.)				
2. Tritium (Regulatory Guide 1.21, Appendix B, Section C)				
a. Quarterly sums of total curies of tritium determined to be released in liquid effluents and estimated error	_____	_____	_____	_____
b. Average concentrations (uCi/ml) of tritium released in liquid effluents to unrestricted areas, averaged over the quarterly periods covered by the report	_____	_____	_____	_____
c. Percent of applicable limit of average concentrations released to unrestricted areas, i.e., percent of 3×10^{-3} uCi/ml. Include the limit and the bases in the supplemental report information	Superseded by NUREG-0473 dose limits			
3. Dissolved and Entrained Gases (Regulatory Guide 1.21, Appendix B, Section C)				
a. Quarterly sums of total curies of gaseous radioactive material determined to be released in liquid effluents and estimated error	_____	_____	_____	_____
b. Average concentrations (uCi/ml) of dissolved and entrained gaseous radioactive material released to unrestricted areas, averaged over the quarterly periods covered by the report	_____	_____	_____	_____
c. Percent of technical specification limit of average concentrations released to unrestricted areas. Include the limit used and the bases in the supplemental report information	Superseded by NUREG-0473 dose limits			
d. Quarterly sums of total curies for each of the radionuclides determined to be released as dissolved and entrained gases in liquid effluents	_____	_____	_____	_____

Date:

Table F-3. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 07-01-86 to 12-31-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
B. Radioactive Effluent Releases (Cont.)				
B-1. Liquid Effluent Release Summary (Cont.)				
4. Alpha Radioactivity and estimated error, (Regulatory Guide 1.21, Appendix B, Section C)				
Quarterly sums of total curies of gross alpha-emitting material determined to be released in liquid effluents	_____	_____	_____	_____
5. Volumes (Regulatory Guide 1.21, Appendix B, Section C)				
a. Quarterly sums, in liters, of total measured volume, prior to dilution of liquid effluent released and estimated error	_____	_____	_____	_____
b. Quarterly sums of total determined volume, in liters, of dilution water used during the period of the report and estimated error	_____	_____	_____	_____
B-2. Gaseous Effluent Release Summary				
1. Gases (Regulatory Guide 1.21, Appendix B, Section B)				
a. Quarterly sums of total curies of fission and activation gases released and estimated error	_____	_____	_____	_____
b. Average release rates (uCi/sec) of fission and activation gases for the quarterly periods covered by the report	_____	_____	_____	_____

Date:

Table F-3. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 07-01-86 to 12-31-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
B. Radioactive Effluent Releases (Cont.)				
B-2. Gaseous Effluent Release Summary (Cont.)				
1. Gases (Regulatory Guide 1.21, Appendix B, Section B) (Cont.)				
c. Percent of technical specification limit for releases of fission and activation gases. This should be calculated in accordance with technical specification limits	Superseded by NUREG-0473 dose limits			
d. Quarterly sums of total curies for each of the radionuclides determined to be released, based on analyses of fission and activation gases. The data should be categorized by (1) elevated releases, batch and continuous modes, and (2) ground-level releases, batch and continuous modes. (Tables 1B and 1C of Regulatory Guide 1.21)	_____	_____	_____	_____
2. Iodines (Regulatory Guide 1.21, Appendix B, Section B)				
a. Quarterly sums of total curies of iodine-131 released and estimated error	_____	_____	_____	_____
b. Average release rate (uCi/sec) of iodine-131	_____	_____	_____	_____
c. Percent of technical specification limit for iodine-131	Superseded by NUREG-0473 dose limits			
d. Quarterly sums of total curies of each of the isotopes, iodine-131, iodine-133, and iodine-135 determined to be released. (Tables 1B and 1C of Regulatory Guide 1.21)	_____	_____	_____	_____

Date:

Table F-3. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 07-01-86 to 12-31-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
B. Radioactive Effluent Releases (Cont.)				
B-2. Gaseous Effluent Release Summary (Cont.)				
3. Particulates (Regulatory Guide 1.21, Appendix B, Section B)				
a. Quarterly sums of total curies of radioactive material in particulate form with half-lives greater than 8 days determined to be released and estimated error	_____	_____	_____	_____
b. Average release rate (uCi/sec) of radioactive material in particulate form with half-lives greater than 8 days	_____	_____	_____	_____
c. Percent of technical specification limit for radioactive material in particulate form with half-lives greater than 8 days	_____	_____	_____	_____
d. Quarterly sums of total curies for each of the radionuclides in particulate form determined to be released based on analyses performed. (Tables 1B and 1C of Regulatory Guide 1.21)	_____	_____	_____	_____
e. Quarterly sums of total curies of gross alpha radioactivity determined to be released	_____	_____	_____	_____
4. Tritium (Regulatory Guide 1.21, Appendix B, Section B)				
a. Quarterly sums of total curies of tritium determined to be released in gaseous effluents and estimated error	_____	_____	_____	_____
b. Average release rate (uCi/sec) of tritium	_____	_____	_____	_____

Date:

Table F-3. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 07-01-86 to 12-31-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/Not Required</u>
B. Radioactive Effluent Releases (Cont.)				
B-2. Gaseous Effluent Release Summary (Cont.)				
4. Tritium (Regulatory Guide 1.21, Appendix B, Section B) (Cont.)				
c. Percent of appropriate technical specification or MPC limits for tritium	_____	_____	_____	_____
B-3. Unplanned Effluent Releases				
Did any of the following unplanned releases occur during the reporting period?				
1. Liquid Releases Yes _____ No _____				
2. Gaseous Releases Yes _____ No _____				
If any unplanned releases occurred, the report shall include a list and description of the release(s)	_____	_____	_____	_____

Date:

Table F-3. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 07-01-86 to 12-31-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
C. Solid Radioactive Waste				
1. The semiannual total quantity in cubic meters and the semiannual total radioactivity in curies, and estimated error, for the categories or types of waste. (Regulatory Guide 1.21, Table 3) These categories should be reported separately for each class of waste in C.5 below.	_____	_____	_____	_____
a. Spent resins, filter sludges, evaporator bottoms	_____	_____	_____	_____
b. Dry compressible waste, contaminated equipment, etc.	_____	_____	_____	_____
c. Irradiated components, control rods, etc.	_____	_____	_____	_____
d. Other, (furnish description)	_____	_____	_____	_____
2. An estimate of the major nuclide composition in the waste categories. (Regulatory Guide 1.21, Appendix B, Section D)	_____	_____	_____	_____
3. The disposition of solid waste shipments. (Identify the number of shipments, the mode of transport, and the destination.) (Regulatory Guide 1.21, Appendix B, Section D)	_____	_____	_____	_____
4. The disposition of irradiated fuel shipments. (Identify the number of shipments, its mode of transportation, and the destination.) (Regulatory Guide 1.21, Appendix B, Section D)	_____	_____	_____	_____
5. Provide the following information for each class of solid waste (as defined by 10CFR Part 61) shipped offsite during the report period:	_____	_____	_____	_____
a. Container volume, in liters	_____	_____	_____	_____
b. Total curie quantity (specify whether determined by measurement or estimate). (Sum of categories in C.1 above.)	_____	_____	_____	_____

Date:

Table F-3. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 07-01-86 to 12-31-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
C. Solid Radioactive Waste (Cont.)				
5. Provide the following information for each class of solid waste (A, B, C, as defined by 10CFR Part 61) shipped offsite during the report period: (Cont.)				
c. Principal nuclides (specify whether determined by measurement or estimate). [Sum of quantities in C.2 above for each class (A, B, C).]	_____	_____	_____	_____
d. Source of waste and processing employed (e.g., dewatered spent resin, compact dry waste, evaporator bottoms). (Sources are categories a, b, c, d in C.1 above.)	_____	_____	_____	_____
e. Type of container (e.g., LSA, Type A, Type B, Large Quantity). (Should be specified for each category in C.1 above.)	_____	_____	_____	_____
f. Solidification agent or absorbent (e.g., cement, urea formaldehyde). (Usually applicable only to category C.1.a above.)	_____	_____	_____	_____
(NUREG-0472/0473, 6.9.1.12)				
D. Radiological Dose Assessment (Regulatory Guide 1.21, Appendix B, Section E)				
D-1.				
1. Total body and significant organ doses to individuals in unrestricted areas from receiving-water-related exposure pathways	_____	_____	_____	_____
2. Total body and skin doses to individuals exposed at the point of maximum offsite ground-level concentrations of radioactive materials in gaseous effluents	_____	_____	_____	_____

Date:

Table F-3. CHECK LIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 07-01-86 to 12-31-86

Part I - Routine Reporting Requirements

<u>Reporting Contents</u>	<u>Information in Licensee's Submittal</u>			
	<u>Complete</u>	<u>Partial</u>	<u>Not Addressed</u>	<u>Not Applicable/ Not Required</u>
D. Radiological Dose Assessment (Regulatory Guide 1.21, Appendix B, Section E) (Cont.)				
D-1 (Cont.)				
3. Organ doses to individuals in unrestricted areas from radioactive iodine and radioactive material in particulate form from all pathways of exposure	_____	_____	_____	_____
4. Total body doses of individuals and populations in unrestricted areas from direct radiation from the facility	_____	_____	_____	_____
5. Total body doses to the population and average doses to individuals in the population from all receiving-water-related pathways	_____	_____	_____	_____
6. Total body doses to the population and average doses to individuals in the population from gaseous effluents to a distance of 50 miles from the site. If a significantly large population area is located just beyond 50 miles from the site, the dose to this population group should be considered	_____	_____	_____	_____
D-2. An assessment of radiation doses due to radioactive liquid and gaseous effluents released from the unit or station during the previous calendar year. (NUREG-0473, Specification 6.9.1.12)	_____	_____	_____	_____
1. The dose or dose commitment to a MEMBER OF OF THE PUBLIC from radioactive materials in liquid effluents released, from each reactor unit, to UNRESTRICTED AREAS.				
2. The (gamma and beta) air doses due to noble gases released in gaseous effluents, from each reactor unit, to areas at and beyond the SITE BOUNDARY.				

Date:

Table F-3. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 07-01-86 to 12-31-86

Part I - Routine Reporting Requirements

Reporting Contents	Information in Licensee's Submittal			
	Complete	Partial	Not Addressed	Not Applicable/ Not Required
D-2. (Cont.)				
3. The dose to a MEMBER OF THE PUBLIC from iodine-131, iodine-133, tritium, and all radionuclides with half-lives greater than 8 days in gaseous effluents released, from each reactor unit, to areas at and beyond the SITE BOUNDARY.				
4. An assess of radiation doses from liquid and gaseous effluents to MEMBERS OF THE PUBLIC due to their activities inside the SITE BOUNDARY during the report period.				
5. An assessment of radiation doses to the likely most exposed MEMBER OF THE PUBLIC from reactor releases and other nearby fuel cycle sources, including doses from primary effluent pathways and direct radiation for the previous calendar year to show conformance with 40 CFR Part 190.				
E. Meteorological Data* (Regulatory Guide 1.23 and Tables 4A and 4B in Appendix B of Regulatory Guide 1.21)				
*The report should include the cumulative joint frequency distribution of wind speed, wind direction, and atmospheric stability for the quarterly periods. Similar data should be reported separately for the meteorological conditions during batch releases. In lieu of submission with the first half year Radioactive Effluent Release Report the Licensee has the option of retaining this summary of required meteorological data on site in a file that shall be provided to the NRC upon request.				

Date:

Table F-3. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 07-01-86 to 12-31-86

Part II - Reporting Requirements Subject to Conditions

Reporting Contents	Is the Subject Reported in the Submittal?			If Yes, Information in Licensee's Submittal	
	Yes	No	Not Applicable/ Not Required	Complete	Partial
A. Monitoring Instrumentation					
Explanation of why inoperability was not corrected in a timely manner for:					
1. Liquid Effluent (NUREG-0472/0473, Specification 3.3.3.10)	_____	_____	_____	_____	_____
2. Gaseous Effluent (NUREG-0472/0473, Specification 3.3.3.11)	_____	_____	_____	_____	_____
B. Radioactivity Inventory (NUREG-0472/0473, Specification 3.11.1.4)					
Description of event(s) leading to exceeding curie limit for liquid holdup tanks	_____	_____	_____	_____	_____
C. Radiological Environmental Monitoring Program					
1. Sampling Relocation (NUREG-0472/0473 Specification 3.12.2)					
o Causes of unavailability of milk and fresh leafy vegetable samples	_____	_____	_____	_____	_____
o Revised figure(s) and table for the ODCM reflecting the new location(s)	_____	_____	_____	_____	_____
o Identification of the new location(s)	_____	_____	_____	_____	_____
2. Land Use Census (NUREG-0472/0473 Specification 3.12.2)					
o Identification of the new location(s) as a result of land use census	_____	_____	_____	_____	_____
o Revised figure(s) and table for the ODCM reflecting the new location(s) as a result of land use census	_____	_____	_____	_____	_____

Date:

Table F-3. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT (Cont.)

Plant Name:

Report Period: 07-01-86 to 12-31-86

Part II - Reporting Requirements Subject to Conditions

Reporting Contents	Is the Subject Reported in the Submittal?			If Yes, Information in Licensee's Submittal	
	Yes	No	Not Applicable/ Not Required	Complete	Partial
D. Licensee-Initiated Changes to the ODCM/Radwaste					
1. ODCM (NUREG-0472/0473, Specification 6.14)					
o Rationale for changes	_____	_____	_____	_____	_____
o Compliance with existing ODCM criteria	_____	_____	_____	_____	_____
o Review and acceptance by the plant URG	_____	_____	_____	_____	_____
2. Radwaste Systems (NUREG-0472/0473, Specification 6.15)					
o Detailed rationale for changes	_____	_____	_____	_____	_____
o Compliance with 10 CFR 50.59	_____	_____	_____	_____	_____
o Review and acceptance by the plant URG	_____	_____	_____	_____	_____

*No change made during period. (NA)

**To be reported in _____ per _____ . (NR)

Date:

Table F-3. CHECKLIST FOR SEMIANNUAL RADIOACTIVE EFFLUENTS RELEASE REPORT (Cont.)

Plant Name:

Report Period: 07-01-86 to 12-31-86

Part III - Other Special RETS-Related Reporting Commitments of the Licensee*

	Is the Subject Reported in the Submittal?			If Yes, Information in Licensee's Submittal	
	Yes	No	Not Applicable/ Not Required	Complete	Partial
<u>Reporting Contents</u>					

* The requirements are those of the licensee's RETS-related reporting commitments which are different from those of the model RETS.

Date:

NRC FORM 325- (2-86) NRCM 1102, 3201, 3202 BIBLIOGRAPHIC DATA SHEET SEE INSTRUCTIONS ON THE REVERSE		U.S. NUCLEAR REGULATORY COMMISSION 1. REPORT NUMBER (Assigned by TDC, add Vol. No., if any) EGG-PHY-7867	
2. TITLE AND SUBTITLE Technical Evaluation Report for the Proposed Guidance for Reviews of Reports Required by RETS		3. LEAVE BLANK	
5. AUTHOR(S) T. E. Young, W. Serrano, E. H. Magleby, J. W. Mandler, F. B. Simpson		4. DATE REPORT COMPLETED MONTH: November YEAR: 1987	
7. PERFORMING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code) Radiological Physics Branch EG&G Idaho, Inc. Idaho Falls, ID 83415		6. DATE REPORT ISSUED MONTH: November YEAR: 1987	
10. SPONSORING ORGANIZATION NAME AND MAILING ADDRESS (Include Zip Code) Office of Nuclear Reactor Regulation U.S. Nuclear Regulatory Commission Washington, D.C. 20555		8. PROJECT/TASK/WORK UNIT NUMBER 9. FUND OR GRANT NUMBER D6034	
12. SUPPLEMENTARY NOTES		11a. TYPE OF REPORT Final b. PERIOD COVERED (Inclusive dates)	
13. ABSTRACT (200 words or less) <p>A detailed discussion is given of the required contents of Licensee reports submitted in accordance with technical specifications identical to the model RETS for boiling water reactors prepared by the NRC staff (NUREG-0473). Instructions are also given for preparation of technical evaluation reports (TERs) documenting reviews of RETS-related reports required by Federal regulations and plant - specific RETS. These instructions include the format of the TER, descriptions of the contents of every section to be included, and examples of all required data tables and figures.</p> <p>These instructions will enable different groups to prepare a consistent set of review TERs.</p>			
14. DOCUMENT ANALYSIS - KEYWORDS/DESCRIPTORS 15. IDENTIFIERS/OPEN ENDED TERMS		15. AVAILABILITY STATEMENT Unlimited 16. SECURITY CLASSIFICATION (This page) Unclassified (This report) Unclassified 17. NUMBER OF PAGES 18. PRICE	