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Evaluation of Peach Bottom Atomic Power Station Units 2 and 3 Offsite Dose Calculation Manual, Revision 5

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N. Morcos
D. W. Akers

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Idaho National Engineering Laboratory
Lockheed Martin Idaho Technologies
Idaho Falls, Idaho 83415

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ABSTRACT

The Offsite Dose Calculation Manual (ODCM) for the Peach Bottom Atomic Power Station (PBAPS) Units 3 and 4 contains current methodology and parameters used to calculate offsite doses, dose rates, and effluent monitoring and alarm setpoints, and to conduct the radiological environment monitoring program. The NRC transmitted the most recent PBAPS ODCM, Revision 5, effective July 1, 1993, to the Idaho National Engineering Laboratory for review by EG&G Idaho, Inc. The ODCM was reviewed, and the results are presented in this report.

The PBAPS ODCM generally uses documented and approved methods that are consistent with the methodology and guidance of NUREG-0133 and Regulatory Guide 1.109. The ODCM contains a description of all the required methodology. Fifteen primary comments on monitoring methodology, calculational methods for gaseous and liquid effluents, and total dose should be addressed promptly. Due to several omissions and errors, it is recommended that the ODCM be revised to address and correct the most significant deficiencies identified in this review.

FOREWORD

This report is submitted as partial fulfillment of the "Review of Radiological Issues" project conducted by the Idaho National Engineering Laboratory for the U.S. Nuclear Regulatory Commission, Office of Nuclear Reactor Regulation. The U.S. Nuclear Regulatory Commission funded this work under FIN E2084.

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Evaluation of Peach Bottom Atomic Power Station Units 2 and 3 Offsite Dose Calculation Manual, Revision 5

Docket No. 50-277, Facility License No. DPR-44
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1. INTRODUCTION

1.1 Purpose of Review

This document reports the review and evaluation of Revision 5 of the Offsite Dose Calculation Manual (ODCM) submitted by the Philadelphia Electric Company, the Licensee for the Peach Bottom Atomic Power Station (PBAPS). Revision 5 of the ODCM, effective July 1, 1993, was transmitted to EG&G Idaho, Inc., for review. The ODCM is a supplementary document for implementing the PBAPS Technical Specifications (TS) in conformance with Section IV of Appendix I to 10 CFR Part 50.[1] The review of this document was performed to assess conformance of the ODCM to the PBAPS TS and NRC guidelines. The ODCM consists of two major parts.

The first part includes an introduction to the ODCM and the methodology to calculate liquid and gaseous monitor setpoints and dose calculations. This part of the ODCM ensures compliance with PBAPS TS 4.8.B.2, 4.8.B.4.a, and 4.8.C.1,2,3,5a,6b. The methodologies for assessing the nuclear fuel cycle total dose in accordance with PBAPS 4.8.D to satisfy the requirements of 10 CFR 190.102 and the calendar year dose calculations in accordance with PBAPS 6.9.2.h are also presented.

The second part of the ODCM provides the description of the Radiological Environmental Program and the methodologies needed to implement the program. A summary of the contents of PBAPS ODCM, Revision 5, is listed in Table 1.

1.2 Plant-Specific Background

The Peach Bottom Atomic Power Station consists of two General Electric boiling water reactor units rated at 1,051 MW(e) each. The two nuclear systems include single-cycle forced-circulation boiling water reactors, with the liquid wastes discharged to the Conowingo Pond through the circulating water discharge canal. The plant is located in a formerly wooded area with a gentle slope. It is about 14 mi northwest of the Sasquehanna river's mouth at the head of the Chesapeake Bay and on the west bank of the pond formed by Conowingo Dam. The city of Lancaster, Pennsylvania, lies 17.9 mi north of the site. The plant grade is established at Elevation 116 ft, and inundation is considered improbable even under flood conditions.

Table 1. Summary of the contents of Peach Bottom Units 2 and 3 ODCM, Revision 5.

Procedural details in ODCM	Peach Bottom Technical Specifications	Brief description of contents
Sect. I.	--[a]	Purpose and scope of the ODCM
Sect. II.A	4.8.B.3.a	Liquid effluent monitoring instrumentation and surveillance
Sect. II.A, B	3.8.C.4.b	Liquid setpoint determination
Sect. III.A	3.8.B.1	Liquid effluent concentration
--[a]	Table 4.8.1	Liquid sampling and analysis
Sect. III.B	3.8.B.2	Liquid effluent dose commitment
Sect. III.B	4.8.B.4.a	Liquid radwaste treatment and dose projection
Sect. II.C	3.8.C.4.a 4.8.C.4.a,b,c,d	Gaseous effluent monitoring instrumentation and surveillance
Sect. II.C, D	3.8.C.1.a	Gaseous setpoint determination
Sect. IV.A.1	3.8.C	Gaseous effluent air dose rate (noble gases)
Sect. IV.A.2	3.8.C.1.b	Gaseous organ dose rate (iodines, tritium, and particulates)
--[a]	Table 4.8.2	Gaseous sampling and analysis
Sect. IV.B	3.8.C.2 4.8.C.2	Gaseous air dose commitment
Sect. IV.C	3.8.C.3 4.8.C.3	Gaseous organ dose commitment
Sect. IV.D	3.8.C.5	Gaseous radwaste treatment and dose projections
Sect. V.A	3.8.D 4.8.D	Uranium fuel cycle (total) dose
Table VII.A.1 Figures VII.A.1,2,3,4	3.8.E 6.9.2.h(3) Table 4.8.3	Radiological environment monitoring, sampling, and analysis
--[a]	--[a]	X/Q and D/Q methodology and data
--[a]	3.8.E.2	Land use census
--[a]	3.8.E.3	Interlaboratory Comparison Program
--[a]	--[a]	Major changes to liquid and gaseous radwaste treatment systems

Table 1. (continued).

Procedural details in ODCM	Peach Bottom Technical Specifications	Brief description of contents
--[a]	6.9.2.h(1)	Annual Radiological Environmental Operating Report
--[a]	6.9.2.h(2,3)	Semiannual Radioactive Effluent Release Report
--[a]	6.9.2.h(2)	Changes to the ODCM

a. Topics not addressed or identified in the ODCM.

The major surficial drainage course within the property limits is Rock Run Creek, which flows generally in an easterly direction into Conowingo Pond just south of the existing Unit 1, a high-temperature gas-cooled 40 MW(e) reactor (Docket No. 50-171). Units 2 and 3 are located a minimum distance of 2,600 ft from the nearest site boundary. The minimum distance to the site boundary in a downstream direction is about 3,300 ft, and in an inland direction of about 3,100 ft from Unit 2. The minimum distance across the pond from either Unit 2 or 3 to the far shore of the pond (to the northeast) is 7,600 ft. The minimum distance from the stack to the site boundary is 2,350 ft. The river below Peach Bottom is used as a source of domestic water supply to the city of Havre deGrace, the Perry Point Veteran's Hospital, the Bainbridge Naval Training Station, the Conowingo Power Plant, and the city of Baltimore.

2. REVIEW CRITERIA

Review criteria for the PBAPS Units 2 and 3 ODCM calculational methods are provided by the NRC in two documents:

1. NUREG-1302, Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors.[2]

2. NUREG-0133, Preparation of RETS for Nuclear Power Plants.[3]

The following NRC guidelines were also used in the ODCM review:

1. Regulatory Guide 1.109, Revision 1, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the purpose of evaluating Compliance with 10 CFR 50, Appendix I."[4]

2. Branch Technical Position, "General Contents of the Dose Calculation Manual."[5]

As specified in NUREG-1302, 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:

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

In addition, the ODCM should contain flow diagrams that represent plant systems and that define the treatment paths and the components of the radioactive liquid and gaseous management systems. A description and the location of samples in support of the environmental monitoring program are also needed in the ODCM. NRC regulations require that the ODCM be a stand-alone document.

3. RADIOACTIVE EFFLUENT RELEASE ROUTES

Liquid and gaseous effluent release routes for PBAPS are discussed in this section together with the current monitoring methodology. The descriptions in Revision 5 of the PBAPS ODCM, dated July 1, 1993, were reviewed. Comments on the monitoring methodology description, its clarity, and the adequacy of the monitored release routes are included in this section.

3.1 Liquid Effluent Release Routes

Liquid and solid wastes from both Units 2 and 3 are routed to a common radwaste building for collection and treatment. Radioactive liquid effluent releases from PBAPS Units 2 and 3 are discharged to the Conowingo Pond through the circulating water discharge canal in a batch mode. Liquid effluent may be released to the environment from five tanks: two waste sample tanks, a floor drain sample tank, and two laundry drain tanks. The concentration of the wastes at the discharge point into the pond complies with the requirements of 10 CFR 20.

Peach Bottom Atomic Power Station Units 2 and 3 share a common discharge point for radioactive liquid releases. Liquid radioactive waste is discharged from the Liquid Radwaste System through the circulating water discharge canal and is processed on a batch basis. Accidental discharge of radioactive liquid waste from the radwaste system is controlled through engineering designs such as redundant valving, monitoring instrumentation, alarms for abnormal conditions, and procedural controls. In addition, the discharge method is through intentional pumping of the waste into the discharge canal.

Figure 1 shows a schematic diagram of the PBAPS Units 2 and 3 liquid radwaste treatment system. The diagram clearly shows the source terms and liquid flow path, and associated monitors. However, it should also identify the monitor labels and indicate which of these monitors incorporates a termination of release capability in addition to the provision for alarms. In addition, it should be made clear whether all potential release pathways are monitored and are included in the ODCM calculations.

3.2 Gaseous Effluent Release Routes

Radioactive gaseous effluents from PBAPS Units 2 and 3 are collected by the gaseous radwaste system and released to the atmosphere through the plant stack (Figure 2). In addition, there are radioactive gaseous releases from the ventilation exhaust waste treatment system, as shown in Figure 3. The gaseous effluent sources from both units are the main condenser air ejectors, the startup pumps, and the gland seal condenser. However, the roof vent and associated monitor are not shown in the diagram. The height of the plant vent stack should be specified in the ODCM to support the calculation of air doses.

Many of the radioactive and potentially radioactive gaseous effluents from PBAPS Units 2 and 3 are released via the monitored plant vent. However, exhausts from the following sources are released through the reactor building vent stack: refueling floor (U3), reactor building (U3), reactor building equipment cell (U2), recombiner building (U2 and U3), turbine building area (U3), turbine building equipment cell (U2), turbine operating floor (U3), radwaste area (U2),

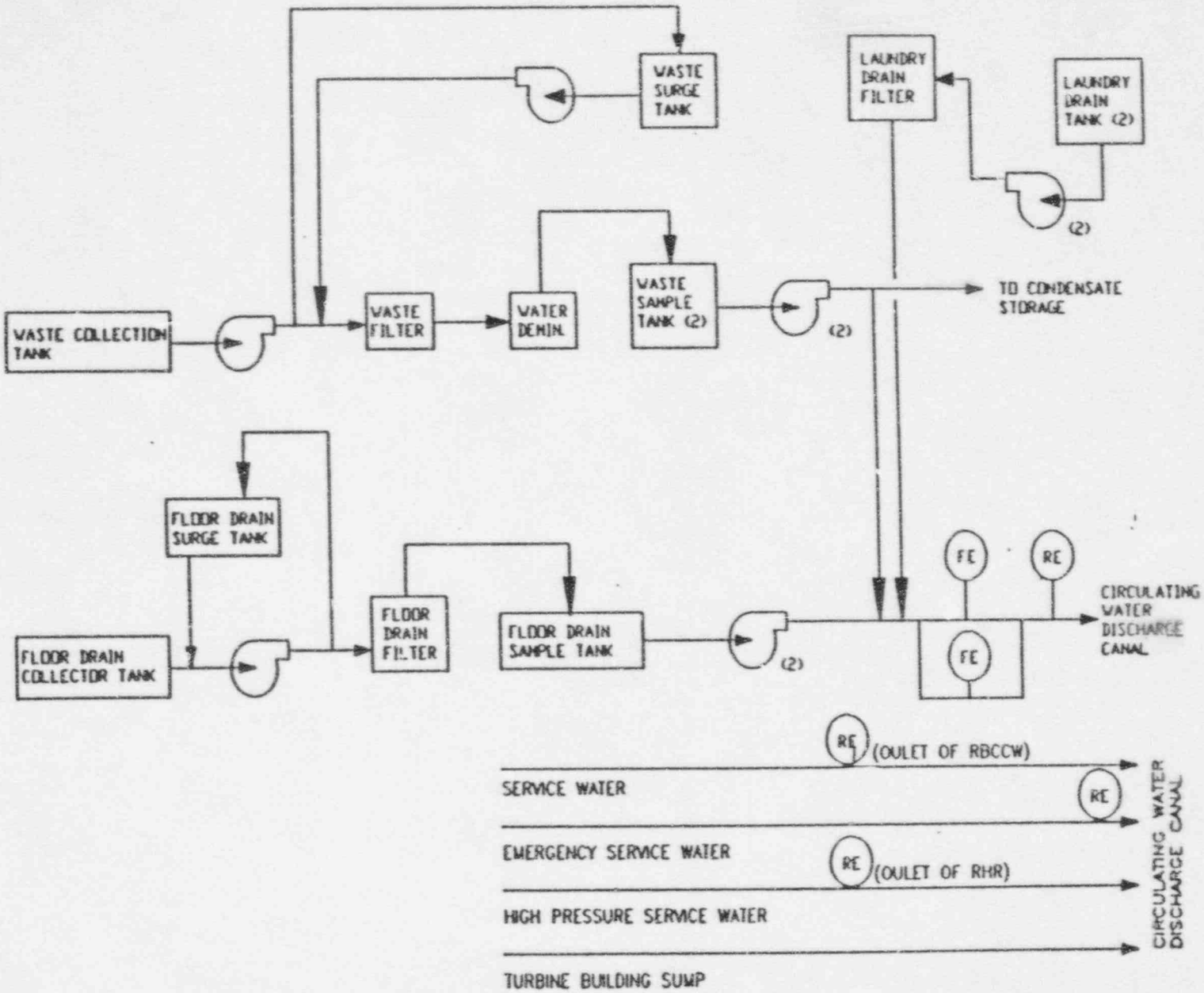

Figure 1. Liquid radwaste treatment system at PBAPS.

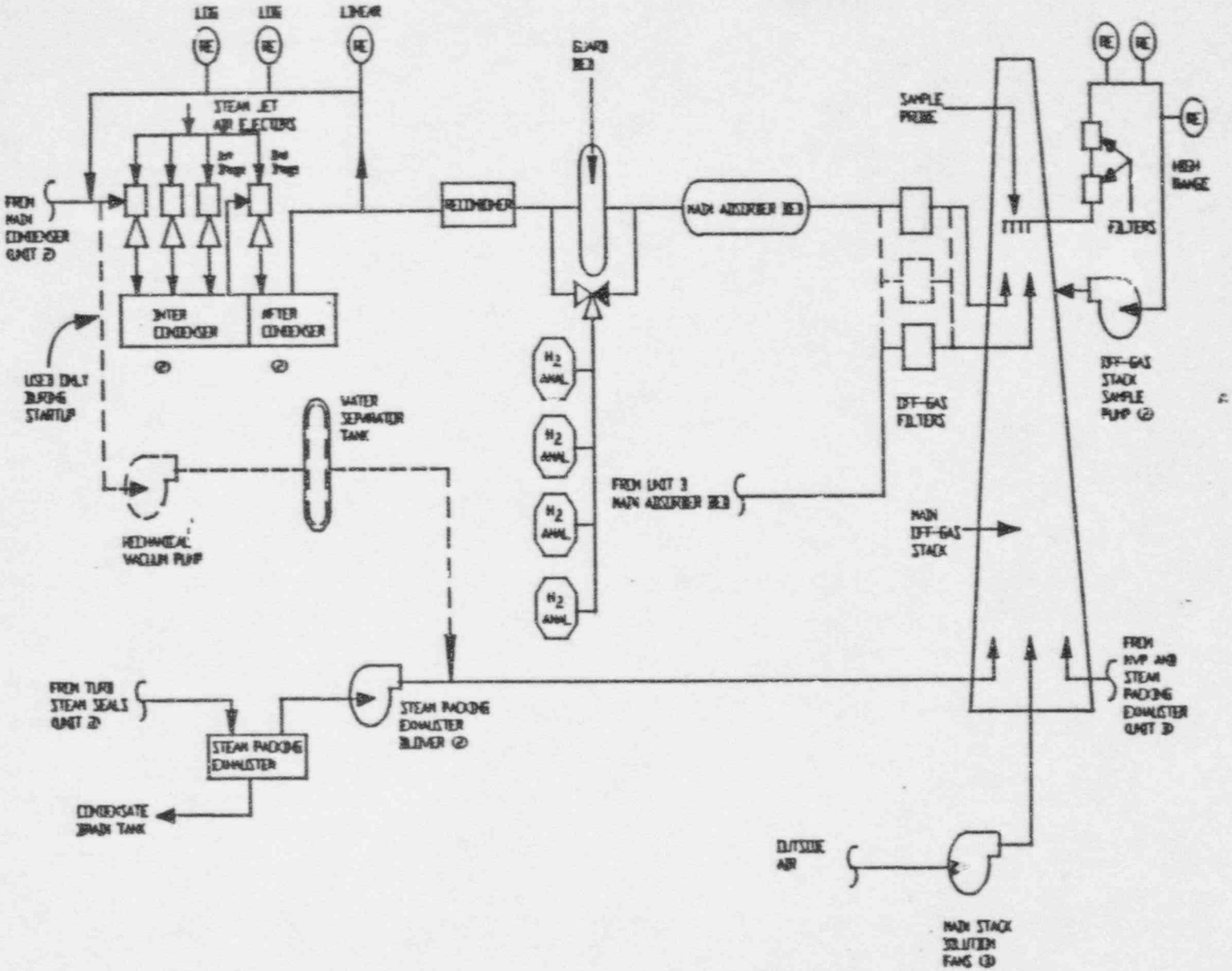

Figure 2. Off-gas radwaste treatment system at PBAPS.

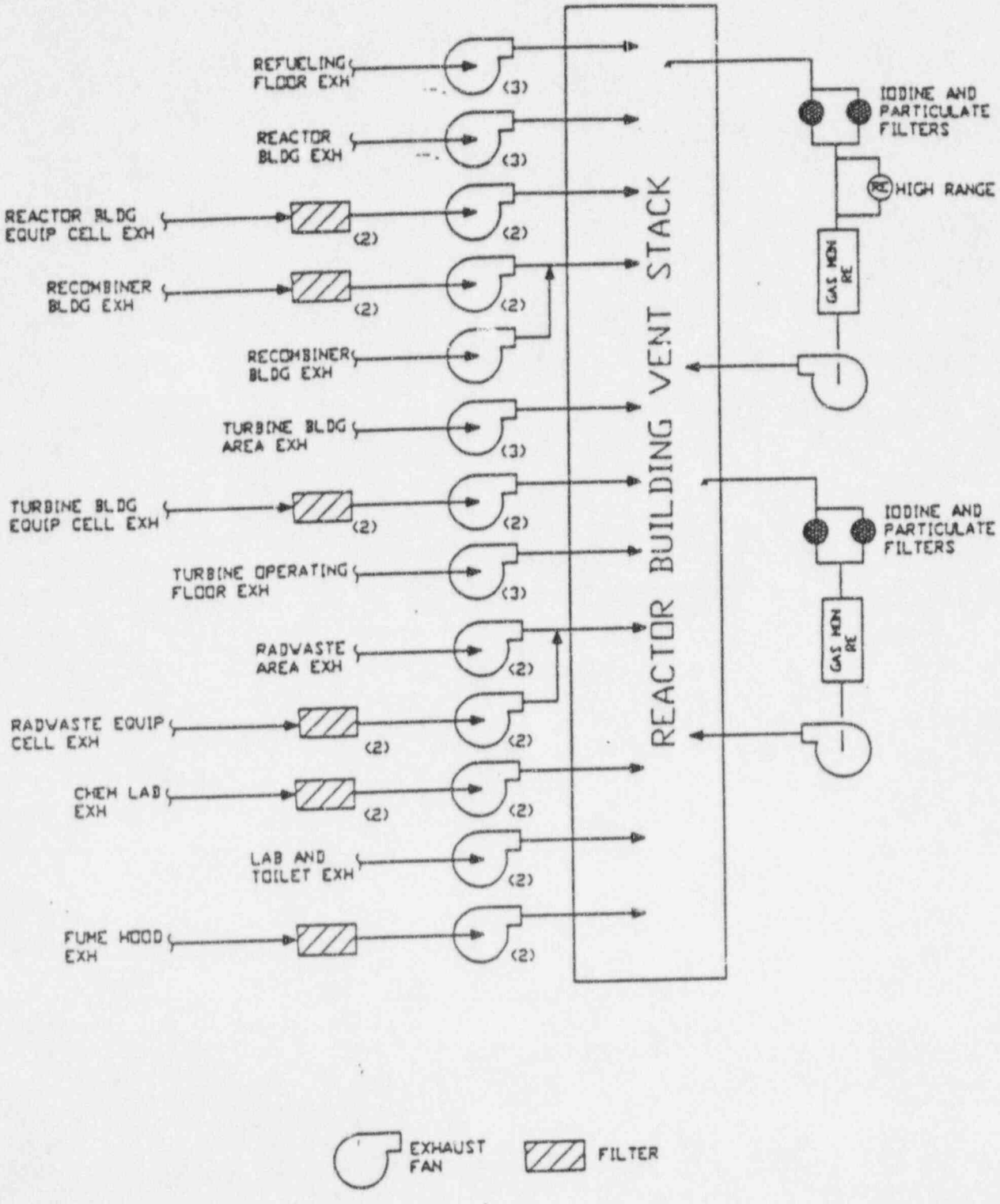

Figure 3. Ventilation exhaust waste treatment system at PBAPS.

radwaste equipment cell (U2), chemistry laboratory (U2), laboratory and toilet (U2), and fume hood (U2). Exhausts from the following sources are filtered prior to release into the reactor building vent stack: the reactor building equipment cell (U2), recombiner building (U2), turbine building equipment cell (U2), radwaste equipment cell (U2), chemistry laboratory (U2), and fume hood (U2).

Radioactive gases from the air ejectors for each main condenser are passed through a 30-minute holdup system to provide sufficient decay for ^{16}N, ^{19}O and short-lived noble gases. In addition, the 30-minute holdup allows the reactor operators time to take appropriate actions in the event of excessive release rates of noble gases. Off-gases from the air ejectors are then filtered through high-efficiency filters prior to release through the plant stack. Gland seal and startup vacuum pump gases are held up for 1-3/4 minutes to allow for decay of ^{16}N and ^{19}O prior to release through the plant stack.

Specific comments regarding the description of the gaseous radwaste system are the following:

1. The filtration system associated with the reactor building equipment cell (U2), recombiner building (U2), turbine building equipment cell (U2), radwaste equipment cell (U2), chemistry laboratory (U2), and fume hood (U2) should be described in the ODCM.

2. The ODCM should include a description of the gaseous radwaste system in addition to the schematic diagram.

4. EVALUATION

The PBAPS ODCM is a supporting document for the PBAPS TS. The ODCM should be a stand-alone document and should include a detailed presentation of the calculational methodology and models used, including a complete tabulation of all values assigned to each parameter used in the calculations.

The PBAPS ODCM should include descriptions and methodology for liquid and gaseous effluents sampling and analysis, X/Q and D/Q calculational methods, performance of the Land Use Census and the Interlaboratory Comparison Program, and necessary reporting actions when major changes are made to the liquid and gaseous radwaste treatment systems.

4.1 Liquid Effluent Monitor Setpoints

PBAPS TS 3.8.B.3.C requires that the radioactive liquid effluent monitoring instrumentation be operable with its alarm/trip setpoints set to ensure that the limits of TS 3.8.B.1 are not exceeded. Section II.A of the ODCM indicates that the alarm and trip setpoint for each liquid effluent radiation monitor include factors of 1.25 and 1.35, respectively, to allow for analysis, calibration, and instrument errors.

Specific comments on setpoint calculations for the liquid effluent monitor setpoints are the following:

1. The specific monitors with alarm and/or trip capabilities should be identified in the ODCM.

2. The general methodology for calculating alarm and trip setpoints for liquid radwaste monitors is well explained in the ODCM. However, the actual calculational methods for the derivation of the conversion factor Eff W/RW is omitted and should be included in the ODCM.

3. It is not clear how the 1.25 and 1.35 factors were determined.

4.2 Gaseous Effluent Monitor Setpoints

The PBAPS TS 3.8.C.4 requires that the radioactive gaseous effluent monitoring instrumentation be operable with its alarm/trip setpoints set to ensure that the limits of TS 3.8.C.1 are not exceeded. Section II.C of the ODCM directs the user to perform the calculations in accordance with Section IV.A of the ODCM.

Specific comments on setpoint calculations for the gaseous effluent monitor setpoints are the following:

1. The roof vent and its associated monitor(s) should be shown in the ODCM.

2. Sections II.C and II.D have the same title. We suggest that the title for II.C be changed to "Radiation Monitor Setpoint Determination for Gaseous Radwaste," and that the title for II.D be changed to "Flow Monitors Setpoint Determination for Gaseous Radwaste."

3. The limiting condition for operation of the off-gas treatment system as described in TS 3.8.C.4 does not clearly indicate that the instantaneous release rate limits are being met. This should be clarified.

4.3 Concentrations in Liquid Effluents

PBAPS TS 3.8.B.1 requires that "the concentration of radioactive material released to areas at and beyond the SITE BOUNDARY shall be limited to the concentration specified in 10 CFR Part 20, Appendix B, Table 2, Column 2 for radionuclides other than noble gases and 2×10^{-4} μCi/mL total activity concentration for all dissolved or entrained noble gases." Section III.A of the PBAPS ODCM directs that each tank of radioactive waste be sampled prior to release to quantitatively analyze for identifiable gamma ray emitting radionuclides as specified in TS Table 4.8.1.

The calculational methodology for determining the radionuclide concentrations in liquid radwaste effluents should be included in the ODCM.

4.4 Dose Rates Due to Gaseous Effluents

PBAPS TS 3.8.C requires that the dose rate in areas at and beyond the SITE BOUNDARY due to radioactive materials in gaseous effluents released from the two reactors at the site shall be limited to ≤500 mrems/yr to the whole body and ≤3,000 mrems/yr to the skin for noble gases, and to ≤1,500 mrems/yr to any organ for ^{131}I, ^{3}H, and for all radionuclides in particulate form with half-lives greater than 8 days. Section IV.A of the PBAPS ODCM describes the methodology for calculating dose rates due to gaseous effluents. The elevated finite plume model is used in the calculations for dispersion.

The ODCM should provide the basis for using the elevated finite plume model for dose rate calculations.

4.4.1 Dose Rates Due To Noble Gases

Section IV.A.1 of the ODCM provides two methods for calculating total body dose rates and skin dose rates due to noble gas releases. The first method, the gross release method, assumes that all noble gases released consist of the most limiting nuclide, ^{88}Kr, for the total body dose due to vent and stack releases and skin dose due to vent releases. This method is used for calculation of dose rates due to noble gases during normal operations of the plant. The second method, isotopic analysis method, is based on the results of noble gas analysis as required by specification 4.8.C.1.a. This second method is used when the noble gas releases are close to the limits as calculated by the previous method. The second method uses data that more accurately reflects

the actual releases. The methodology presented for both methods is in general agreement with Section 5.2.1 of NUREG-0133.

The ODCM should include the calculational methodology and calculational details for the values of V_i, K_i, and B_i shown in Table IV.A.1 and used in the methodology section IV.A.1.b.

4.4.2 Radionuclides Other Than Noble Gases

The PBAPS ODCM section IV.A.2 provides two methods to determine dose rates to any organ due to ^{3}H, ^{131}I, ^{133}I, and radioactive materials in particulate form with half-lives greater than 8 days. The first method, the ^{131}I method, is based on the ^{131}I releases and a correction factor to calculate the dose rate from all nuclides released. This method is used to calculate dose rates under normal operations since ^{131}I is the dominant contributor to dose rates to the thyroid, which is the critical organ pathway. The second method, the isotopic analysis method, is based on the identification and quantification of all applicable radionuclides. This second method is used when ^{131}I releases are minimal, such as during a long-term shutdown. Under these conditions, the lung replaces the thyroid as the critical organ. The methodology presented is within NRC guidelines.

There are no comments on this section.

4.5 Dose Due to Liquid Effluents

PBAPS TS 3.8.B.2 requires that the dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluent releases from the two reactors at the site to areas at and beyond the SITE BOUNDARY shall be limited to ≤3 mrem to the whole body and ≤10 mrem to any organ during any calendar quarter, and to ≤6 mrem to the whole body and ≤20 mrem to any organ during any calendar year.

Section III.B of the ODCM provides the methodology for calculating total doses due to radioactive liquid effluents. In general, the methodology is in agreement with the NRC guidelines. There are no comments for this section of the ODCM.

4.6 Doses Due To Gaseous Effluents

PBAPS TS 3.8.C.2 requires that the air dose at and beyond the SITE BOUNDARY due to noble gases in gaseous effluents released from the two reactors at the site shall be limited during any calendar quarter to ≤10 mrad for gamma radiation and ≤20 mrad for beta radiation, and during any calendar year to ≤20 mrad for gamma radiation and ≤40 mrad for beta radiation. Section IV.B of the ODCM provides the methodology for calculating the air dose due to noble gas releases in plant gaseous effluents. The methodology provides two methods for calculating the air doses due to gamma and beta radiation from noble gas radionuclides. The first method, the gross release method, is used for normal plant operations and assumes that all noble gases released consist of the most limiting radionuclides: ^{88}Kr for gamma ray emitters and ^{87}Kr for beta ray emitters. The second method, the isotopic analysis method, relies on an isotopic analysis of

the released noble gases as required by TS 4.8.C.1.a. Both methods are in general agreement with Section 5.3.1 of NUREG-0133.[3]

Specific comments concerning the air dose calculational methodology as described in the ODCM are the following:

1. The basis and justification for the $(X/Q)_v$ values used in the ODCM should depend upon current meteorological data.

2. The ODCM should clearly show the calculational methods for obtaining the terms M_i and B_i in Section IVB.1.b and N_i in Section IV.B.2.b.

4.7 Dose Projections

PBAPS TS 4.8.B.4.a requires that doses due to liquid effluent releases to areas at and beyond the SITE BOUNDARY shall be projected once per month in accordance with the methodology and parameters in the ODCM. Section III.C of the ODCM states that the dose projection calculations for liquid effluents shall be performed using the methodology shown in Section III.B of the ODCM. Section IV.D of the ODCM states that the projected dose calculations for gaseous effluents shall be based on expected releases from plant operations. The calculations are based on the methodologies for normal operations from Section IV.B.1 for gamma air dose, Section IV.B.2 for beta air dose, and Section IV.C for the critical organ dose (e.g., liver). The basis of why the liver is considered the critical organ should be included in the ODCM.

4.7.1 Liquid Effluent Dose Projections

There are no comments on the liquid effluent dose projections methodology.

4.7.2 Gaseous Effluent Dose Projections

There are no comments on the gaseous effluent dose projections methodology.

4.8 Diagrams of Effluent Release Routes

The ODCM contains three diagrams pertaining to effluent release routes. The first diagram clearly shows the offgas radwaste treatment system. The third shows the liquid radwaste treatment and effluent pathways, and the second diagram shows the ventilation exhaust waste treatment system. Comments on the diagrams were noted previously.

4.9 Total Dose

PBAPS TS 3.8.D requires that the annual (calendar) dose or dose commitment to any MEMBER OF THE PUBLIC from all uranium fuel cycles within 8 km is limited to ≤75 mrem to the thyroid and to ≤25 mrem to the total body or any other organ over the calendar year.

Section V.A of the ODCM describes the methodology to assess the total dose from uranium cycle at PBAPS. The methodology presented in the ODCM does not include any detail except with the statement that "it is in accordance with ANSI/ANS 6.6.1-0-1979." The ODCM should clearly state the details of the methodology and the calculational methods and include a comparison of the methods used with those described in Appendix E of Regulatory Guide 1.109.[4]

4.10 Environmental Monitoring Program

PBAPS TS 3.8.E requires that Environmental Monitoring Program sampling shall be performed in accordance with the sampling and analysis methods shown in Table 4.8.3.a.

Section VII.A of the ODCM requires the collection of environmental monitoring samples shown in Table VII.A.1 from the locations shown on Figures VII.A.1, 2, 3, and 4. The analysis of these samples are in accordance with the methods shown in Table VII.A.1.

There are no comments related to the Environmental Monitoring Program.

4.11 Land Use Census

There are no references to performing a Land Use Census in the PBAPS ODCM, and no justification is provided for this omission.

4.12 Interlaboratory Comparison Program

There are no references to performing an interlaboratory comparison program in the PBAPS ODCM, and no justification is provided for this omission.

5. TECHNICAL FINDINGS

Primary deficiencies and suggestions are summarized below in four categories of decreasing importance. Items in Category A identify the most serious deficiencies, including omissions that cause uncertainty about the methodology used in the ODCM. Category B contains deficiencies that are less serious than Category A, and Category C contains minor deficiencies and editorial recommendations. Category D contains suggestions for changes the licensee may wish to make to simplify calculations, update data, or remove excess conservatism from the methodology.

Category A

The items in this category should be addressed promptly. Some items identify errors or omissions that result in erroneous calculated doses and dose rates. Others identify omissions or inappropriate values that may result in exceeding release rate limits or insufficiently documenting reported doses.

1. The calculational methodology for determining the radionuclide concentrations in liquid radwaste effluents should be included in the ODCM.

2. The ODCM should provide the basis for using the elevated finite plume model for dose rate calculations.

3. The ODCM should include the calculational methodology and calculational details for the values of V_i, K_i, and B_i shown in Table IV.A.1 and used in the methodology section IV.A.1.b.

4. Section V.A of the ODCM describes the methodology for assessing the total dose from uranium cycle at PBAPS. The methodology presented in the ODCM does not include any detail except with the statement that "it is in accordance with ANSI/ANS 6.6.1-1979." The ODCM should clearly state the details of the methodology and the calculational methods and include a comparison of the methods used with those described in Appendix E of Regulatory Guide 1.109.

5. The PBAPS ODCM should include descriptions and methodology for liquid and gaseous effluents sampling and analysis, X/Q and D/Q calculational methods, performance of the Land Use Census and the Interlaboratory Comparison Program, and necessary reporting actions when major changes are made to the liquid and gaseous radwaste treatment systems.

Category B

The items below concern information that should be added to make the ODCM complete, prevent erroneous interpretation of the methodology, or to correct erroneous methodology.

1. The general methodology for calculating alarm and trip setpoints for liquid radwaste monitors is well explained in the ODCM. However, the actual calculational methods,

including the derivation of the conversion factor Eff W/RW, is omitted and should be included in the ODCM.

2. The offgas filtration system associated with the reactor building equipment cell (U2), recombiner building (U2), turbine building equipment cell (U2), radwaste equipment cell (U2), chemistry laboratory (U2), and fume hood (U2) should be described in the ODCM.

3. The ODCM should include a description of the gaseous radwaste system in addition to the schematic diagram.

4. Specific liquid effluent monitors with alarm and/or trip capabilities should be identified in the ODCM.

5. It is not clear how the 1.25 and 1.35 factors were determined for the liquid effluent monitor setpoint calculations.

6. The limiting condition for operation of the off-gas treatment system as described in TS 3.8.C.4 does not clearly indicate that the instantaneous release rate limits are being met. This should be clarified.

7. The basis and justification for the $(X/Q)_v$ values used in the ODCM should be based upon current meteorological data.

8. The ODCM should clearly show the calculational methods for obtaining the terms M_i and B_i in Section IVB.1.b and N_i in Section IV.B.2.b.

9. The basis of why the liver is considered the critical organ for dose projections should be included in the ODCM.

Category C

The items in this category indicate omissions and editorial deficiencies that are not likely to cause significant problems.

1. Figure 1 shows a schematic diagram of the PBAPS Units 2 and 3 liquid radwaste treatment system. The diagram clearly shows the source terms and liquid flow path, and associated monitors. It should also identify the monitor labels and indicate which of these monitors incorporate a flow shutoff capability in addition to the provision of alarms.

2. Radioactive gaseous effluents from PBAPS Units 2 and 3 are collected by the gaseous radwaste system and released to the atmosphere through the plant stack and reactor building vent stack. The gaseous effluent sources from both units are the main condenser air ejectors, startup pumps, and the gland seal condenser. However, the roof vent and associated monitor are not shown in the diagram.

3. The height of the plant vent stack should be specified in the ODCM to support the calculation of air doses since the ODCM should be a stand-alone document.

4. There are no references to performing a Land Use Census in the PBAPS ODCM, and no justification is provided for this omission.

5. There are no references to performing an interlaboratory comparison program in the PBAPS ODCM, and no justification is provided for this omission.

Category D

The following items concern methodology and parameters that the licensee may wish to change because the change may simplify calculations, remove unnecessary conservatism in the calculations, or make use of more recent data.

Sections II.C and II.D have the same title. We suggest that the title for II.C be changed to "Radiation Monitor Setpoint Determination for Gaseous Radwaste," and that the title for II.D be changed to "Flow Monitors Setpoint Determination for Gaseous Radwaste."

6. REFERENCES

1. Title 10, Code of Federal Regulations, Part 50, "Domestic Licensing of Production and Utilization Facilities."

2. NUREG-1302, *Standard Operating Procedure for Radiological Effluent Controls for Pressurized Water Reactors*, August 198£.

3. NUREG-0133, *Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants, A Guidance Manual for Uses of Standard Technical Specifications*, October 1978.

4. 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."

5. "General Contents of the Offsite Dose Calculation Manual," Revision 1, Branch Technical Position, Radiological Assessment Branch, NRC, February 8, 1979.