Beaver Valley Power Station - Units 1 & 2

Annual Radioactive Effluent Release Report

Calendar Year - 2004
Attachment 2
Unit 1 and 2 Offsite Dose Calculation Manual Changes

Attachment 2
Attached is a complete copy of the ODCM that includes:
Change (21) of the ODCM (Effective: November, 2004)

Attachment 2 Clarification
A complete copy of the ODCM has been provided to the following offices: United States Nuclear Regulatory Commission Attention: Document Control Desk Washington, DC 20555-0001 United States Nuclear Regulatory Commission Regional Administrator 475 Allendale Road King of Prussia, PA 19406
For a complete copy of the ODCM, contact Mr. Anthony T Lonnett at 724-682-7523.

RTL #A9.621B

Beaver Valley Power Station

Unit 1/2

1/2-ODC-1.01

ODCM: Index, Matrix and History of ODCM Changes

Document Owner
Manager, Nuclear Environmental and Chemistry

Revision Number	4
Level Of Use	General Skill Reference
Safety Related Procedure	Yes

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TABLE OF CONTENTS

1.0 PURPOSE

1.1 This procedure provides an index for the entire Offsite Dose Calculation Manual (ODCM).

1.2 This procedure also provides an historical description of all changes to the ODCM.

1.3 This procedure also contains a matrix of plant procedure references for Radiological Effluent Technical Specifications (RETS), Radiological Environmental Monitoring Program (REMP) surveillances that were transferred from the Technical Specification Procedure Matrix to the ODCM via Change (8) and Change (16).

1.3.1 Prior to issuance of this procedure, these items were located in the Index and Appendix F of the old ODCM.

1.3.2 The numbering of each specific ODCM Controls, ODCM Surveillance Requirements and ODCM Controls Tables contained in this procedure does not appear to be sequential. This is intentional, as all ODCM Controls, ODCM Surveillance Requirements and ODCM Controls Tables numbers remained the same when they were transferred from the Technical Specifications Procedure Matrix. This was done in an effort to minimize the amount of plant procedure changes and to eliminate any confusion associated with numbering changes.

2.0 SCOPE

2.1 This procedure is applicable to all station personnel that are qualified to perform activities as described and referenced in this procedure.

3.0 REFERENCES AND COMMITMENTS

3.1 References Used in This Procedure

3.1.1 NUREG-0472, Draft 7 for Rev. 3, Standard Radiological Effluent Technical Specifications For PWRs September, 1982.

3.1.2 NUREG-0133, Preparation Of Radiological Effluent Technical Specifications For Nuclear Power Plants, October, 1978.

3.1.3 Generic Letter 89-01, Implementation Of Programmatic Controls For Radiological Effluent Technical Specifications In The Administrative Controls Section Of The Technical Specifications And The Relocation Of Procedural Details Of RETS To The ODCM Or To The PCP, January 31, 1989.

3.1.4 NUREG-1301, Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls For Pressurized Water Reactors, Generic Letter 89-01, Supplement No. 1, April, 1991.

3.1.5 1/2-ODC-3.03, ODCM: Controls for RETS and REMP Programs

3.1.6 1/2-ADM-1640, Control of the Offsite Dose Calculation Manual

3.1.7 1/2-ADM-0100, Procedure Writer's Guide

3.1.8 NOP-SS-3001, Procedure Review and Approval

3.2 Summary of References Used Throughout Other Procedures of the ODCM

3.2.1 BVPS-1 and 2 UFSAR:

3.2.1.1 BVPS-1 UFSAR Section 11.2.3; Gaseous Waste Disposal System

3.2.1.2 BVPS-1 UFSAR Section 11.2.4; Liquid Waste Disposal System

3.2.1.3 BVPS-2 UFSAR Section 11.2; Liquid Waste Management Systems

3.2.1.4 BVPS-2 UFSAR Section 11.3; Gaseous Waste Management Systems

3.2.2 Condition Reports:

3.2.2.1 CR 971578, MEMBERS OF THE PUBLIC Discrepancies. CA-01, Revise Section 4 of the ODCM to clarify how doses due to effluents for members of the public (conducting activities inside the site boundary) are derived and reported.

3.2.2.2 CR 980129, ODCM Procedure Matrix Discrepancies. CA-01, Revise Appendix F of the ODCM to correct discrepancies with 1/2-OM L5 Surveillance Logs.

3.2.2.3 CR 980353, EPMP 2.01 Discrepancies for Environmental Sampling Locations. CA-01, Revise Section 3 of the ODCM to correct REMP sample site distances and sectors.

3.2.2.4 CR 981488, Chemistry Related ODCM Procedures and ODCM Appendix F References. CA-01, Revise ODCM Appendix F to add Chemistry procedure references.

3.2.2.5 CR 981489, ODCM Table 4.11-2 Row A (Waste Gas Storage Tank Discharge Tritium). CA-01, Revise Appendix C of the ODCM (Table 4.11-2) to add clarification as to where and when tritium samples are to be obtained for GWST discharges.

3.2.2.6 CR 981490, ODCM Table 4.11-2 Note e, and Related Chemistry Department Procedures. CA-01, Revise Appendix C of the ODCM (Table 4.11-2, Note e) to specify the proper tritium sample point.

3.2.2.7 CR 982097, Liquid Discharge Post Release Review Methodology. CA-01, Revise Section 1 of the ODCM to add clarification for calculation of radionuclide concentration when the Post Dose Correction Factor is >1.

3.2.2.8 CR 990025, Unnecessary Radiation Monitor Setpoint Change After Waste Discharges. No ODCM changes are required for this CR.

3.2.2.9 CR 992652, Discrepancies Concerning ODCM Surviellances of Unit 1 Gaseous Effluent Instrumentation. CA-02, Revise Appendix F of the ODCM to make proper reference to the HP Shift logs.

3.2.2.10 CR 993021, Apparent Failure to Test RM-DA-100 Trip Function as Required by ODCM. No ODCM changes are required for this CR.

3.2.2.11 CR 001682, ODCM Action 28 Guidance. CA-02, Revise Appendix C of the ODCM (Table 3.3-13, Action 28) to differentiate actions associated with Inoperable Process Flow Rate Monitors vs. Sample Flow Rate Monitors.

3.2.2.12 CR02-05533, Procedure 1/2-ODC-3.03, ATTACHMENT E Missing Information. CA-01, Revise ODCM procedure 1/2-ODC-3.03 (Table 3.3-12) to include minimum channels operable and associated actions when Flow Rate Measurement Device [FR-1LW-103] is inoperable.

3.2.2.13 CR02-05711, TS and ODCM changes not reflected in 1OM-54.3.L5 Surveillance Log. CA-01, Revise 1/2-ODC-3.03 to add a requirement for applicable station groups notification of pending ODCM changes.

3.2.2.14 CR02-06174, Tracking of Activities for Unit 1 RCS Zinc Addition Implementation. CA-13, Revise ODCM procedure 1/2-ODC-1.01 to include a discussion as to why Zn-65 is being added to the ODCM. CA-14, Revise ODCM procedure 1/2-ODC-2.01 (Tables 1.1-1a and 1b) to include the addition of Zn-65 to ODCM liquid source term.

3.2.2.15 CR 03-02466, RFA-Radiation Protection Effluent Control Provide Recommendation on Processing when Performing Weekly Sample of [1LW-TK-7A/7B]. CA-02, Revise ODCM Procedure 1/2-ODC-2.01, (Attachment D) to show the liquid waste flow path cross-connect between Unit 1 and Unit 2.

3.2.2.16 CR03-04830, Containment Vacuum Pump Replacement Increases ODCM Source Term. CA-03, Revise Unit 1 Containment Vacuum Pump Source-Term in ODCM procedure 1/2-ODC-2.02, Attachment A, Table 2.1-1a.

3.2.2.17 CR03-06123, Enhance Table 3.3-6 of 1/2-ODC-3.03 to Add More Preplanned Method of Monitoring. CA-01, Revise Table 3.3-6 and Table 4.3-3 to allow use of Eberline SPING Channel 5 as an additional 2nd PMM when the Unit 1 Mid or High Range Noble Gas Effluent Monitors are Inoperable.

3.2.2.18 CR03-06281, Gaseous Tritium Sampling Required by ODCM (1/2-ODC-3.03) Unclear for Chemistry. CA-01, Revise procedure Attachment K Table 4.11-2 for RP & Chemistry sampling of Gaseous Effluent Pathways to show which effluent pathways need sampled for compliance to ODCM Control 3.11.2.1 requirements.

3.2.2.19 CR03-07487, Results of NQA Assessment of the Radiological Effluents Program. CA-01, Revise Calculation Package No. ERS-ATL-95-007 to clarify the term "Surface Water Supply" per guidance presented in NUREG-0800 SRP 15.7.3. CA-05, Revise 1/2-ODC3.03 Control 3.11.1.4 to update the activity limits for the outside storage tanks.

3.2.2.20 CR03-07668, Benchmark Effluent & Environmental Programs VS Papers Presented at 13th REMP/RETS Workshop. CA-01, Evaluate procedure Attachment K Table 4.11-2 to reduce the amount of Effluent Samples obtained during a power transient.

3.2.2.21 CR03-09288, LAR 1A-321 & 2A-193, Increased Flexibility in Mode Restraints. CA-19, Review LAR 1A-321/2A-193 to identify the affected Rad Effluent procedures, programs, manuals, and applicable plant modification documents that will need to be revised to support implementing the LAR.

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3.2.2.22 CR03-09959, RFA-Rad Protection Provide Clarification to ODCM 1/Day Air Tritium Sample. CA-01, Revise ODCM procedure 1/2-ODC-3.03 Attachment K (Table 4.11-2 note c & note e) to allow sampling of the appropriate building atmosphere.

3.2.2.23 CR03-11726, Typographical Error Found in ODCM 3.11.2.5. CA-01, Revise ODCM procedure 1/2-ODC-3.03, Attachment O, Control 3.11.2.5 to correct a typographical error. Specifically, the final word in Action (a) needs changed from "nad" to "and".

3.2.2.24 CR04-01643, Procedure Correction – Typographical Error in the ODCM. CA-01, Revise ODCM procedure 1/2-ODC-3.03, Attachment F, (Table 3.3-13 and 4.3-13) to correct a typographical error. Specifically, the Asset Number for the Vacuum Gauge used for measurement of sample flow (from the Alternate Sampling Device) needs changed from [PI-1GW-13] to [PI-1GW-135].

3.2.2.25 CR04-02275, Discrepancies in Table 3.3-13 of the ODCM. CA-01, Revise ODCM procedure 1/2-ODC-3.03, Attachment F, (Table 3.3-13 and 4.3-13) to add clarification that the "Sampler Flow Rate Monitors are the devices used for "Particulate and Iodine Sampling".

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3.2.3 Calculation Packages:

3.2.3.1 ERS-ATL-83-027; Liquid Waste Dose Factor Calculation for HPM-RP 6.5, Issue 3 and Later

3.2.3.2 ERS-SFL-85-031; Gaseous Effluent Monitor Efficiency Data

3.2.3.3 ERS-ATL-86-008; ODCM Alarm Setpoint Revisions for Gaseous Monitors

3.2.3.4 ERS-HHM-87-014; Unit 1/2 ODCM Gaseous Effluent Monitor Alarm Setpoint Determinations

3.2.3.5 ERS-ATL-87-026; BVPS-1 and BVPS-2 ODCM T Factor Justification

3.2.3.6 ERS-ATL-89-014; Verification/Validation of ODCM R Values

3.2.3.7 ERS-ATL-90-021; Justification for Removal of Technical Specification Process Flowrate Measurement Requirements for 2RMQ-RQ301, 2RMQ-RQ303 and 2HVL-RQ112

3.2.3.8 ERS-ATL-95-006; Re-evaluation of TS/ODCM SR's 4.11.1.1.3, 4.11.1.1.4 and Notes e and g of TS/ODCM Table 4.11-1

3.2.3.9 ERS-ATL-95-007; Verification of Outside Storage Tank Activity Limit of TS 3.11.1.4

3.2.3.10 Stone and Webster UR(B)-160; BVPS Liquid Radwaste Releases and Concentrations - Expected and Design Cases (Per Unit and Site)

3.2.4 Internal Letters:

3.2.4.1 DLC Response to NRC Unresolved Item 50-334/83-30-05, Radiation Monitor Study- Particle Distribution Evaluation, November 26, 1986.

3.2.4.2 ND1SHP:776, BVPS-1 ODCM Table 2.2-2, Appendix B, February 12, 1988

3.2.4.3 ND3NSM:3431; Technical Specification Verification Effort, August 11, 1988

3.2.4.4 NDLNSM:3522; Technical Specification Verification Effort Checklist, September 14, 1988

3.2.4.5 ND1NSM:3652; Technical Specification Verification Effort, November 21, 1988

3.2.4.6 NPD3SHP:2466; Self Assessment of the Liquid and Gaseous Effluent Processes at BVPS - Final Report, July 16, 1997

3.2.4.7 NPD3SHP:2257; ODCM Liquid Waste Recirculation Rates, February 11, 1998

3.2.4.8 NPD3SHP:2643; Action 28 of ODCM Appendix C Table 3.3-13, January 14, 1999

3.2.4.9 ND3MNO:4309; Response to Request for Technical Specification Interpretation, April 20, 1999.

3.2.5 Contractor Technical Evaluation Reports:

3.2.5.1 EGG-PHY-8194; Technical Evaluation Report for the Evaluation of ODCM Updated through Issue 2, Revision 1, Beaver Valley Power Station, Unit 1, September 1988

3.2.5.2 EGG-PHY-8217; Technical Evaluation Report for the Evaluation of ODCM updated through Issue 1, Revision 2, Beaver Valley Power Station, Unit 2, September 1988

3.2.5.3 NUS-2173; Development of Terrain Adjustment Factors For Use at the Beaver Valley Power Station for the Straight-Line Atmospheric Dispersion Model, June 1978

3.2.5.4 UCRL-50564; Concentration Factors of Chemical Elements in Edible Aquatic Organisms, Revision 1, 1972

3.2.6 <u>NRC Letters</u>:

3.2.6.1 Unit 1 Technical Specification Amendment 66, March 28, 1983

3.2.6.2 Beaver Valley Unit 2 - Offsite Dose Calculation Manual, ODCM (TAC 63996), July 14, 1987

3.2.6.3 Beaver Valley Units 1 and 2 - Acceptance of the Offsite Dose Calculation Manuals (TAC 93996 and 67421), March 2, 1989

3.2.6.4 Unit 1/2 Technical Specification 6.8.6, including Amendments 1A-188/2A-70 (LAR 1A-175/2A-37), Implemented August 7, 1995

3.2.6.5 Unit 1/2 Technical Specification 6.8.6, including Amendments 1A-194/2A-77 (LAR's 1A-231/2A-101), Implemented December 1, 1995

3.2.6.6 Unit 1/2 Technical Specification Figure 5.1-2, including Amendments 1A-202/2A-83 (LAR 1A-234/2A-107, Implemented June 9, 1997

3.2.6.7 Unit 1/2 Technical Specifications 6.9.1.10 and 6.9.2, including Amendments 1A-220/2A-97 (LAR 1A-246/2A-116), Implemented May 20, 1999

3.2.6.8 Unit 1/2 Technical Specification 3.3.3.1, including Amendments 1A-246/2A-124 (LAR 1A-287/2A-159), Implemented April 11, 2002

3.2.6.9 Unit 1/2 Technical Specifications 3.11.1.4, 3.11.2.5, 6.8.6, and 6.9.2 including Amendments 1A-250/2A-130 (LAR 1A-291/2A-163), Implemented August 7, 2002

3.2.7 <u>NUREG's</u>:

3.2.7.1 NUREG-0017, Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Pressurized Water Reactors, (PWR- Gale Code), Revision 1, April 1985

3.2.7.2 NUREG 0133; Preparation of Radiological Effluent Technical Specification for Nuclear Power Plants, October 1978

3.2.7.3 NUREG-0172; Age-Specific Radiation Dose Commitment Factors for a One-Year Chronic Intake, November 1977

3.2.7.4 NUREG-0324, XOQDOQ, Program for the Meteorological Evaluation of Routine Releases at Nuclear Power Stations, September 1977

3.2.7.5 NUREG-0472; Radiological Effluent Technical Specifications for PWR's.

3.2.7.6 NUREG-0800, Standard Review Plan, Postulated Radioactive Releases Due to Liquid-Containing Tank Failures, July 1981

3.2.7.7 NUREG-1301; Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors (Generic Letter 89-01, Supplement No. 1), April 1991

3.2.7.8 NUREG-1431; Standard Technical Specification - Westinghouse Plants Specifications

3.2.7.9 NUREG/CR-2919; Meteorological Evaluation of Routine Effluent Releases At Nuclear Power Stations, September 1982

3.2.8 <u>Regulatory Guides:</u>

3.2.8.1 RG-1.23; Meteorological Measurement Program For Nuclear Power Plants

3.2.8.2 RG-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, April 1977

3.2.8.3 RG-1.111; Methods For Estimating Atmospheric Transport And Dispersion of Gaseous Effluents In Routine Releases From Light-Water-Cooled Reactors, Revision 1, July 1977

3.2.8.4 RG-1.113; Estimating Aquatic Dispersion of Effluents From Accidental and Routine Reactor Releases For The Purpose of Implementing Appendix I, April 1977

3.3 <u>Commitments</u>

3.3.1 10 CFR Part 20, Standards for Protection Against Radiation

3.3.2 10CFR20.1302, Compliance with Dose Limits for Individual Members of the Public.

3.3.3 10 CFR Part 50, Domestic Licensing of Production and Utilization Facilities

3.3.4 10CFR50.36a, Technical Specifications on Effluents from Nuclear Power Reactors

3.3.5 Appendix I to 10 CFR Part 50, Numerical Guides For Design Objectives and Limiting Conditions For Operation to Meet The Criterion "As Low As Reasonably Achievable" For Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents

3.3.6 40 CFR Part 141

3.3.7 40 CFR Part 190, Environmental Radiation Protection Standards For Nuclear Power Operations

3.3.8 Licensee Response to NRC Unresolved Item 50-334/83-30-05. The Radiation Monitor Particle Distribution Evaluation showed that the Licensee must continue to use correction factors to determine particulate activity in samples obtained from the effluent release pathways.

4.0 RECORDS AND FORMS

4.1 Records

4.1.1 Any calculation supporting ODCM changes shall be documented, as appropriate, by a retrievable document (eg; letter or calculation package) with an appropriate RTL number.

4.2 Forms

4.2.1 None

5.0 PRECAUTIONS AND LIMITATIONS

5.1 This OFFSITE DOSE CALCULATION MANUAL (ODCM) provides the information and methodologies to be used by Beaver Valley Power Station Unit 1 and Unit 2 (BV-1) and (BV-2) to assure compliance with the Administrative Controls Section of the operating Technical Specifications. They are intended to show compliance with 10 CFR 20.1302,[3.2.1] 10 CFR 50.36a,[3.2.2] Appendix I of 10 CFR Part 50,[3.2.3] and 40 CFR Part 190.[3.2.4]

5.2 This ODCM is based on the NUREG's and Generic Letter documents from the United States Nuclear Regulatory Commission.[3.1.1, 3.1.2, 3.1.3, 3.1.4] Specific plant procedures for implementation of the ODCM are included in various site procedures and documents, and are utilized by the operating staff to assure compliance with Technical Specifications and the CONTROLS Procedure of the ODCM.[3.1.5]

5.3 The ODCM has been prepared as generically as possible in order to minimize the need for future versions. However, some changes to the ODCM may be necessary in the future. Any such changes will be properly prepared, reviewed, and approved as indicated in the Administrative Control Section of the Technical Specifications.

5.3.1 An implementation procedure for control of the ODCM is included in 1/2-ADM-1640.(3.1.6)

5.4 This procedure also contains information that was previously contained in Appendix F of the previous BV-1 and 2 Offsite Dose Calculation Manual.

5.4.1 In regards to this, the Tables that were transferred from Appendix F to the appropriate ATTACHMENTS of this procedure will still contain a prefix denoting an "F".

6.0 ACCEPTANCE CRITERIA

6.1 All changes to this procedure shall contain sufficient justification that the change will maintain the level of radioactive Effluent Control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a and Appendix I to 10 CFR 50, and not adversely impact the accuracy or reliability of effluent dose or alarm setpoint calculation.(3.1.7)

6.1.1 All changes to this procedure shall be prepared in accordance with 1/2-ADM-0100(3.1.7) and 1/2-ADM-1640.(3.1.6)

6.1.2 All changes to this procedure shall be reviewed and approved in accordance with NOP-SS-3001 (3.1.8) and 1/2-ADM-1640.(3.1.6)

7.0 PREREQUISITES

7.1 The user of this procedure shall be familiar with ODCM structure and content.

8.0 PROCEDURE

8.1 Description of ODCM Structure

8.1.1 1/2-ODC-1.01, ODCM: Index, Matrix and History of ODCM changes (formerly: ODCM Index and Appendix F)

8.1.1.1 History of ODCM Changes

8.1.1.2 Summary of ODCM References

8.1.1.3 List of Tables (ATTACHMENT A)

8.1.1.4 List of Figures (ATTACHMENT B)

8.1.1.5 Matrix of Procedures Used to Meet ODCM Controls (ATTACHMENT C)

8.1.2.3 Compliance With 10 CFR 50 Dose Limits

8.1.2.3.1 Cumulation Of Doses

8.1.2.3.2 Projection Of Doses

8.1.2.4 Liquid Radwaste Treatment System

8.1.2.4.1 BV-1 Liquid Radwaste Treatment System Components

8.1.2.4.2 BV-1 Laundry and Contaminated Shower Drain System Components

8.1.2.4.3 BV-2 Liquid Radwaste Treatment System Components

8.1.2.5 Site Boundary for Liquid Effluents

8.1.2.5.1 Liquid Effluent Site Boundary

8.1.3 1/2-ODC-2.02, ODCM: Gaseous Effluents
(formerly; ODCM Sections 2 and 5)

8.1.3.1 Alarm Setpoints

8.1.3.1.1 BV-1 Setpoint Determination Based On A Calculated Mix

8.1.3.1.2 BV-1 Setpoint Determination Based On Analysis Prior To Release

8.1.3.1.3 BV-2 Setpoint Determination Based On A Calculated Mix

8.1.3.1.4 BV-2 Setpoint Determination Based On Analysis Prior To Release

8.1.3.1.5 BV-1/2 Setpoint Determination Based On A Calculated Mix

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8.1.3.2 Compliance With 10 CFR 20 Dose Rate Limits

8.1.3.2.1 Dose Rate Due To Noble Gases

8.1.3.2.2 Dose Rate Due To Radioiodines And Particulates

8.1.3.3 Compliance With 10 CFR 50 Dose Limits

8.1.3.3.1 Doses Due To Noble Gases

8.1.3.3.2 Doses Due To Radioiodines And Particulates

8.1.3.4 Gaseous Radwaste Treatment System

8.1.7.6 Bases 3.11.1.3: Liquid Radwaste Treatment System

8.1.7.7 Bases 3.11.1.4: Liquid Holdup Tanks

8.1.7.8 Bases 3.11.2.1: Gaseous Effluent Dose Rate

8.1.7.9 Bases 3.11.2.2: Dose- Noble Gases

8.1.7.10 Bases 3.11.2.3: Dose - Radioiodines, Radioactive Material in Particulate Form, and Radionuclides Other Than Noble Gases

8.1.7.11 Bases 3.11.2.4: Gaseous Radwaste Treatment System

8.1.7.12 Bases 3.11.2.5: Gas Storage Tanks

8.1.7.13 Bases 3.11.4.1: Total Dose

8.1.7.14 Bases 3.12.1: REMP Program Requirements

8.1.7.15 Bases 3.12.2: REMP - Land Use Census

8.1.7.16 Bases 3.12.3: REMP - Interlaboratory Comparison Program

8.1.8 <u>1/2-ODC-3.03, ODCM: Controls for RETS and REMP Programs</u> (formerly; ODCM Appendix C)

8.1.8.1 Controls 3.0.1 thru 3.0.4: Applicability

8.1.8.2 Controls 4.0.1 thru 4.0.4: Surveillance Requirements

8.1.8.3 Control 3.3.3.1: Radiation Monitoring Instrumentation

8.1.8.4 Control 3.3.3.9: Radioactive Liquid Effluent Monitoring Instrumentation

8.1.8.5 Control 3.3.3.10: Radioactive Gaseous Monitoring Instrumentation

8.1.8.6 Control 3.11.1.1: Liquid Effluent Concentration

8.1.8.7 Control 3.11.1.2: Liquid Effluent Dose

8.1.8.8 Control 3.11.1.3: Liquid Radwaste Treatment System

8.1.8.9 Control 3.11.1.4: Liquid Holdup Tanks

8.1.8.10 Control 3.11.2.1: Gaseous Effluent Dose Rate

8.1.8.11 Control 3.11.2.2: Dose- Noble Gases

8.1.8.12 Control 3.11.2.3: Dose - Radioiodines, Radioactive Material in Particulate Form, and Radionuclides Other Than Noble Gases

8.1.8.13 Control 3.11.2.4: Gaseous Radwaste Treatment System

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8.1.8.17 Control 3.12.2: REMP - Land Use Census

8.1.8.18 Control 3.12.3: REMP - Interlaboratory Comparison Program

8.1.8.19 Control 6.9.2: Annual REMP Report

8.1.8.20 Control 6.9.3: Annual RETS Report

8.2 History Of ODCM Changes

8.2.1 Change (1) of BV-1 ODCM (Issue 1, Effective January, 1984)

8.2.1.1 This is the initial issue of the BV-1 ODCM, as prepared for implementation of the Radiological Effluent Technical Specifications (RETS). Implementation of this manual was commensurate with Amendment No. 66 to the Unit 1 Technical Specifications as approved by the NRC on March 28, 1983.

8.2.2 Change (2) of BV-1 ODCM (Issue 1, Revision 1, Effective October, 1984)

8.2.2.1 A description of the changes that were implemented with this revision are as follows:

8.2.2.1.1 Section 1.0: Table 1.3-1 was revised to include liquid dose factors for nuclides presently identified at BVPS and not included in the original table.

8.2.2.1.2 Section 2.0: Equations 2.1-19 and 2.1-22 were revised as approved at RSC Meeting No. BVPS-RSC-1-84 on January 31, 1984. The equations were revised to clarify flow rate terminology.

8.2.2.1.3 Section 2.0: Section 2.2.2 was revised to delete the food and ground pathways for gaseous dose rate calculations of I-131, tritium, and radionuclides in particulate form with half lives greater than 8 days.

8.2.2.1.4 Section 2.0: Table 2.2-13 was revised to include 7 organs rather than only the maximum organ. Also, the receptor was changed from infant to child, and addition/deletion of nuclides to be consistent with the Technical Specifications and nuclides identified at BV-1.

8.2.3 Change (3) of BV-1 ODCM (Issue 1, Revision 2, Effective July, 1986)

8.2.3.1 A description of the changes that were implemented with this revision are as follows:

8.2.3.1.1 Section 1.0: Provide a flow based monitor setpoint adjustment factor in Section 1.1.2. This change makes Section 1.1.2 consistent with Section 1.1.1 and current procedures.

8.2.3.1.2 Section 1.0 and 2.0: Revise the 31-day dose projection limits and methodology in Sections 1.3.2, 2.3.1.2, and 2.3.2.2. This change corrected the 31-day dose projection limits and changed the dose projection methodology to be consistent with proposed software.

8.2.3.1.3 Section 2.0: Revise the Gaseous Effluent Monitor Setpoints in Sections 2.1.1 and 2.1.2. They were revised due to pressure corrections determined for the detectors, changes in isotopic literature, and the addition of SPING Channel 5 alternate monitor data. The calculations supporting this item are contained in Calculation Packages ERS-SFL-85-031 and ERS-ATL-86-008.

8.2.4 Change (4) of BV-1 ODCM (Issue 2, Effective July, 1987), and BV-2 ODCM (Issue 1, Revision 1, Effective July, 1987)

8.2.4.1 With the start-up of BV-2 in the second half of 1987, the BV-1 ODCM required revision and the BV-2 ODCM required initial implementation. A description of the changes are as follows:

8.2.4.1.1 Produce functionally compatible BV-1 and BV-2 ODCMs which address site dose rate limits and meet regulatory requirements. Note that due to the scope of the revisions to the Unit 1 ODCM, it was re-issued as Issue 2. Also, for clarity, the draft BV-2 ODCM previously submitted to the NRC was regarded as Issue 1 (historical) and operation of BV-2 began with Issue 1, Revision 1 of the BV-2 ODCM.

8.2.4.1.2 Section 1.0: A shared liquid radwaste system, permitting mixing of waste for processing, the sharing of dilution water, and the apportionment of dose according to NUREG-0133 was incorporated into both ODCMs.

8.2.4.1.3 Section 2.0: A shared elevated gaseous radwaste system, permitting the mixing of gaseous radwaste and the apportionment of dose, according to NUREG-0133 was incorporated into both ODCMs.

8.2.4.1.4 Section 2.0: Separate ground level gaseous releases were maintained. The BV-1 ODCM was updated to incorporate the BV-2 five year meteorology base. Gaseous source terms were revised to that calculated for BV-1 in the BV-2 FSAR, and terms were added for calculation of a turbine building release.

8.2.4.1.5 Section 2.0: The gaseous effluent monitor alarm setpoints of both ODCMs were revised as required by revisions to meteorology, source terms, monitor efficiencies, and revised percentages of site dose rate limits.

8.2.4.1.6 Section 2.0: Formal justification was provided for use of the "T" factor in Containment Purge Dose Rate calculations. Whereas, the dose rate for a Containment Purge may be averaged over a time period not to exceed 960 minutes. Since the Containment air volume change time period is 60 minutes, then the maximum value for "T" is 16 (i.e., 960 minutes/60 minutes = 16).

8.2.5 Change (5) of BV-1 ODCM (Issue 2, Revision 1 Effective December, 1987), and BV-2 ODCM (Issue 1, Revision 2, Effective December, 1987)

8.2.5.1 Section 2.0: Sections 2.1.3 and 2.1.4 of both ODCMs were changed to delete a note concerning noble gas nuclides as requested by a NRC letter dated July 14, 1987 titled Beaver Valley Unit 2 - Offsite Dose Calculation Manual, ODCM (TAC 63996).

8.2.6 Change (6) of BV-1 ODCM (Issue 2, Revision 2 Effective June, 1989), and BV-2 ODCM (Issue 1, Revision 3, Effective June, 1989)

8.2.6.1 A description of the changes that were implemented with this revision are as follows:

8.2.6.1.1 Section 1.0 and 2.0: Both ODCMs were revised for addition of Sections 1.4 and 2.4. This addition gives a description of and includes flow diagrams of the Liquid Radwaste System and the Gaseous Radwaste System. (See justification 1)

8.2.6.1.2 Section 1.0: Corrected typos to BV-1 ODCM Equation 1.1-8 to show differentiation between the two f's, and add the division sign. (See Justification 1)

8.2.6.1.3 Section 1.0: Re-define F_k in equation 1.3-1 of both ODCMs, as allowed by the NRC. (See Justification 1)

8.2.6.1.4 Section 1.0 and 2.0: Typos were corrected to the following: (1) BV-1 ODCM equation 1.3-7; add a division sign between the brackets. (2) BV-1 ODCM equation 1.3-8; add a division sign between the brackets. (3) Equation 2.1-20 of both ODCMs; change the HHSP to HSP multiplier from 0.70 to 0.33. (4) Equation 2.1-24 of both ODCMs, change the HHSP to HSP multiplier from 0.70 to 0.33. (See Justification 1)

8.2.6.1.5 Section 1.0 and 2.0: Typos were also corrected as follows: (1) Add the words "from each reactor unit" to five places (Sections 1.3.1, 1.3.2, 2.3.1.1, 2.3.1.2, and 2.3.2.2) of both ODCMs. This ensures compliance with the current requirements of the Technical Specifications. (2) Correct punctuation in Section 2.3.2.1 of the BV-1 ODCM. (3) Correct typos in Table 3.0-1 of both ODCMs. (4) Correct typos in Figure 3.0-3 of both ODCMs.

8.2.6.1.6 Section 2.0: Add a Reference to Section 2 of the BV-1 ODCM. (See Justification 3)

8.2.6.1.7 Section 2.0: Add the words "from the site" to Section 2.2.2 of both ODCMs. This ensures compliance with the current requirements of the Technical Specifications. (See Justification 2)

8.2.6.1.8 Section 2.0: Revise BV-1 ODCM Table 2.2-2 to change the particulate and iodine radionuclide mix for the Unit 1 Ventilation Vent and to correct a typo for Xe-135m in the Containment Vacuum Pumps. (See Justification 3)

8.2.6.1.9 Section 2.0: Provide re-verified $P_{i\tau}$ values for the Beaver Valley site in Table 2.2-13 of both ODCMs. (See Justification 1)

8.2.6.1.10 Section 2.0: Correct the definition for the t_f value in the cow-meat pathway in Section 2.3.2.1 of both ODCMs. (See Justification 1)

8.2.6.1.11 Section 2.0: Provide re-verified R values for the Beaver Valley site in Tables 2.3-2 through 2.3-20 of both ODCMs. (See Justification 1)

8.2.6.1.12 Appendix B: Change the particulate and iodine release fractions in Appendix B of the BV-1 ODCM. (See Justification 3)

8.2.6.2 The justification used for Change (6) to the ODCMs are as follows:

8.2.6.2.1 A letter dated March 2, 1989 (from the NRC) was received by Duquesne Light regarding acceptance of the Offsite Dose Calculation Manuals. The NRC acceptance of the BV-1 and BV-2 ODCMs was based on Technical Evaluation Reports (TER No. EGG-PHY-8194 and EGG-PHY-8217) provided by the Idaho National Engineering Laboratory.

As stated in the letter, minor concerns are delineated in Section 4 of the TER. In general, these concerns are considered typos or additions and in one way impact any of the calculations currently being performed for dose contributions. However, one of these concerns is regarding the inability to reproduce the ODCM R values for the cow-meat, cow-milk and goat-milk pathways when using the ODCM/NUREG-0133 methodology. These R values (along with all other ODCM R values) were re-validated VIA Calculation Package No. ERS-ATL-89-014. The results of this package showed that the R values for the three aforementioned pathways were in error. Since the R values in error do not involve the controlling receptor for gaseous release (i.e.; the controlling receptor is VIA the Inhalation, Ground, and Vegetation pathways, not the pathways subject to error) than these changes to the ODCM will not adversely impact the accuracy or reliability of effluent dose calculations.

8.2.6.2.2 As requested by DLC letters ND3NSM:3431, ND1NSM:3522, and ND1NSM:3652, Technical Specifications were required to be verified in all plant implementing procedures. As part of this effort, wording errors/typos were identified in various sections of the ODCM. This revision corrects the anomalies identified during the verification effort.

8.2.6.2.3 As delineated in letter ND1SHP:776, dated February 12, 1988 (BVPS-1 ODCM Table 2.2-2, Appendix B) a series of apparent discrepancies were identified between ODCM Table 2.2-2 and similar tables of the BVPS-2 FSAR. Evaluation showed that apparent credit was given for continuous filtration of SLCRS releases which is invalid at Unit 1. However, the calculation package on which the BVPS-2 FSAR expected release tables are based, is correct (i.e.; no credit was taken for routine filtration for Unit 1 releases). Except for revising the ODCM, no further corrective action is necessary because the particulates and iodines in the ODCM were not used for gaseous effluent alarm setpoint. Therefore, this change does not adversely impact the accuracy or reliability of setpoint calculations.

8.2.7 <u>Change (7) of BV-1 and 2 ODCM (Issue 3, Effective August, 1995)</u>

8.2.7.1 The combined ODCM, as implemented by ISSUE 3, contains the following changes:

8.2.7.1.1 Prior to ISSUE 3, BV-1 and BV-2 had individual ODCMs that were generically equal. In an effort to simplify the implementing documents, the ODCMs have been combined. This merger of the individual ODCMs will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR Part 50. Also, this merger will not adversely impact the accuracy or reliability of effluent, dose, or setpoint calculations.

8.2.7.1.2 <u>Section 1.0</u>: Revised Section 1.0 (Liquid Effluents) to show compliance with 10 CFR 20 Appendix B (20.1001 - 20.2401), Table 2, Col. 2 EC's. This includes the following: (1) Revising the alarm setpoints for monitors [RM-1LW-104, RM-1LW-116, and 2SGC-RQ100]. (2) Updating the BV-1 monitor detection efficiencies. (3) Updating discharge rate and dilution rate parameters for BV-1 and BV-2. (4) Adding the alarm setpoints for monitors [RM-1RW-100, RM-1DA-100, 2SWS-RQ101, and 2SWS-RQ102].

8.2.7.1.3 Section 1.0: Revised Section 1.0 (Liquid Effluents) and Section 2.0 (Gaseous Effluents) to merge the BV-1 alarm setpoint calculations with the BV-2 alarm setpoint calculations. For all practical purposes, when Tables, Figures, and Equations were transferred to the combined ODCM, the numbering was kept generically equal. The two exceptions to this are as follows: (1) If a table was contained in both ODCMs, but each had data specific to BV-1 or BV-2, then an a or b was added to the table. For example, Table 1.1-1 was previously included in the BV-1 ODCM and the BV-2 ODCM. These tables are now numbered 1.1-1a and 1.1-1b denoting BV-1 and BV-2 respectively. A cross reference for ODCM tables is provided in the Table Of Contents. (2) If an equation was contained in both ODCMs, but each had data specific to BV-1 or BV-2, then a (1) or (2) was added to the equation. For example, Equation 1.1-1 was previously included in the BV-1 ODCM and the BV-2 ODCM. These equations are now numbered 1.1(1)-1 and 1.1(2)-1, denoting BV-1 and BV-2 respectively. A cross reference for ODCM equations is provided in the Table Of Contents.

8.2.7.1.4 Section 3.0: Revised Section 3.0 (Radiological Environmental Monitoring Program) to list the program requirements from the Radiological Assessment Branch Technical Position (Revision 1, 1979).

8.2.7.1.5 Section 4.0: Revised Section 4.0 (Information Related To 40 CFR 190) to provide clarified reporting requirements for the Special Report. The clarifications were taken from Generic Letter 89-01, Supplement No. 1 (NUREG-1301).

8.2.7.1.6 Appendix A: Revised Appendix A to transfer the Batch Release dispersion parameters from Appendix A (Tables A-2 through A-5) to Section 2.3 (Tables 2.3-35 through 2.3-38). This revision was done for clarification. For example, all dispersion parameters are now included in one area of the ODCM.

8.2.7.1.7 Appendix C: This is a new Appendix to the ODCM. Procedural details for the Radiological Effluent Technical Specifications (RETS) were transferred from the Technical Specifications to Appendix C of the ODCM per Generic Letter 89-01 and Generic Letter 89-01, Supplement No. 1 (NUREG 1301). This Appendix also includes selected Definitions and Tables as delineated in the Technical Specifications (Section 1) and selected Applicability and Surveillance Requirement statements as delineated in the Technical Specifications (Section 3/4). These were added to Appendix C for reference purposes, even though they are currently described in the Technical Specification.

8.2.7.1.8 Appendix D: This is a new Appendix to the ODCM. The bases for ODCM Controls were transferred from the Bases Section of the Technical Specifications to Appendix D of the ODCM per Generic Letter 89-01.

8.2.7.1.9 Appendix E: This is a new Appendix to the ODCM. The Annual Radioactive Effluent Release Report and the Annual Radiological Environmental Report reporting requirements are listed in this appendix to the ODCM.

8.2.7.1.10 There are three differences (i.e., non-editorial changes) in this ODCM revision when compared to the previous BV-1 and BV-2 Technical Specifications. These are the only changes that are identified by revision bars. These differences are as follows:

8.2.7.1.10.1 First Difference - LLD Definition Clarification is described as follows: (1) There was a sentence removed in the LLD Standard Deviation Definitions delineated in Appendix C Tables 4.11-1 and 4.11-2. This sentence stated: "In calculating the LLD for a radionuclide determined by gamma ray spectrometry, the background shall include the typical contributions of other radionuclides normally present in the samples (e.g., potassium in milk samples)." (2) This sentence was removed by justification of NUREG-0472, Rev. 2 (i.e., this revision to the NUREG removed the sentence from Tables 4.11-1 and 4.11-2). At BV-1 and 2, there are no other radionuclides normally present in effluent samples. However, there is applicability to environmental LLD calculations due to the existence of other radionuclides in environmental samples. This sentence, therefore, will not be removed from Appendix C, Table 4.12-1. (3) Removal of the sentence from Appendix C, Tables 4.11-1 and 4.11-2 does not adversely impact the accuracy or reliability of current or past effluent LLD calculations. This change maintains the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR Part 50, and does not adversely impact the accuracy or reliability of effluent, dose, or setpoint calculations. (4) This change brings ODCM Appendix C, Tables 4.11-1 and 4.11-2 in generic agreement with NRC guidance (i.e., NUREG-0472) and industry standard.

8.2.7.1.10.2 Second Difference - Change From Semi-Annual Report To Annual Report as follows: (1) The frequency of the Radioactive Effluent Release Report was changed from Semi-Annual to Annual. This change is justified by Federal Register, Rules And Regulations (Vol. 57, No. 169, Monday, August 31, 1992), where as; 10 CFR Part 50.36a(a)(2) states, in part. "Each licensee shall submit a report to the Commission annually that specifies the quantity of each of the principal radionuclides released to unrestricted areas in liquid and in gaseous effluents during the previous 12 months of operation...the time between submission of the reports must be no longer than 12 months..." (2) This change maintains the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR Part 50, and does not adversely impact the accuracy or reliability of effluent, dose, or setpoint calculations.

8.2.7.1.10.3 Third Difference - Implementation Of New 10 CFR 20 is described as follows: (1) The definition for MEMBER(S) OF THE PUBLIC was revised to agree with the definition in 10 CFR 20.1003. (2) The definition for UNRESTRICTED AREA was modified from the definition that was in the Technical Specifications prior to transferring to the ODCM. This modification was necessary to ensure that the ODCM dose model for gaseous releases is not affected. The modification involved adding the following sentence: "For gaseous release dose calculations, the UNRESTRICTED AREA should exclude any public road, railway, or waterway adjacent to or crossing the site that is not occupied continuously by MEMBER(S) OF THE PUBLIC". (3) The limits for liquid effluent concentration were changed from 1 times 10 CFR 20 Appendix B (20.1 - 20.601), Table II, Col. 2 MPC's to 10 times 10 CFR 20 Appendix B (20.1001 - 20.2401), Table 2, Col. 2 EC's. This limit will now be referred to as the ODCM Effluent Concentration Limit (OEC). (4) For gaseous effluents, no changes were made to implement the New 10 CFR 20. As justification, when the utility adopted the RETS (1/1/84), compliance to 10 CFR 20 shifted from the MPC concept to the Unrestricted Area Dose Rate concept. The Dose Rate concept is the preferred method of controlling gaseous effluent release rate, and will continue to be used in-lieu of the MPC or EC concept. (5) Changing to the OEC limit for liquid effluents accommodates needed operational flexibility to facilitate implementation of the New 10 CFR 20 requirements. (6) For information, the general intent of the New Part 20 is that radiation doses to members of the public not exceed 100 mrems per year, which is more restrictive than the 500 mrems per year limit in the Old Part 20, and that fuel cycle licensees also comply with 40 CFR 190. The New Part 20 does not include a requirement on limiting radioactivity concentrations in effluents, which is less restrictive than the Old Part 20. (7) The basic requirements for RETS (i.e.; ODCM Appendix C Controls) are stated in 10 CFR 50.36a. These requirements indicate that compliance with the RETS will keep average annual releases of radioactive material in effluents to small percentages of the limits specified in the 10 CFR 20.106 (10 CFR 20.1302). These requirements also indicate that operational flexibility is allowed (with considerations for public health and safety) which may temporarily result in releases higher than such small percentages, but still within the MPC limits specified in the 10 CFR 20.106. The MPC's relate to an annual dose of 500 mrem. Also, 10 CFR 50.36a indicates that when using operational flexibility, best efforts shall be exerted to keep levels of radioactive materials in effluents to ALARA as set forth in 10 CFR 50 Appendix I. (8) As stated in the Introduction to Appendix B of the New 10 CFR 20, the liquid EC's are based on an annual dose of 50 mrem. Since a release concentration corresponding to a limiting dose rate of 500 mrem/year has been acceptable as a RETS limit for liquid effluents, it should not be necessary to reduce this limit by a factor of ten. (9) BV-1 and BV-2 has demonstrated that the use of the MPC's associated with the 10 CFR 20.106 has resulted in calculated maximum individual doses to a member of the public that are small percentages of the limits of 10 CFR 50 Appendix I. Therefore, the use of the OEC's, which correspond to an annual dose of 500 mrem (i.e.; 10 times the 10 CFR 20 EC's) should not have a negative impact on the ability to continue to operate within the limits of 10 CFR 50 Appendix I, and 40 CFR 190. (10) Operational flexibility is also necessary in establishing a basis for effluent monitor setpoint calculations. As previously discussed, the EC's stated in 10 CFR 20 relate to a dose of 50 mrem in a year. This is too restrictive to base effluent monitor setpoint calculations. For many liquid effluent release situations, the monitor background is high, which could result in a monitor setpoint that is approximately equal to the monitor background. (11) In summary, to accommodate operational flexibility needed for effluent releases, the limits associated with the liquid release concentration (i.e.; the OEC) are based on 10 times the EC's stated in the 10 CFR 20. The multiplier of 10 is used because the annual dose of 500 mrem (10 CFR 20 MPC bases) is a factor of 10 higher than the annual dose of 50 mrem (10 CFR 20 EC bases). Compliance with the 100 mrem dose limit of the 10 CFR 20.1302 will be demonstrated by operating within the dose limits of 10 CFR 50 Appendix I, and 40 CFR 190 (which are also ODCM Controls for liquid and gaseous effluents). Implementation of the 10 CFR 20 for liquid effluents maintains the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR Part 50, and does not adversely impact the accuracy or reliability of effluent, dose, or setpoint calculations.

8.2.7.2 In summary, Per Generic Letter 89-01, the transfer of RETS procedural details fulfills the goal of the USNRC Policy Statement for Technical Specification improvements. It is not the USNRC's (or DLC's) intent to reduce the level of radioactive effluent control. Rather, the intent is to provide programmatic controls for RETS (as delineated in Technical Specification 6.8.6) and allow for relocation of the procedural details of the RETS to the ODCM.

8.2.8 <u>Change (8) of BV-1 and 2 ODCM (Issue 3, Revision 1, Effective October, 1995)</u>

8.2.8.1 A description of the changes that were implemented with this revision are as follows:

8.2.8.1.1 <u>Index</u>: Editorial changes were made for clarity. (See justification 1)

8.2.8.1.2 <u>Section 1.0</u>: Revised Nb-95 and Nb-97 dose factors in Table 1.3-1 due to changing the niobium bioaccumulation factor. (see justification 2)

8.2.8.1.3 <u>Appendix A</u>: A change was made to Table 1.1 so that the letter A would proceed the table number. (See justification 1)

8.2.8.1.4 <u>Appendix B</u>: A descriptive paragraph was added at the front of this Appendix. Also, changes were made to the tables so that the letter B would proceed the table numbers. (See justification 1)

8.2.8.1.5 <u>Appendix C</u>: Descriptive paragraphs were added at the front of the Appendix (See justification 1). Removed the process flow rate operability and surveillance requirements for gaseous effluent radiation monitors [2RMQ-RQ301, 2RMQ-RQ303 and 2HVL-RQ112] from Tables 3.3-13 and 4.3-13 (See justification 3). Added alternate system effluent flow rate measuring devices for the three gaseous effluent pathways to Tables 3.3-13 and 4.3-13 (See justification 4). Revised Surveillance Requirements 4.11.1.1.3 and 4.11.1.1.4 and notes e and g of Table 4.11-1 to clarify Turbine Building sump sampling requirements (See justification 5).

8.2.8.1.6 <u>Appendix D</u>: Descriptive paragraphs were added at the front of the Appendix. (See justification 1)

8.2.8.1.7 <u>Appendix E</u>: Descriptive paragraphs were added at the front of the Appendix. (See justification 1)

8.2.8.1.8 <u>Appendix F</u>: This is a new Appendix to the ODCM. It contains plant procedure references for Radiological Effluent Technical Specification (RETS) that were transferred from the Technical Specification Procedure Matrix. (See justification 1)

8.2.8.2 The justification used for change (8) to the ODCM are as follows:

8.2.8.2.1 These changes are considered editorial in nature. Therefore, these editorial changes will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50. Also the editorial changes will not adversely impact the accuracy or reliability of effluent dose or setpoint calculation.

8.2.8.2.2 This change resulted from revising the bioaccumulation factor (BF) for niobium from the value posted in Table A-1 of Regulatory Guide 1.109, Revision 1, 1977 (30,000 pCi/kg per pCi/l). Since this change in niobium BF (as documented and justified in Appendix A to Calculation Package No. ERS-ATL-83-027) merely removes the conservatism associated with organism uptake, then the change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50. Also, removing the conservatism will not adversely impact the accuracy or reliability of effluent dose or setpoint calculation.

8.2.8.2.3 This change removes the process flow rate operability and surveillance requirements for BV-2 Gaseous Effluent Radiation Monitors [2RMQ-RQ301, 2RMQ-RQ303 and 2HVL-RQ112] from Appendix C Tables 3.3-13 and 4.3-13. These items were removed from the ODCM by justification provided in Calculation Package No. ERS-ATL-90-021. A safety analysis and a no significant hazards evaluation were prepared and approved prior to submitted it to the NRC via TSCR No. 2A-61 in 1992. However, it was withdrawn in 1993 in an effort to alleviate any further delays associated with approval of TSCR No. 1A-175/2A-37 (Generic Letter 89-01 implementation). Removal of these requirements from the ODCM will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a and Appendix I to 10 CFR 50. Also removal of these items will not adversely impact the accuracy or reliability of effluent dose or setpoint calculation. The following is a summary of the justification. (1) BVPS-1 and BVPS-2 is currently using, and will continue to use design (maximum) system flow rates in ODCM Dose & Dose Rate Calculations, rather than those flow rates observed during normal plant operation. (2) BVPS-2 UFSAR Section 11.3.3 indicates that the source term for these three pathways are not significant. These pathways are not included in UFSAR Tables 11.3-1 through 11.3-4 that list the expected and design releases for each potentially radioactive pathway. (3) The DLC commitment to Regulatory Guide 1.97, Rev. 2 (Section 1.8-1 of the BVPS-2 UFSAR) is not affected. This RG applies to instrumentation used during and after postulated accident conditions. These three process flow rate instruments were not used in any accident analysis, nor are they used to assess plant conditions during and following an accident. (4) The DLC commitment to Regulatory Guide 1.21, Rev. 1 (Section 1.8-1 of the

BVPS-2 UFSAR) is not affected. RG 1.21, Section C.2 (Location of Monitoring) states in part: "All major and potentially significant paths for release of radioactive material during normal reactor operation, including anticipated operational occurrences, should be monitored. Measurements of effluent volume, rates of release, and specific radionuclides should be made insofar as practical . . " As previously stated, the three process flow rate instruments are located on effluent pathways that do not have a significant source term. (5) BVPS-2 UFSAR Sections 9.4.13 and 9.4.16 indicate that the building ventilation system for these three pathways are non-safety related and are not required to perform any safety-related function. (6) There is no effect to the Noble Gas Monitors located on these three pathways. The Noble Gas Monitors are still capable of performing their intended functions as described in BVPS-2 UFSAR Section 11.5.2.4.

8.2.8.2.4 This change adds alternate system effluent flowrate measuring devices for the three BV-1 gaseous effluent pathways to Appendix C Tables 3.3-13 and 4.3-13. A 10 CFR 50.59 safety evaluation has concluded that no unreviewed safety question is involved by adding the alternate measuring devices to Appendix C Tables 3.3-13 and 4.3-13. This conclusion is based on the following: (1) There is no increase in the probability or consequences of accidents or malfunctions of equipment important to safety. (2) There is no creation of a possibility for an accident or malfunction of a different type than any evaluated previously. (3) There is no reduction in the margin of safety. (4) Also, since this change merely adds alternate measuring devices that meet the same surveillance requirements of the primary channel, then the change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50. Also, addition of the alternate flow rate measuring devices will not adversely impact the accuracy or reliability of effluent dose or setpoint calculations.

8.2.8.2.5 This change to the ODCM clarifies Turbine Building sump sampling requirements and clarifies effluent related actions associated with detection of radioactivity in the secondary system. These clarifications are documented and justified in Calculation Package No. ERS-ATL-95-006. Also, since these clarifications were shown to meet the intent of NUREG-1301 (superseding NUREG-0472) and the BVPS-1 and 2 UFSAR's, then the clarification will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a and Appendix I to 10 CFR 50. Also, the clarifications will not adversely impact the accuracy or reliability of effluent dose or setpoint calculation. Also, a 10 CFR 50.59 safety evaluation has concluded that no unreviewed safety question is involved by clarifying these actions. This conclusion is based on the following: (1) There is no increase in the probability or consequences of accidents or malfunctions of equipment important to safety. (2) There is no creation of a possibility for an accident or malfunction of a different type than any evaluated previously. (3) There is no reduction in the margin of safety.

8.2.9 Change (9) of BV-1 and 2 ODCM (Issue 3, Revision 2, Effective May 1997)

8.2.9.1 A description of the changes that were implemented with this revision are as follows:

8.2.9.1.1 Index: Editorial changes were made for clarity. (See Justification 1)

8.2.9.1.2 Section 1.0: Clarifying statements were added to Tables 1.2-1a and 1.2-1b to show that the recirculation times listed are based on historical recirculation rates. Figure 1.4-3 was added to show BV-1 and 2 liquid Effluent Release Points. (See Justification 1)

8.2.9.1.3 Section 3.0: Removed the option to perform broad leaf vegetation sampling at the site boundary in a sector with the highest D/Q. (See Justification 2)

8.2.9.1.4 Appendix C: Added plant specific Mark Numbers to Tables 3.3-12, 4.3-12, 3.3-13 and 4.3-13 (See Justification 1). Corrected typographical errors on Surveillance Requirement 4.11.4.1.1 (See Justification 1). Added clarifying statements from NUREG-1301 and the Radiological Assessment Branch Technical Position to Tables 3.12-2 and 4.12-1 (See Justification 1). Removed the option to perform broad leaf vegetation sampling at the site boundary in a sector with the highest D/Q (See Justification 2).

8.2.9.1.5 Appendix E: Corrected typographical error on Table 6.9-1. (See Justification 1)

8.2.9.1.6 Appendix F: Added procedure details to Tables 11, 12 and 13. (See Justification 1)

8.2.9.2 The justification used for Change (9) to the ODCM are as follows:

8.2.9.2.1 These changes are considered editorial in nature. The changes either correct typographical errors or add editorial details from previously approved station documents. Therefore, these changes will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a and Appendix I to 10 CFR 50. Also, the editorial changes will not adversely impact the accuracy or reliability of effluent dose or setpoint calculations.

8.2.9.2.2 This change removes the option to perform broad leaf vegetation sampling at the site boundary (in a sector with the highest D/Q) in lieu of the garden census. Per NUREG-1301 and the Radiological Branch Technical Position, this option does not apply to plants with elevated releases. Since BV-1 and 2 have elevated releases, the option should not be exercised. A review of past garden census showed that the option was never exercised at BV-1 and 2. Since this change removes an option that should not be exercised, then the change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a and Appendix I to 10 CFR 50. Also, removal of the option will not adversely impact the accuracy or reliability of effluent dose or setpoint calculations.

8.2.10 <u>Change (10) of BV-1 and 2 ODCM (Issue 3, Revision 3, Effective June 1997)</u>

8.2.10.1 A description of the change that was implemented with this revision is as follows:

8.2.10.1.1 <u>Section 2.0</u>: A release point for the BV-2 Turbine Building Vent was added (for editorial purposes) to Figure 2.4-2.

8.2.10.2 The justification used for Change (10) to the ODCM is as follows:

8.2.10.2.1 This change is considered editorial in nature. The change adds an equivalent item that was previously located on BV-2 Technical Specification Figure 5.1-2. Since BV-2 Technical Specification Amendment 83 removed this figure, then the gaseous release point for the BV-2 Turbine Building Vent needed transferred to the ODCM. Therefore, since this change is considered editorial, the change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a and Appendix I to 10 CFR 50. Also, the editorial change will not adversely impact the accuracy or reliability of effluent dose or setpoint calculations.

8.2.11 <u>Change (11) of BV-1 and 2 ODCM (Issue 3, Revision 4, Effective March 1998)</u>

8.2.11.1 A description of the changes that were implemented with this revision are as follows:

8.2.11.1.1 <u>Index</u>: Editorial changes were made for clarity.

8.2.11.1.2 <u>Section 3.0</u>: The distances for the environmental monitoring sample points were revised to show a more accurate measurement from the center of the Unit 1 Containment Building. The actual sample locations and descriptions remain unchanged. Also, the 4 individual quadrant maps showing TLD locations were consolidated into 1 map. This is a Corrective Action to Condition Report CR 980353.

8.2.11.1.3 Section 4.0: Added clarifying statements as to how doses due to radioactive effluents for MEMBERS OF THE PUBLIC conducting activities inside the site boundary are derived and reported. This is a Corrective Action to Condition Report CR 971578.

8.2.11.1.4 Appendix C: Added statements to Action 23 of Table 3.3-12 to clarify that batch liquid releases may also be initiated with the same Action needed for resuming the release. This is a recommendation from the 1997 RETS Self-Assessment. A note was also added to this table to clarify that independent signatures on the discharge permit satisfy the requirement for "two technically qualified members of the Facility Staff independently verify the release rate calculation..." Added Action 29 to RM-1GW-108B on Table 3.3-13. This addition ensures consistency with the other 7 continuous gaseous effluent pathway Actions for Noble Gas Monitor inoperability. Added plant specific Mark Numbers for primary and alternate instrumentation to Tables 3.3-13 and 4.3-13 as follows: (1) For Noble Gas Activity Monitors, [RM-1VS-109 Channel 5] was added as an alternate to [RM-1VS-101B] and [RM-1V1S-110 Channel 5] was added as an alternate to [RM-1VS-107B]. [RM-1GW-109 Channel 5] was not added as an alternate to [RM-1GW-108B] at this time, because it does not perform on auto-isolation of gaseous waste decay tank release upon upper activity alarm. (2) For Particulate Activity Monitors, [RM-1VS-109 Channel 1] was added as an alternate to [RM-1VS-101A], [RM-1VS-1110 Channel 1] was added as an alternate to [RM-VS-1107A], and [RM-1GW-109 Channel 1] was added as an alternate to RM-1GW-108A.

8.2.11.1.5 Appendix E: Corrected typographical errors on Table E:6.9-1

8.2.11.1.6 Appendix F: Updated the procedure details for primary and alternate instrumentation included in Appendix C Tables 3.3-13 and 4.3-13. Reduced the amount of detail contained in reference to the Operating Manual L-5 logs so that the position of the surveillance on the logs can be changed without having a need to change the Tables in this Appendix. This is a Corrective Action to Condition Report CR 980129.

8.2.11.2 The justification used for Change (11) to the ODCM is as follows:

8.2.11.2.1 These changes are considered editorial in nature. The changes either correct typographical errors or add editorial details from previously approved station documents. Therefore, these changes will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a and Appendix I to 10 CFR 50. Also, the editorial changes will not adversely impact the accuracy or reliability of effluent dose or alarm setpoint calculations.

8.2.12 Change (12) of BV-1 and 2 ODCM (Issue 3, Revision 5, Effective November 1998)

8.2.12.1 A description of the changes that were implemented with this revision are as follows.

8.2.12.1.1 Index: Editorial changes were made for clarity. (See Justification 1.)

8.2.12.1.2 Section 1.0: Added clarification for calculation of radionuclide concentration when the Post Dose Correction Factor is >1. (See Justification 1).

8.2.12.1.3 Section 3.0: Added an additional site location for the upstream environmental surface water sample. Added additional method after collecting and compositing this sample. (See Justification 2.)

8.2.12.1.4 Appendix C: Revised the definitions for MEMBER(S) OF THE PUBLIC and UNRESTRICTED AREA to ensure compliance with 10 CFR 20.1003. (See Justification 1.) Added a definition for MEMBER(S) OF THE PUBLIC to ensure compliance with 40 CFR 190.02(k). (See Justification 1.) Added plant specific Mark Numbers for primary and alternate instrumentation to Table 3.3-13 that were inadvertently omitted from change (11) to the ODCM. (See Justification 1.) Added clarification to Table 4.11-2 as to where and when H-3 samples of Waste Gas Storage Tanks are to be obtained. This is a Corrective Action to Condition Report CR 981489. (See Justification 1.) Added clarification to note "e" of Table 4.11-2 as to the appropriate ventilation release path. This is a Corrective Action to CR 981490. (See Justification 1.). Corrected an obvious omission on Table 3.12-1 to ensure that 2 TLD's are used for determination of Direct Radiation. (See Justification 1.) Incorporated the appropriate changes to Table 3.12-1 that are described above for Section 3.0. (See Justification 2.)

8.2.12.1.5 Appendix F: Added procedure details from the Chemistry Manual to Table 6. This is a Corrective Action to Condition Report CR 981488. (See Justification 1.)

8.2.12.2 The justifications used for Change (12) to the ODCM are as follows:

8.2.12.2.1 These changes are considered editorial in nature. The changes either correct typographical errors or add editorial details from previously approved station documents. Therefore, these changes will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50. Also, the editorial changes will not adversely impact the accuracy or reliability of effluent dose or alarm setpoint calculations.

8.2.12.2.2 These changes involve the upstream environmental surface water sample method and sample site. Since these changes were shown to meet the intent of NUREG-1301, and BVPS-1 and 2 UFSAR's, then the change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a and Appendix I to 10 CFR 50. Also, the change will not adversely impact the accuracy or reliability of effluent dose or alarm setpoint calculations. Also, a 10 CFR 10.50 safety evaluation has concluded that no unreviewed safety question is involved by adding an additional sample site and sample method. This evaluation is based on the following: (1) There is no increase in the probability or consequences of accidents or malfunctions of equipment important to safety. (2) There is no creation of a possibility for an accident or malfunction of a different type than any evaluated previously. (3) There is no reduction in the margin of safety.

8.2.13 <u>Change (13) of BV-1 and 2 ODCM (Issue 3, Revision 6, Effective May 1999)</u>

8.2.13.1 A description of the changes that were implemented with this revision is as follows:

8.2.13.1.1 Index: Editorial changes were made for clarity.

8.2.13.1.2 Section 3.0: Updated figure number and table reference. Removed a redundant upstream environmental surface water sampling location.

8.2.13.1.3 Appendix C: Made editorial changes for clarity. Added definitions for SHUTDOWN and STARTUP. Changed definition for ODCM to ensure agreement with definition provided in Unit 1/2 Technical Specification Amendments 220/97. Changed designations for primary and alternate instruments on Tables 3.3-12, 4.3-12, 3.3-13 and 4.3-13 from "P" and "A" to "Pri" and "Alt". Clarified use of the Flow Rate Measurement Devices for the Cooling Tower Blowdown Line on Tables 3.3-12 and 4.3-12 to show that the Unit 1/2 combined instrument [FT-1CW-101-1] is the primary and both of the individual Unit 1 and Unit 2 instruments [FT-1CW-101] and [2CWS-FT101] are the alternates. Updated Actions 24, 25 and 26 of Table 3.3-12 to describe use of comparable alternate monitoring channels when the primary channels are INOPERABLE. Clarified Table 3.3-13 Action 28 applicability for Unit 2 gaseous effluent monitors. Clarified Table 3.3-13 Action 30 to show that applicability is for batch purges of the reactor containments. Changed reference of Special Report compliance requirement from Technical Specification 6.9.2f to 10 CFR 20.2203 and 10 CFR 50.4 as permitted by Unit 1/2 Technical Specification Amendments 220/97. Clarified note b of Table 4.11-2 regarding sampling and surveillances frequencies. Clarified Controls 3.12.1 and 3.12.2 to ensure compliance with NUREG-1301.

8.2.13.1.4 Appendix E: Made editorial changes for clarity. Changed reference of Special Report compliance requirement from Technical Specification 6.9.2f to 10 CFR 20.2203 and 10 CFR 50.4 as permitted by Unit 1/2 Technical Specification Amendments 220/97. Changed submittal date of annual REMP report from May 1 to May 15 as permitted by Unit 1/2 Technical Specification Amendments 220/97. Changed column heading in Table E: 6.9-1 to ensure consistency with NUREG-1301.

8.2.13.2 The justification used for change (13) to the ODCM is as follows:

8.2.13.2.1 All changes are considered editorial in nature. The changes either clarify the intent of the original specification or add equivalent items form the standard guidance document (NUREG-1301) or recent Technical Specification Amendments. Therefore, since these changes are considered editorial, the changes will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a and Appendix I to 10 CFR 50. Also, the editorial changes will not adversely impact the accuracy or reliability of effluent dose or setpoint calculations.

8.2.14 Change (14) of BV-1 and 2 ODCM (Revision 14, Effective March 2000)

8.2.14.1 Prior to this ODCM change, the change numbers did not match the Issue and Revision numbers. For example, the last implemented ODCM change was (13), but carried an Issue 3, Revision 6 designation. Therefore, as of this ODCM change (14), consecutive Revision numbers will begin with Revision 14.

8.2.14.2 A description of the changes that were implemented with this revision is as follows:

8.2.14.2.1 Index: Editorial changes were made for clarity. References to condition reports CR 982097, CR 992652 and CR 993021 were added.

8.2.14.2.2 Appendix C: Editorial changes were made for clarity. Corrected a typographical error on Table 3.3-12 in regards to FT-CW-101-1. Changed the grab sampling requirement from 8 hours to 12 hours for Table 3.3-12 Action 24 (NUREG-1301, Table 3.3-12, Action 36 and 37 allow this change). Enhanced the Channel Functional Test requirements on Table 4.3-12 from Q(6) to Q(1) for RM-1DA-100 (Corrective Action to Condition Report CR 993021). Add clarification to Table 3.3-13 and 4.3-13 to show the plant specific Mark Numbers for the primary and alternate BV-1 Sample Flow Rate Measuring Devices. Corrected a typographical error on Table 3.3-13 Action 27. Separated Action 28 of Table 3.3-13 into individual Action 28 requirements for System Effluent Flow Rate Measuring Devices/Process Flowrate Monitors and individual Action 28 requirements for Sample Flow Rate Measuring Devices/Sample Flowrate Monitors. Added clarification to Table 3.3-13 to show that Action 29 and Action 32 are applicable for continuous releases. Added an alternate method in lieu of grab sample collection (ie., local monitor readings can be obtained when communication is lost to the Control Room) to show compliance to Table 3.3-13 Action 29. Changed the grab sampling requirement from 8 hours to 12 hours for Table 3.3-13 Action 29 and Action 32 (NUREG-1301, Table 3.3-013, Action 47 allows this change). Corrected typographical errors on Table 4.11-1 in regards to liquid composite analysis frequency and table notation.

8.2.14.2.3 Appendix F: Made editorial changes for clarity. Updated the procedure details for primary and alternate instrumentation included in Appendix C Tables 3.3-13 and 4.3-13. Added appropriate references to the HP Shift Logs (ie., HPM Appendix 1) when these logs are used satisfy ODCM Appendix C Surveillances and Actions (Corrective Action to Condition Report CR 992652).

8.2.14.3 The justification used for change (14) to the ODCM is as follows:

8.2.14.3.1 Most of these changes are considered editorial in nature. All changes were screened for 10CFR50.59 applicability. In summary, the BVPS-1 and 2 UFSAR's are not impacted, because the changes either clarify the intent of the original specification, add plant specific Mark Numbers, or add equivalent items from the standard guidance document (NUREG-1301). Therefore, these changes will maintain the level of radioactive effluent control requried by 10CFR20.1302, 40CFR Part 190, 10 CFR50.36a, and Appendix I to 10CFR50. Also, these changes will not adversely impact the accuracy or reliablity of effluent dose or alarm setpoint calculations.

8.2.15 Change (15) of BV-1 and 2 ODCM (Revision 15, Effective August 2000)

8.2.15.1 A description of the changes that were implemented with this revision is as follows:

8.2.15.1.1 Index: Editorial changes were made for clarity. Reference to Condition Report CR 001682 was added. Reference to NRC unresolved Item 83-30-05 was added.

8.2.15.1.2 Appendix C: Editorial changes were made for clarity. Annotated Actions 28 of Table 3.3-13 into Action 28A and 28B to show differentiation between Action 28A requirements for system/process flow rate measurement and Action 28B requirements for sampler flow rate measurement. Added an alternate method in lieu of 4 hour flow rate estimations (ie; assume ODCM design values for system/process flow rate) to show compliance with Table 3.3-13 Action 28A when the system/process flow rate monitor is inoperable. Annotated Actions 30 of Table 3.3-13 into Action 30A and 30B to show differentiation between Action 30A requirements for BV-1 reactor containment purges and Action 30B requirements for BV-2 reactor containment purges.

8.2.15.2 The justification used for change (15) to the ODCM is as follows:

8.2.15.2.1 Some of these changes are considered editorial in nature. These changes were screened for 10CFR50.59 applicability and determined not to impact the BVPS-1 and 2 UFSAR's. Since the editorial changes clarify the intent of the original specification, then these changes will maintain the level of radioactive effluent control required by 10CFR20.1302, 40CFR Part 190, 10CFR50.36a, and Appendix I to 10CFR50. Also, these changes will not impact the accuracy or reliability of effluent dose or alarm setpoint calculation.

8.2.15.2.2 The change to allow use of design (maximum) system flow rates in lieu of 4 hour flow rate estimations (for five of the eight gaseous effluent release pathways) was screened for 10CFR50.59 applicability and determined not to impact the BVPS-1 and 2 UFSAR's. The 4 hour flow rate estimations for these effluent release pathways have never been used in ODCM Dose and Dose Rate Calculations. The method for use of process flow rates in ODCM Dose and Dose Rate Calculations remains unchanged. For example, BVPS-1 and BVPS-2 is currently using, and will continue to use design (maximum) system flow rates in ODCM Dose and Dose Rate Calculations for all eight gaseous effluent release pathways. This is necessary to ensure that DLC response to NRC Unresolved Item 50-334/83-30-05 is not compromised. Also this change is considered similar and within the justification provided for ODCM change (8) that removed all of the process flow rate operability and surveillance requirements for the other three gaseous effluent release pathways. Based on the above, these changes will maintain the level of radioactive effluent control required by 10CFR20.1302, 40CFR Part 190, 10CFR50.36a, and Appendix I to 10CFR50. Also, these changes will not impact the accuracy or reliability of effluent dose or alarm setpoint calculation.

8.2.16 Change (16) of BV-1 and 2 ODCM (Effective April 2002)

8.2.16.1 A description of the changes that were implemented with this revision are as follows:

8.2.16.1.1 The entire BV-1 and 2 ODCM was converted to the ODC format as delineated in 1/2-ADM-0100. As part of this process, the ODCM was separated into eight procedures as follows:

8.2.16.1.1.1 1/2-ODC-1.01, Rev 0; ODCM: Index, Matrix and History of ODCM Changes (formerly; ODCM Index and Appendix F)

8.2.16.1.1.2 1/2-ODC-2.01, Rev 0; ODCM: Liquid Effluents (formerly; ODCM Section 1 and 5)

8.2.16.1.1.3 1/2-ODC-2.02, Rev 0; ODCM: Gaseous Effluents (formerly; ODCM Section 2 and 5)

8.2.16.1.1.4 1/2-ODC-2.03, Rev 0; ODCM: Radiological Environmental Monitoring Program (formerly; ODCM Section 3)

8.2.16.1.1.5 1/2-ODC-2.04, Rev 0; ODCM: Information Related to 40CFR190 (formerly; ODCM Section 4)

8.2.16.1.1.6 1/2-ODC-3.01, Rev 0; ODCM: Dispersion Calculational Procedure and Source Term Inputs (formerly; ODCM Appendix A & B)

8.2.16.1.1.7 1/2-ODC-3.02, Rev 0; ODCM: Bases for ODCM Controls (formerly; ODCM Appendix D)

8.2.16.1.1.8 1/2-ODC-3.03, Rev 0; ODCM: Controls for RETS and REMP Programs (formerly; ODCM Appendix C and E)

8.2.16.1.2 Procedure 1/2-ODC-3.02, Rev 0: Technical Specification Bases 3/4.3.3.1 was duplicated in the Bases for ODCM Controls as permitted by Unit 1/2 Technical Specification Amendments 1A-246/2A-124.[3.2.6.8]

8.2.16.1.3 Procedure 1/2-ODC-3.03, Rev 0: Portions of Technical Specification LCO 3.3.3.1 (including portions of Tables 3.3-6 and 4.3-3) were transferred to the ODCM Controls as permitted by Unit 1/2 Technical Specification Amendments 1A-246/2A-124.[3.2.6.8] Specifically, this includes the Mid and High Range Channels of Noble Gas Effluent Monitors [RM-1VS-109 (7 and 9), RM-1VS-110 (7 and 9), RM-1GW-109 (7 and 9), and 2HVS-RQ109C and 109D], the Atmospheric Steam Dump Valve/Code Safety Relief Valve Discharge Monitors [RM-1MS-100A, B and C] and Auxiliary Feedwater Pump Turbine Exhaust Monitor [RM-1MS-101]. The Preplanned Method of Monitoring (PMM) was also added for clarification of necessary actions when the primary instrument is inoperable. Addition of the PMM's are considered an editorial change because it merely specifies the asset number (or appropriate form number), which were included as PMM's in previously approved station documents.

8.2.16.1.4 Procedure 1/2-ODC-3.03, Rev 0: Added clarifications to ODCM Control 3.3.3.9 Table 3.3-13 to show that Action 30A and Action 3B are applicable to the initial batch purge of the reactor containment atmosphere. All other releases of reactor containment atmosphere (i.e.; after the initial batch purge) are considered continuous releases.

8.2.16.1.5 Procedure 1/2-ODC-3.03, Rev 0: Added specific plant asset numbers to ODCM Control 3.3.3.10 Table 3.3-13 and Table 4.3-13 to show that Sample Flow Rate Monitor flow transmitters [2HVS-FIT101-1, 2RMQ-FIT301-1, 2HVL-FIT112-1 and 2RMQFIT303-1] may be used as comparable alternates when the primary instruments [RM-11 Monitor Item 28 for 2HVS-RQ101, 2RMQ-RQ301, 2HVL-RQ112 and 2RMQ-RQ303], respectively, are INOPERABLE. This is considered an editorial change because the primary monitoring channel (i.e.; RM-11 Monitor Item 28) display already receives its input from these same flow transmitters.

8.2.16.1.6 Procedure 1/2-ODC-3.03, Rev 0: Added notation to ODCM Control 3.3.3.10 Table 3.3-13 and Table 4.3-13 to show that [RM-1GW-109 Channel 5] may be used as a comparable alternate to [RM-1GW-108B] for continuous releases. However, since [RM-1GW-109 Channel 5] cannot perform an automatic isolation of gaseous waste decay or storage tank releases, then notation was also added to prevent using this monitor as a comparable alternate for batch releases. This is considered an editorial change because it merely specifies the asset number of a redundant alternate monitoring channel that was included in previously approved station documents.

8.2.16.1.7 <u>Procedure 1/2-ODC-3.03, Rev 0</u>: Replaced the requirements for "Particulate Activity Monitors" in ODCM Control 3.3.3.10 Tables 3.3-13 and Table 4.3-13 with requirements for "Particulate and Iodine Samplers". This is considered an editorial change because the NRC guidance document used for preparation of ODCM Controls (NUREG-1301) contains the clarification that the requirements listed in these Tables are for the "Particulate and Iodine Samplers", and not for the "Particulate Activity Monitors".

8.2.16.2 The justification used for change (16) to the ODCM is as follows:

8.2.16.2.1 The specific radiation monitoring channels transferred to the ODCM provide alarms and indications to alert plant personnel of high radiation conditions and to assist in evaluating and trending plant effluents. The Actions applicable if the monitors are inoperable require only that area surveys be performed on a daily basis, or that explanations of inoperability be provided in an annual effluent report. The Actions do not impact or reference the operability of other systems nor do the Actions require that plant operation be terminated at any time.

8.2.16.2.2 Some of the radiation monitoring effluent monitors transferred to the ODCM provide indications used to assess selected plant parameters following an accident consistent with the recommendations of NUREG-0737. However, the monitors do not provide indication for post accident variables that have been identified as Regulatory Guide 1.97 Type A or Category I.

8.2.16.2.3 The Safety Analysis performed for the License Amendments conclude that the radiating monitoring channels transferred to the ODCM do not reduce the effectiveness of the requirements being relocated. Rather, the transferred results in a change in the regulatory control required for future changes made to the requirements. The requirements will continue to be implemented by the appropriate plant procedures in the same manner as before. However, future changes to the transferred requirements will be controlled in accordance with 10 CFR 50.59 instead of requiring a license amendment per 10 CFR 50.90.

8.2.16.2.4 Based on the above, these changes will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50. Also, these changes will not impact the accuracy or reliability of effluent dose or alarm setpoint calculation.

8.2.17 <u>Change (17) of BV-1 and 2 OCDM (Effective August 2002)</u>

8.2.17.1 A description of the changes that were implemented with this revision are as follows:

8.2.17.1.1 Procedure 1/2-ODC-3.03, Rev 1: Technical Specification LCO 3.11.1.4 for Liquid Storage Tank Activity Limits, and LCO 3.11.2.5, for Gas Storage Tank Activity Limits were transferred to ODCM Controls 3.11.1.4 and 3.11.2.5 respectively as permitted by Unit 1/2 Technical Specification Amendments 1A- 250/2A-130.(3.2.6.9)

8.2.17.1.1.1 As part of the preparation work for transfer of the Liquid Storage Tank Activity Limits to the ODCM, the 10 Curie Limit for these tanks was re-verified and documented in Calculation Package ERS-ATL-95-007.(3.2.3.9) The results of this calculation provide tank specific activity limits to ensure that the 10CFR20 Appendix B Table 2, Col. 2 EC Limits will be maintained should an accidental release of the tank(s) contents occur. Previously, LCO 3.11.1.4 used a generic limit of 10 Curies for each of the four tanks listed. However, formal documentation for derivation of the 10 Curie value could not be located in the records storage system.

8.2.17.1.1.2 In addition, individual tank Activity limits were developed for the Unit 1 and 2 Refueling Water Storage Tanks (RWST's), which were also added to this ODCM Control. The Surveillance Requirements for determination of RWST Activity will not be performed once per 7 days like the other Liquid Storage Tanks, because radioactive material is not added to the RWST's on a weekly basis. Therefore, the surveillance for determination of (RWST's) Activity will be performed within 7 days of returning reactor cavity water (radioactive material) back to the RWST (i.e.; during a refueling outage).

8.2.17.1.2 Procedure 1/2-ODC-3.03, Rev 1: Changed the due date of the Annual Radioactive Effluent Release Report from April 1 to May 1 as permitted by Unit 1/2 Technical Specification Amendments 1A-250/2A-130.(3.2.6.9)

8.2.17.1.3 Procedure 1/2-ODC-3.03, Rev 1: Changed Table 3.3-12 of Control 3.3.3.9 to correct an obvious omission of Channel Operability and Action Statement Requirements for Flow Rate Measurement Device [FR-1LW-103] on the Liquid Waste Containment Drain Line. This obvious omission is detailed in CR 02-05533.(3.2.2.12)

8.2.17.1.4 Procedure 1/2-ODC-3.03, Rev 1: Made editorial changes to correct the primary asset numbers of the BVPS-2 Sample Flowrate Monitors as shown on Tables 3.3-13 and 4.3-13 of Control 3.3.3.10. These changes clarify that the primary Sampler Flowrate Monitor is the device that is used for monitoring sample flowrate through the Particulate and Iodine Sampler Flowpath, not the Particulate and Iodine Monitoring Flowpath.

8.2.17.2 The justification used for change (17) of the ODCM is as follows:

8.2.17.2.1 These changes merely transfers existing storage tank activity limits from the Technical Specification to the ODCM and changes the due date for the Annual Radioactive Effluent Release Report as permitted by Unit 1/2 Technical Specification Amendments 1A-250/2A-130. As part of this change, the ODCM Control for Liquid Storage Tank Activity Limits was enhanced to add ODCM Controls and Surveillance Requirements for the Unit 1 and Unit 2 RWST's. Therefore, these changes (as delineated in the Technical Specification Amendments) will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50. Also, these changes will not impact the accuracy or reliability of effluent dose or alarm setpoint calculation.

8.2.18 Change (18) of the BV-1 and 2 ODCM (Effective October 2002).

8.2.18.1 A description of the changes that were implemented with this revision are as follows:

8.2.18.1.1 <u>Procedure 1/2-ODC-3.03, Rev 2</u>: Added requirement for applicable station groups notification of pending ODCM changes as described in CR 09-05711.[3.2.2.13]

8.2.18.2 The justification used for change (18) of the ODCM is as follows:

8.2.18.2.1 This change is considered editorial in nature, which exempts the change from Regulatory Applicability Determination. Therefore, this change will not impact the level of radioactive effluent control required by 10CFR20.1302, 40CFR Part 190, 10CFR50.36a, and Appendix I to 10CFR50. Also this change will not impact the accuracy or reliability of effluent dose or alarm setpoint calculation.

8.2.19 Change (19) of BV-1 and 2 ODCM (Effective November 2002)

8.2.19.1 A description of the changes that were implemented with this revision are as follows:

8.2.19.1.1 <u>Procedure 1/2-ODC-2.01, Rev 1</u>: Changed Table 1.1-1a and 1.1-1b to add Zn-65 to the respective BV-1 and 2 Liquid Source Term as described in CR 02-06174 (CA-01, CA-13 and CA-14). For information, zinc may be added to the reactor coolant system in an effort to reduce general corrosion of primary system materials and mitigation of stress corrosion cracking. Added benefits to zinc addition involve preferential release of nickel and cobalt which, in-turn, reduces plant dose rates. Development of the specific Zn-65 Annual Release Activity is delineated in Calculation Package No. ERS-ATL-83-027.[3.2.3.1] Addition of Zn-65 to the source terms also caused changes in the Liquid Effluent Monitor Alarm Setpoints, and appropriate monitor conversion factors.

8.2.19.1.2 Procedure 1/2-ODC-2.01, Rev 1: Table 1.1-1a was changed to update the remainder of the source term with annual release values derived in Stone and Webster Calculation Package No. UR(B)-160.(3.2.3.10)

8.2.19.1.3 Procedure 1/2-ODC-2.01, Rev 1: Editorial changes were made to this procedure for update of ODCM references and to add discussion of why Liquid Waste Evaporators are no longer used at BV-1 and 2 to process liquid waste.

8.2.19.2 The justification used for change (19) of the ODCM is as follows:

8.2.19.2.1 Addition of Zn-65 to the BV-1 and 2 Liquid Source Terms, along with update of the BV-1 and 2 Liquid Source Term is considered a procedure correction, and is enveloped by the Regulatory Applicability Determination performed for BV-1 ECP-02-0410. Based on the above, these changes will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50. Also, these changes will not impact the accuracy or reliability of effluent dose or alarm setpoint calculation.

8.2.20 Change (20) of BV-1 and 2 ODCM (Effective October 2003)

8.2.20.1 A description of the changes that were implemented with this revision are as follows:

8.2.20.1.1 Procedure 1/2-ODC-2.01, Rev 2: Changed LW System diagrams (Attachment D) to indicate the flow path for cross connect of LW between Unit 1 and Unit 2.

8.2.20.1.2 Procedure 1/2-ODC-2.02, Rev 1: Changed Table 2.1-1 to revise the source term for the Unit 1 Containment Vacuum Pumps as described in CR03-04830 (CA-03).

8.2.20.1.3 Procedure 1/2-ODC-3.03, Rev 3: Changed the Preplanned Method of Monitoring (PMM) in Attachment D Table 3.3-6 and Table 4.3-3. Specifically, the 2nd PMM for the Reactor Building/SLCRS Mid & High Range Noble Gas Monitors (RM-1VS-110 Ch 7 & Ch 9) was changed FROM "(RM-1VS-107B)" TO "(RM-1VS-107B, or RM-1VS-110 Ch 5)". Also, the 2nd PMM for the Auxiliary Building Ventilation System Mid & High Range Noble Gas Monitors (RM-1VS-109 Ch 7 & Ch 9) was changed FROM "(RM-1VS-101B)" TO "(RM-1VS-101B, or RM-1VS-109 Ch 5)". Similarly, the 2nd PMM for the Gaseous Waste/ Process Vent System Mid & High Range Noble Gas Monitors (RM-1GW-109 Ch 7 & Ch 9) was changed FROM "(RM-1GW-108B)" TO "(RM-1GW-108B, or RM-1GW-109 Ch 5)".

8.2.20.1.4 Procedure 1/2-ODC-3.03, Rev 3: Changed Attachment J Control 3.11.1.4 to update the activity limits for the liquid storage tanks to the values specified in Calculation Package No. ERS-ATL-95-007.

8.2.20.1.5 Procedure 1/2-ODC-3.03, Rev 3: Changed Attachment K Table 4.11-2 to add more specific guidance for sampling of Gaseous Effluent Pathways. Specifically, this table is generic for Unit 1 & Unit 2 Gaseous Effluent Pathways, but sampling may only need required at some of the Gaseous Effluent Pathways rather than all of the Gaseous Effluent Pathways (as could be inferred from the wording in the Table Notation). Therefore to prevent unnecessary sampling, applicability statements were added to this table to delineate which ventilation systems are affected by the note(s). Also, note (f) includes a clarification of how compliance to this requirement is achieved per response to NRC Unresolved Item 50-334/83-30-05.

8.2.20.2 The justifications used for change (20) of the ODCM are as follows:

8.2.20.2.1 Procedure 1/2-ODC-2.01, Rev 2: Changing the diagram to show the LW cross connect between Unit 1 and Unit 2 is not a change to plant configuration, and is considered a procedure correction. Specifically, this procedure of the ODCM already describes the shared radwaste treatments system. Also, the UFSAR's describe the cross connect. Based on the above, this change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50. Also, this change will not impact the accuracy or reliability of effluent dose or alarm setpoint calculation.

8.2.20.2.2 Procedure 1/2-ODC-2.02, Rev 1: The original source-term calculation for the GW System was based on an operating flow rate of 5 scfm for the Unit 1 containment vacuum pumps. The flow rate for the new pumps is 70 scfm. Consequently, the source-term was revised per Calculation Package ERS-HHM-87-014 and then transcribed to this procedure. Although the new pumps represent a factor of 15 increase in flow rate, the gaseous effluent monitor alarm setpoints are unchanged. Specifically, the previous setpoints were based on a percentage of Offsite Dose Rate Limits, and those values were actually above the range of the instruments, so an on-scale value was substituted. This is also true for the re-calculated setpoints, so the same on-scale values are used. In summary, changing the source term is considered a procedure correction, and is enveloped by the Regulatory Applicability Determination performed for BV-1 ECP-02-0079. Based on the above, this change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50. Also, this change will not impact the accuracy or reliability of effluent dose or alarm setpoint calculation.. This is a Corrective Action per CR03-04830-03.

8.2.20.2.3 Procedure 1/2-ODC-3.03, Rev 3: Changing the Preplanned Method of Monitoring (PMM) will prevent unnecessary grab sampling (ie; the 3rd PMM) when the primary channel for the Mid or High Range Noble Gas Monitor is inoperable. Specifically, **IF** other Noble Gas Monitoring channels are available on that effluent pathway, **THEN** monitoring should be assumed with those channels as the 2nd PMM. In summary, the 3rd PMM (ie; obtaining grab gas samples every 12 hours) should only be performed as a last resort to a complete lack of continuous noble gas monitoring channels being available on that effluent pathway. Based on the above, this change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50. Also, this change will not impact the accuracy or reliability of effluent dose or alarm setpoint calculation.. This is a Corrective Action per CR03-06123-01.

8.2.20.2.4 Procedure 1/2-ODC-3.03, Rev 3: Changing the activity limits for liquid storage tanks does not affect original plant accident analyses. Specifically, the original analyses were performed in accordance with NUREG-0800 SRP 15.7.3 using the best available data at that time. The updated analyses were also performed in accordance the same NUREG, but current (more accurate) data was used to determine allowable activity content in each tank. Based on the above, this change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50. Also, this change will not impact the accuracy or reliability of effluent dose or alarm setpoint calculation. This is a Corrective Action per CR03-07487-05.

8.2.20.2.5 Procedure 1/2-ODC-3.03, Rev 3: Changing Attachment K Table 4.11-2 to add more specific guidance for sampling of Gaseous Effluent Pathways is considered a simple change. Specifically, this change merely prevents unnecessary sampling of unaffected ventilation pathways. Based on the above, this change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50. Also, this change will not impact the accuracy or reliability of effluent dose or alarm setpoint calculation. This is a Corrective Action per CR03-06281-01.

8.2.21 Change (21) of BV-1 and 2 ODCM (Effective November 2004) 11/04

8.2.21.1 A description of the changes that were implemented with this revision are as follows:

8.2.21.1.1 Procedure 1/2-ODC-2.01, Rev 3: Changed Attachment D to correct the volume Liquid Waste Drain Tanks (2LWS-TK21A/21B) from 7,500 gal/tank to 10,000 gal/tank.

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8.2.21.1.2 Procedure 1/2-ODC-3.03, Rev 4: Changed Attachment C to implement the increased flexibility in Mode restraints that is described in LAR 1A-321/2A-193 and CR03-09288-19.

8.2.21.1.3 Procedure 1/2-ODC-3.03, Rev 4: Corrected a typographical error in Attachment O, Control 3.11.2.5 per CR03-11726-01. Specifically, the final word in Action (a) was changed from "nad" to "and".

8.2.21.1.4 Procedure 1/2-ODC-3.03, Rev 4: Revised Attachment F, (Table 3.3-13 and 4.3-13) to correct a typographical error per CR04-01643-01. Specifically, the Asset Number for the Vacuum Gauge used for measurement of sample flow (from the Alternate Sampling Device) was changed from [PI-1GW-13] to [PI-1GW-135].

8.2.21.1.5 Procedure 1/2-ODC-3.03, Rev 4: Revised Attachment F, (Table 3.3-13 and 4.3-13) per CR04-02275-01. Specifically, clarification was provided to indicate that the "Sampler Flow Rate Monitors are the devices used for "Particulate and Iodine Sampling".

8.2.21.1.6 Procedure 1/2-ODC-3.03, Rev 4: Revised Attachment J, Control 3.11.1.4, ACTION a, to add clarification that requires specific calculation of 10 CFR Part 20 EC's when the individual tank limits are exceeded.

8.2.21.2 The justifications used for change (21) of the ODCM are as follows:

8.2.21.2.1 Procedure 1/2-ODC-2.01, Rev 3: Changing the volume of the Unit 2 Liquid Waste Tank is considered a procedure correction. SINCE this was a typographical error on the Attachment, THEN it does not impact the actual tank volume that is used in effluent release calculations and offsite dose determinations. Therefore, this change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50. Also, this change will not impact the accuracy or reliability of effluent dose or alarm setpoint calculation.

8.2.21.2.2 Procedure 1/2-ODC-3.03, Rev 4: Changing Attachment C to implement the increased flexibility in Mode restraints (described in LAR 1A-321/2A-193) is considered a simple change. SINCE the change implements guidance provided in the Technical Specifications, THEN the change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50. Also, this change will not impact the accuracy or reliability of effluent dose or alarm setpoint calculation. This is a Corrective Action per CR03-09288-19.

8.2.21.2.3 Procedure 1/2-ODC-3.03, Rev 4: The typographical error in Attachment O, Control 3.11.2.5 is considered a procedure correction. Therefore, this change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50. Also, this change will not impact the accuracy or reliability of effluent dose or alarm setpoint calculation. This is a Corrective Action per CR03-11726-01.

8.2.21.2.4 Procedure 1/2-ODC-3.03, Rev 4: Correcting the typographical error in Attachment F, (Table 3.3-13 and 4.3-13) is considered a procedure correction. SINCE this change merely corrects an obvious error, THEN this change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50. Also, this change will not impact the accuracy or reliability of effluent dose or alarm setpoint calculation. This is a Corrective Action per CR04-01643-01.

8.2.21.2.5 Procedure 1/2-ODC-3.03, Rev 4: Providing clarification for the Sampler Flow Rate Monitors is considered a simple change, because it was possible to misinterpret which filter paper sampler (e.g.; moving filter or fixed filter) the specification was referring to. SINCE no changes were made to actual samplers used for effluent release calculations or offsite dose determinations, THEN this change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50. Also, this change will not impact the accuracy or reliability of effluent dose or alarm setpoint calculation. This is a Corrective Action per CR04-02275-01.

8.2.21.2.6 Procedure 1/2-ODC-3.03, Rev 4: Providing clarification that requires calculation of 10 CFR Part 20 EC's (when the individual tank limits are exceeded) is considered a simple change. Specifically, the individual tank limits were derived from an assumed source-term and may not be representative of the actual source term at time of sample. This clarification also insures that a "Special Report" is submitted only when the limits (i.e.; when calculated using actual sample analysis) are exceeded at the nearest surface water supply and the nearest potable water supply in the unrestricted area. Per Calculation Package No. ERS-ATL-95-007,[3.2.3.9] the nearest surface water supply and the nearest potable water supply are considered to be the entrance to the Midland Water Treatment Facility. SINCE no changes were made to the bases for the tank activity limits, THEN this change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50. Also, this change will not impact the accuracy or reliability of effluent dose or alarm setpoint calculation.

- END -

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ODCM CONTROLS PROCEDURE MATRIX

BV-1 RADIATION MONITORING INSTRUMENTION SURVEILLANCES

TABLE F:1a
ODCM Control 3.3.3.1: Radiation Monitoring Channels In 1/2-ODC-3.03, Table 3.3-6 OPERABLE
APPLICABILITY: Modes 1 thru 4

ODCM SR	DESCRIPTION	PROCEDURE
4.3.3.1	Test Monitors at Table 4.3-3 Frequency	
4.3.3.1.1	**Noble Gas Effluent Monitors - SPINGS**	**NOTE: Actions for INOPERABLE Monitors are documented in the Operations Shift Logs, and the RP Shift Logs.**
4.3.3.1.1.a	Supplementary Leak Collection and Release System (RM-1VS-110 CH7 & CH9)	1MSP-43.59-I: Channel Calibration 1OM-54.3 L5 Log Item 205: Channel Check 1OST-43.07: Channel Functional Test
4.3.3.1.1.b	Auxiliary Building Ventilation System (RM-1VS-109 CH7 & CH9)	1MSP-43.60-I: Channel Calibration 1OM-54.3 L5 Log Item 204: Channel Check 1OST-43.07: Channel Functional Test
4.3.3.1.1.c	Process Vent System (RM-1GW-109 CH7 & 9)	1MSP-43.58-I: Channel Calibration 1OM-54.3 L5 Log Item 206: Channel Check 1OST-43.07: Channel Functional Test
4.3.3.1.2	**Noble Gas Steam Effluent Monitors**	**NOTE: Actions for INOPERABLE Monitors are documented in the Operations Shift Logs, and the RP Shift Logs.**
4.3.3.1.2.ci v.1.2a	Atmospheric Steam Dump Valve and Code Safety Valve Discharge (RM-1MS-100A, B, C)	1MSP-43.62-I: RM-1MS-100A Channel Calibration 1MSP-43.63-I: RM-1MS-100B Channel Calibration 1MSP-43.64-I: RM-1MS-100C Channel Calibration 1OM-54.3 L5 Log Item 078: RM-1MS-100A Channel Check 1OM-54.3 L5 Log tem 079: RM-1MS-100B Channel Check 1OM-54.3 L5 Log Item 103: RM-1MS-100C Channel Check 1OST-43.05: Channel Functional Test
4.3.3.1.2.b	Auxiliary Feedwater Pump Turbine Exhaust (RM-1MS-101)	1MSP-43.65-I: Channel Calibration 1OM-54.3 L5 Log Item 104: Channel Check 1OST-43.05: Channel Functional Test

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BV-2 RADIATION MONITORING INSTRUMENTION SURVEILLANCES

TABLE F:1b
ODCM Control 3.3.3.1: Radiation Monitoring Channels In 1/2-ODC-3.03, Table 3.3-6 OPERABLE
APPLICABILITY: Modes 1 thru 4

ODCM SR	DESCRIPTION	PROCEDURE
4.3.3.1	Test Monitors at Table 4.3-3 Frequency	
4.3.3.1.1	**Noble Gas Effluent Monitors**	**NOTE: Actions for INOPERABLE Monitors are documented in the Operations Shift Logs, and the RP Shift Logs.**
4.3.3.1.2. c.i.1.1.a	Supplementary Leak Collection and Release System (2HVS-RQ109C & D)	2MSP-43.33-I: Channel Calibration 2OM-54.3 Log L5 Log Item 133: Channel Check 2OST-43.08: Channel Functional Test

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BV-1 LIQUID EFFLUENT MONITOR SURVEILLANCES

TABLE F:2a
ODCM Control 3.3.3.9: Liquid Effluent Monitors In 1/2-ODC-3.03, Table 3.3-12 OPERABLE
APPLICABILITY: During Releases Through The Flow Path

ODCM SR	DESCRIPTION	PROCEDURE
4.3.3.9	Test Monitors at Table 4.3-12 Frequency	
4.3.3.9.1	**Monitors Providing Alarm and Automatic Termination**	**NOTE: Actions for INOPERABLE monitors are documented in the Operations Shift Logs, and the RP Shift Logs.**
4.3.3.9.1.a	Liquid Radwaste Effluent Line (RM-1LW-104)	1MSP-43.18-I: Channel Calibration 1OM-54.3 L5 Log: Channel Check 1/2OM-17.4A.D: Source Check 1OST-43.09: Channel Functional Test 1/2-ADM-1611.F03: Channel Check (Back-up)
4.3.3.9.1.b	Liquid Waste Contaminated Drain Line (RM-1LW-116)	1MSP-43.23-I: Channel Calibration 1OM-54.3 L5 Log: Channel Check 1/2OM-17.4A.D: Source Check 1OST-43.09: Channel Functional Test 1/2-ADM-1611.F03: Channel Check (Back-up)
4.3.3.9.1.c	Auxiliary Feed Pump Bay Drain Monitor (RM-1DA-100)	1MSP-43.70-I: Channel Calibration 1OM-54.3 L5 Log: Channel Check 1OM-54.3 L5 Log: Source Check 1OST-43.09: Channel Functional Test 1/2-ADM-1611.F03: Channel Check (Back-up)
4.3.3.9.2	**Monitors Providing Alarm, but Not Prividing Auto Termination**	**NOTE: Actions for INOPERABLE monitors are documented in the Operations Shift Logs, and the RP Shift Logs.**
4.3.3.9.2.a	Component Cooling - Recirculation Spray Hx River Water Monitor (RM-1RW-100)	1MSP-43.10-I: Channel Calibration 1OM-54.3 L5 Log: Channel Check 1OST-43.09: Channel Functional Test 1OST-43.09A: Source Check 1/2-ADM-1611.F03: Channel Check (Back-up)
4.3.3.9.3	**Flow Rate Measurement Devices**	**NOTE: Actions for INOPERABLE monitors are documented in the Operations Shift Logs, 1/2-HPP-3.06.005, and the RP Shift Logs**
4.3.3.9.3a,b	Liquid Radwaste Effluent Lines 3a: (FR-1LW-104 for RM-1LW-104) 3b: (FR-1LW-103 for RM-1LW-116)	1MSP-17.05-I: Channel Calibration (3b) 1MSP-17.06-I: F-LW-104-1 Channel Calibration (3a) 1MSP-17.07-I: F-LW-104-2 Channel Calibration (3a) 1MSP-17.08-I: F-LW-104-1 Channel Functional Test (3a) 1MSP-17.09-I: F-LW-104-2 Channel Functional Test (3a) 1MSP-17.10-I: F-LW-103 Channel Functional Test (3b) 1OM-54.3 L5 Log: FR-LW-103 Channel Check (3b) 1OM-54.3 L5 Log: FR-LW-104-1 Channel Check (3a) 1OM-54.3 L5 Log: FR-LW-104-2 Channel Check (3a)
4.3.3.9.3.c	Cooling Tower Blowdown Line (FT-1CW-101) (FT-1CW-101-1)	1MSP-31.04-I: F-CW-101 Channel Calibration 1MSP-31.05-I: F-CW-101 Channel Functional Test 1MSP-31.06-I: F-CW-101-1 Channel Calibration 1MSP-31.07-I: F-CW-101-1 Channel Functional Test 1OM-54.3 L5 Log: FT-CW-101 Channel Check 1OM-54.3 L5 Log: FT-CW-101-1 Channel Check
4.3.3.9.4	**Tank Level Indicating Devices**	**NOTE: Actions for INOPERABLE monitors are documented in the Operations Shift Logs**
4.3.3.9.4.a	Primary Water Storage Tank (LI-1PG-115A for 1BR-TK-6A)	1MSP-8.01-I: L-PG115A Channel Functional Test 1MSP-8.03-I: L-PG115A Channel Calibration 1OM-54.3 L5 Log: Channel Check (When Adding to Tank)
4.3.3.9.4.b	Primary Water Storage Tank (LI-1PG-115B for 1BR-TK-6B)	1MSP-8.02-I: L-PG-115B Channel Functional Test 1MSP-8.04-I: L-PG-115B Channel Calibration 1OM-54.3 L5 Log: Channel Check (When Adding to Tank)
4.3.3.9.4.c	Steam Generator Drain Tank (LI-1LW-110 for 1LW-TK-7A)	1MSP-17.01-I: L-LW110 Channel Functional Test 1MSP-17.03-I: L-LW110 Channel Calibration 1OM-54.3 L5 Log: Channel Check (When Adding to Tank)
4.3.3.9.4.d	Steam Generator Drain Tank (LI-1LW-111 for 1LW-TK-7B)	1MSP-17.02-I: L-LW111 Channel Functional Test 1MSP-17.04-I: L-LW111 Channel Calibration 1OM-54.3 L5 Log: Channel Check (When Adding to Tank)

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BV-2 LIQUID EFFLUENT MONITOR SURVEILLANCES

TABLE F:2b

ODCM Control 3.3.3.9: Liquid Effluent Monitors In 1/2-ODC-3.03 Table 3.3-12 OPERABLE
APPLICABILITY: During Releases Through The Flow Paths

ODCM SR	DESCRIPTION	PROCEDURE
4.3.3.9	Test Monitors at Table 4.3-12 Frequency	
4.3.3.9.1	**Monitors Providing Alarm and Automatic Termination**	**NOTE: Actions for INOPERABLE monitors are documented in the Operations Shift Logs, and the RP Shift Logs.**
4.3.3.9.1.a	Liquid Waste Process Effluent Monitor (2SGC-RQ100)	1/2-ADM-1611.F04: Channel Check (Back-up) 1/2-HPP-3.06.005.F01: Source Check 2MSP-43.39-I: Channel Calibration 1/2OM-17.4A.C: Source Check 2OM-54.3 L5 Log: Channel Check 2OM-25.4.L: Source Check 2OM-25.4.N: Source Check 2OST-43.03: Channel Functional Test
4.3.3.9.2	**Flow Rate Measurement Devices**	**NOTE: Actions for INOPERABLE monitors are documented in the Operations Logs, 1/2-HPP-3.06.005, and the RP Shift Logs.**
4.3.3.9.2.a	Liquid Radwaste Effluent (2SGC-FIS100)	2MSP-25.01-I: 2SGC-P26A,B Ch Cal & Ch Functional Test 2MSP-43.39-I: Channel Calibration 2OM-54.3 L5 Log L5: Channel Check
4.3.3.9.2.b	Cooling Tower Blowdown Line (2CWS-FT101)	2MSP-31.04-I: Channel Calibration 2MSP-31.05-I: Channel Functional Test 2OM-54.3 L5 Log: Channel Check

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ODCM CONTROLS PROCEDURE MATRIX

BV-1 GASEOUS EFFLUENT MONITOR SURVEILLANCES

TABLE F:3a
ODCM Control 3.3.3.10: Gaseous Effluent Monitors In 1/2-ODC-3.03 Table 3.3-13 OPERABLE
APPLICABILITY: During Releases Through The Flow Paths

ODCM SR	DESCRIPTION	PROCEDURE
4.3.3.10	Test Monitors at Table 4.3-13 Frequency	
4.3.3.10.1	**Gaseous Waste / Process Vent System**	**NOTE: Actions for INOPERABLE monitors are documented in the Operations Shift Logs, 1/2-HPP-3.06.006, and the RP Shift Logs.**
4.3.3.10.1.a	Noble Gas Activity Monitor Pri: (RM-1GW-108B) Alt: (RM-1GW-109 Ch 5): for continuous releases only, not an alternate for batch releases	1MSP-43.22-I: Channel Calibration 1OM-19.4.E, H: Channel Check 1OM-19.4.E, H: Source Check 1/2-OM-19.4A.D: Source Check 1/2-OM-19.4A.D: Channel Check 1OM-54.3 L5 Log: RM-1GW-108B Channel Check 1OM-54.3 L5 Log: RM-1GW-109 Channel Check 1OST-43.09: Channel Functional Test 1/2-ADM-1611.F03: Channel Check (Back-up)
4.3.3.10.1.b	Particulate & Iodine Sampler Pri: Filter Paper and Charcoal Cartridge for (RM-1GW-109) Alt: Filter Paper and Charcoal Cartridge for (RM-1GW-110)	1/2-ADM-1611.F03: Channel Check
4.3.3.10.1.c	System Effluent Flow Rate Measuring Device Pri: (FR-1GW-108) Alt: (RM-1GW-109 Ch 10)	1MSP-19.05-I: Channel Functional Test 1MSP-19.06-I: Channel Calibration 1OM-54.3 L5 Log: Channel Check 1/2-ADM-1611.F03: Channel Check (Back-up)
4.3.3.10.1.d	Sampler Flow Rate Measuring Device Pri: (RM-1GW-109 Ch 15) Alt: (Rotometer: FM-1GW-101 and Vacuum Gauge: PI-1GW-135 for RM-1GW-110)	1MSP-43.21-I: Channel Calibration 1MSP-43.71-I: Channel Functional Test (Rotometer) 1OM 54.3 L5 Log L5: Channel Check 1OST-43.07: Channel Functional Test 1OST-43.11: Channel Functional Test 1/2-ADM-1611.F03: Channel Check (Back-up)
4.3.3.10.2	**Auxiliary Building Ventilation System (Ventilation Vent)**	**NOTE: Actions for INOPERABLE monitors are documented in the Operations Shift Logs, 1/2-HPP-3.06.006, and RP Shift Logs.**
4.3.3.10.2.a	Noble Gas Activity Monitor Pri: (RM-1VS-101B) Alt: (RM-1VS-109 Ch 5)	1MSP-43.13-I: Channel Calibration 1OM-54.3 L5 Log: RM-1VS-101B Channel Check 1OM-54.3 L5 Log: RM-1VS-109 Channel Check 1OST-43.07A: RM-1VS-109 Channel Functional Test 1OST-43.09: Channel Functional Test 1OST-43.09A: Source Check 1/2-ADM-1611.F03: Channel Check (Back-up)
4.3.3.10.2.b	Particulate & Iodine Sampler Pri: Filter Paper and Charcoal Cartridge for (RM-1VS-109) Alt: Filter Paper and Charcoal Cartridge for (RM-1VS-111)	1/2-ADM-1611.F03: Channel Check
4.3.3.10.2.c	System Effluent Flow Rate Measuring Device Pri: (FR-1VS-101) Alt: (RM-1VS-109 Ch 10)	1MSP-44.07-I: Channel Functional Test 1MSP-44.08-I: Channel Calibration 1OM-54.3 L5 Log: Channel Check 1/2-ADM-1611.F03: Channel Check (Back-up)

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ODCM CONTROLS PROCEDURE MATRIX

BV-1 GASEOUS EFFLUENT MONITOR SURVEILLANCES
Continued

TABLE F:3a
ODCM Control 3.3.3.10: Gaseous Effluent Monitors In 1/2-ODC-3.03 Table 3.3-13 OPERABLE
APPLICABILITY: During Releases Through The Flow Paths

ODCM SR	DESCRIPTION	PROCEDURE
4.3.3.10.2.d	Sampler Flow Rate Measuring Device Pri: (RM-1VS-109 Ch 15) Alt: (Rotometer: FM-1VS-102 and Vacuum Gauge: PI-1VS-659 for RM-1VS-111)	1MSP-44.07-I: Channel Functional Test 1MSP-44.08-I: Channel Calibration 1OM 54.03 L5 Log: Channel Check 1OST-43.07: Channel Functional Test 1OST-43.11: Channel Functional Test 1/2-ADM-1611.F03: Channel Check (Back-up)
4.3.3.10.3	**Rx Containment / SLCRS (Elevated Release)**	**NOTE: Actions for INOPERABLE monitors are documented in the Operations Shift Logs, 1/2-HPP-3.06.006, and the RP Shift Logs.**
4.3.3.10.3.a	Noble Gas Activity Monitor Pri: (RM-1VS-107B) Alt: (RM-1VS-110 Ch 5)	1MSP-43.20-I: Channel Calibration 1OM-54.3 L5 Log: RM-1VS-107B Channel Check 1OM-54.3 L5 Log: RM-1VS-110 Channel Check 1OST-43.07A: RM-1VS-110 Channel Functional Test 1OST-43.09: Channel Functional Test 1OST-43.09A: Source Check 1/2-ADM-1611.F03: Channel Check (Back-up)
4.3.3.10.3.b	Particulate & Iodine Sampler Pri: Filter Paper and Charcoal Cartridge for (RM-1VS-110) Alt: Filter Paper and Charcoal Cartridge for (RM-1VS-112)	1/2-ADM-1611.F03: Channel Check
4.3.3.10.3.c	System Effluent Flow Rate Measuring Device Pri: (FR-1VS-112) Alt: (RM-1VS-110 Ch 10)	1MSP-44.09-I: Channel Calibration 1MSP-44.10-I: Channel Functional Test 1OM-54.3 L5 Log: Channel Check 1/2-ADM-1611.F03: Channel Check (Back-up)
4.3.3.10.3.d	Sampler Flow Rate Measuring Device Pri: (RM-1VS-110 Ch 15) Alt: (Rotometer: FM-1VS-103 and Vacuum Gauge: PI-1VS-660 for RM-1VS-112)	1MSP-43.19-I: Channel Calibration 1MSP-43.72-I: Channel Functional Test (Rotometer) 1OM 54.3 L5 Log: Channel Check 1OST-43.07: Channel Functional Test 1OST-43.11: Channel Functional Test 1/2-ADM-1611.F03: Channel Check (Back-up)

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ODCM CONTROLS PROCEDURE MATRIX

BV-2 GASEOUS EFFLUENT MONITOR SURVEILLANCES
Continued

TABLE F:3b
ODCM Control 3.3.3.10: Gaseous Effluent Monitors In 1/2-ODC-3.03 Table 3.3-13 OPERABLE
APPLICABILITY: During Releases Through The Flow Paths

ODCM SR	DESCRIPTION	PROCEDURE
4.3.3.10	Test Monitors at Table 4.3-13 Frequency	
4.3.3.10.1	**SLCRS Unfiltered Pathway (Ventilation Vent)**	**NOTE: Actions for INOPERABLE monitors are documented in the Operations Shift Logs, 1/2-HPP-3.06.006, and the RP Shift Logs.**
4.3.3.10.1.a	Noble Gas Activity Monitor Pri: (2HVS-RQ101B)	2MSP-43.36-I: Channel Calibration 2OM-54.3 L5 Log: Channel Check 2OST-43.09: Channel Functional Test 1/2-ADM-1611.F04: Channel Check (Back-up) 2-HPP-4.02.018: Source Check (DRMS Auto Function)
4.3.3.10.1.b	Particulate & Iodine Sampler Pri: Filter Paper and Charcoal Cartridge for (2HVS-RQ101A)	1/2-ADM-1611.F04: Channel Check
4.3.3.10.1.c	Process Flow Rate Monitor Pri: (Monitor Item 29 for 2HVS-VP101)	2MSP-43.36-I: Channel Calibration 2MSP-43.36A-I: Channel Functional Test Work Request: Channel Calibration (Velocity Probe) 2OM-54.3 L5 Log: Channel Check 1/2-ADM-1611.F04: Channel Check (Back-up)
4.3.3.10.1.d	Sampler Flow Rate Monitor Pri: (2HVS-FIT101-1)	2MSP-43.36-I: Channel Calibration 2MSP-43.36A-I: Channel Functional Test 2OM-54.3 L5 Log: Channel Check 1/2-ADM-1611.F04: Channel Check (Back-up)
4.3.3.10.2	**SLCRS Filtered Pathway (Elevated Release)**	**NOTE: Actions for INOPERABLE monitors are documented in the Operations Shift Logs, 1/2-HPP-3.06.006, and the RP Shift Logs.**
4.3.3.10.2.a	Noble Gas Activity Monitor Pri: (2HVS-RQ109B)	2MSP-43.32-I: 2HVS-RQ109A Channel Calibration 2MSP-43.33-I: 2HVS-RQ109B,C,D Channel Calibration 2OM-54.3 L5 Log: Channel Check 2OST-43.08: Channel Functional Test 1/2-ADM-1611.F04: Channel Check (Back-up) 2-HPP-4.02.018: Source Check (DRMS Auto Function)
4.3.3.10.2.b	Particulate & Iodine Sampler Pri: Filter Paper and Charcoal Cartridge for (2HVS-RQ109A)	1/2-ADM-1611.F04: Channel Check
4.3.3.10.2.c	Process Flow Rate Monitor Pri: (Monitor Item 29 for 2HVS-FR22) 1st Alt: (2HVS-FI22A and FI22C) 2nd Alt: (2HVS-FI22B and FI22D)	2MSP-43.32A-I: Channel Functional Test 2MSP-43.33-I: 2HVS-RQ109B,C,D, Channel Calibration 2OM-54.3 L5 Log: Channel Check 1/2-ADM-1611.F04: Channel Check (Back-up)
4.3.3.10.2.d	Sampler Flow Rate Monitor Pri: (Monitor Items 28 & 72 for 2HVS-DAU109A)	2MSP-43.32-I: 2HVS-RQ109A Channel Calibration 2MSP-43.32A-I: Channel Functional Test 2MSP-43.33-I: 2HVS-RQ109B,C,D, Channel Calibration 2OM-54.3 L5 Log: Channel Check 1/2-ADM-1611.F04: Channel Check (Back-up)

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ODCM CONTROLS PROCEDURE MATRIX

BV-2 GASEOUS EFFLUENT MONITOR SURVEILLANCES
Continued

TABLE F:3b
ODCM Control 3.3.3.10: Gaseous Effluent Monitors In 1/2-ODC-3.03 Table 3.3-13 OPERABLE
APPLICABILITY: During Releases Through The Flow Paths

ODCM SR	DESCRIPTION	PROCEDURE
4.3.3.10.3	**Decontamination Building Vent**	**NOTE: Actions for INOPERABLE monitors are documented in the Operations Shift Logs, 1/2-HPP-3.06.006, and the RP Shift Logs.**
4.3.3.10.3.a	Noble Gas Activity Monitor Pri: (2RMQ-RQ301B)	2MSP-43.35-I: Channel Calibration 2OM-54.3 L5 Log: Channel Check 2OST-43.09: Channel Functional Test 2-HPP-4.02.018: Source Check (DRMS Auto Function) 1/2-ADM-1611.F04: Channel Check (Back-up)
4.3.3.10.3.b	Particulate & Iodine Sampler Pri: Filter Paper and Charcoal Cartridge for (2RMQ-RQ301A)	1/2-ADM-1611.F04: Channel Check
4.3.3.10.3.d	Sampler Flow Rate Monitor Pri: (2RMQ-FIT301-1)	2MSP-43.35-I: Channel Calibration 2MSP-43.35A-I: Channel Functional Test 2OM-54.3 L5 Log: Channel Check 1/2-ADM-1611.F04: Channel Check (Back-up)
4.3.3.10.4	**Condensate Polishing Building Vent**	**NOTE: Actions for INOPERABLE monitors are documented in the Operations Shift Logs, 1/2-HPP-3.06.006, and the RP Shift Logs.**
4.3.3.10.4.a	Noble Gas Activity Monitor Pri: (2HVL-RQ112B)	2MSP-43.38-I: Channel Calibration 2OM-54.3 L5 Log: Channel Check 2OST 2.43.09: Channel Functional Test 1/2-ADM-1611.F04: Channel Check (Back-up) 2-HPP-4.02.018: Source Check (DRMS Auto Function)
4.3.3.10.4.b	Particulate & Iodine Sampler Pri: Filter Paper and Charcoal Cartridge for (2HVL-RQ112A)	1/2-ADM-1611.F04: Channel Check
4.3.3.10.4.d	Sampler Flow Rate Monitor Pri: (2HVL-FIT112-1)	2MSP-43.38-I: Channel Calibration 2MSP-43.38A-I: Channel Functional Test 2OM-54.3 L5 Log: Channel Check 1/2-ADM-1611.F04: Channel Check (Back-up)
4.3.3.10.5	**Waste Gas Storage Vault Vent**	**NOTE: Actions for INOPERABLE monitors are documented in the Operations Shift Logs, 1/2-HPP-3.06.006, and the RP Shift Logs.**
4.3.3.10.5.a	Noble Gas Activity Monitor Pri: (2RMQ-RQ303B)	2MSP-43.37-I: Channel Calibration 2OM-54.3 L5 Log: Channel Check 2OST-43.09: Channel Functional Test 1/2-ADM-1611.F04: Channel Check (Back-up) 2-HPP-4.02.018: Source Check (DRMS Auto Function)
4.3.3.10.5.b	Particulate & Iodine Sampler Pri: Filter Paper and Charcoal Cartridge for (2RMQ-RQ303A)	1/2-ADM-1611.F04 Channel Check
4.3.3.10.5.d	Sampler Flow Rate Monitor Pri: (2RMQ-FIT303-1)	2MSP-43.37-I: Channel Calibration 2MSP-43.37A-I Channel Functional Test 2OM-54.3 L5 Log: Channel Check 1/2-ADM-1611.F04: Channel Check (Back-up)

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BV-1 AND 2 LIQUID EFFLUENT CONCENTRATION SURVEILLANCES

TABLE F:4
ODCM Control 3.11.1.1: Effluent Concentration Within 10 Times 10CFR20 EC's
APPLICABILITY: At All Times

ODCM SR	DESCRIPTION	PROCEDURE
4.11.1.1.1	Sample and Analyze Radioactive Liquid Wastes per Table 4.11-1	1/2-ADM-1601: Liquid Radwaste Discharges
4.11.1.1.1.A	Batch Waste Release Tanks	CHM CP 3: Sampling and Testing CHM CP 5: Radiochemical Procedures CHM CP 8: Logs and Forms (Analysis) CHM CP 9: Conduct of Operation 1/2-ADM-1611.F03 & F04: LW Tank Sampling 1/2-HPP-3.06.001.F01: LW Tank Sampling 1/2-HPP-4.02.002.F02: Rad Monitor Sampling 1/2-HPP-4.05.023: Gamma Spec Analysis Matrix
4.11.1.1.1.B	Continuous Releases	CHM CP 3: Sampling and Testing CHM CP 5: Radiochemical Procedures CHM CP 8: Logs and Forms (Analysis) CHM CP 9: Conduct of Operation 1/2-ADM-1611.F03 & F04: LW Tank Sampling 1/2-HPP-4.02.002.F02: Rad Monitor Sampling 1/2-HPP-4.05.023: Gamma Spec Analysis Matrix
4.11.1.1.2	Use ODCM Methodology to Assure Compliance	1/2-HPP-3.06.005.F01: RWDA-L 1/2OM-17.4A.D: RWDA-L
4.11.1.1.3	Take Turbine Building Grab Sample When BV-1 Primary to Secondary Leakage Exceeds 0.1 gpm (142 gpd)	CHM CP 3: Sampling and Testing CHM CP 5: Leak Rate Calculations CHM CP 8: Logs and Forms (Analysis) 1/2-ADM-1611.F03 & F04: Sump Sampling 1/2-HPP-3.06.001.F01: LW Tank Sampling 1/2-HPP-3.06.005.F01: RWDA-L 1/2-HPP-4.02.002.F02: Rad Monitor Sampling
4.11.1.1.4	Take Turbine Building Grab Sample When BV-2 Primary to Secondary Leakage Exceeds 0.1 gpm (142 gpd)	CHM CP 3: Sampling and Testing CHM CP 5: Leak Rate Calculations CHM CP 8: Logs and Forms (Analysis) 1/2-ADM-1611.F03 & F04: Sump Sampling 1/2-HPP-3.06.001.F01: LW Tank Sampling 1/2-HPP-3.06.005.F01: RWDA-L 1/2-HPP-4.02.002.F02: Rad Monitor Sampling
4.11.1.1.5	Take Grab Samples Prior to BV-2 Recirculation Drain Pump Discharge to Catch Basin No. 16	1/2-ADM-1611.F03 & F04: Sump Sampling 1/2-HPP-3,06.001.F01: LW Tank Sampling 2OM-9.2: Rx Plant Vents and Drains (CB-16) 2OM-9.4F: Drain RSS Pump Casing / Pit 2OM 51: OM Clearance 51-86 (2DAS-P215A/B)

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ODCM CONTROLS PROCEDURE MATRIX

BV-1 AND 2 LIQUID EFFLUENT DOSE SURVEILLANCES

TABLE F:5
ODCM Control 3.11.1.2: Liquid Effluent Dose
APPLICABILITY: At All Times

ODCM SR	DESCRIPTION	PROCEDURE
4.11.1.2.1	Using the ODCM - Determine Cumulative Dose From Liquid Effluents Every 31 Days	1/2-HPP-3.06.005.F01: RWDA-L SHP Letter: Monthly Dose Projection 1/2OM-17.4A.D: RWDA-L

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BV-1 AND 2 LIQUID EFFLUENT TREATMENT SURVEILLANCES

TABLE F:6
ODCM Control 3.11.1.3: Liquid Effluent Treatment System
APPLICABILITY: At All Times

ODCM SR	DESCRIPTION	PROCEDURE
4.11.1.3.1	Using the ODCM - Project the Liquid Release Dose Every 31 Days	1/2-HPP-3.06.005.F01: RWDA-L SHP Letter: Monthly Dose Projection 1/2OM-17.4A.D: RWDA-L

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ODCM CONTROLS PROCEDURE MATRIX

BV-1 AND 2 LIQUID STORAGE TANK ACTIVITY LIMIT SURVEILLANCES

TABLE F:7
ODCM Control 3.11.1.4: ≤10 Curies in 1BR-TK-6A&B, 1LW-TK-7A&B and Misc. Temp Liquid Tanks. Also, <4.2 Curies in 1QS-TK-1 and 2QSS-TK21.
APPLICABILITY: At All Times

ODCM SR	DESCRIPTION	PROCEDURE
4.11.1.4.1	Every 7 days Analyze a tank sample when radioactive material is added to tanks except the RWST's. For RWST's, analyze sample within 7 days of reactor cavity drain down back to the RWST.	1/2-HPP-3.06.001.F05: Activity Determination 1/2-HPP-3.06.005.F01: RWDA-L 1OM-8.4.Z: Recirculate Test Tanks Thru Ion Exchanger 1OM-17.4.AJ: LW Transfer to 1LW-TK-7A&B 1OM-54.3 L5 Log Item 197: 1OM-54.3 L5 Log Item 132: 1OM-54.3 L5 Log Item 134: 1OM-54.3 L5 Log Item 200: 2OM-17.4B: LW to SG Blowdown Tank

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ODCM CONTROLS PROCEDURE MATRIX

BV-1 AND 2 GASEOUS EFFLUENT DOSE SURVEILLANCES

TABLE F:8
ODCM Control 3.11.2.1: Gaseous Effluent Dose Rates
APPLICABILITY: At All Times

ODCM SR	DESCRIPTION	PROCEDURE
4.11.2.1.1	Using the ODCM - Determine the Noble Gas Effluent Dose Rate	1/2-HPP-3.06.006.F01: RWDA-G 1/2-ENV-01.03.F01: Continuous Release Permit 1/2-HPP-3.06.012.F01: Abnormal Gaseous Releases 1OM-19.4E, H: RWDA-G for Unit 1 GWDT's 1/2OM-19.4A.B: RWDA-G for Unit 2 GWST's
4.11.2.1.2	Sample and Analyze per Table 4.11-2 to Determine Inhalation Pathway Dose	1/2-ADM-1601: Gaseous Radwaste Discharges
4.11.2.1.2.A	Waste Gas Storage Tank - Grag Sample Each Tank	CHM CP 3: Sampling and Testing CHM CP 5: Radiochemical Procedures CHM CP 8: Logs and Forms (Analysis) CHM CP 9: Conduct of Operation 1/2-ADM-1611.F03 & F04: GW Tank Sampling 1-HPP-3.06.003.F01: GW Tank Sampling 1/2-HPP-3.06.006.F01: RWDA-G 1/2-HPP-4.02.002.F01: Rad Monitor Sampling
4.11.2.1.2.B	Containment Purge - Grag Sample Each Purge	CHM CP 3: Sampling and Testing CHM CP 5: Radiochemical Procedures CHM CP 8: Logs and Forms (Analysis) CHM CP 9: Conduct of Operation 1/2-ADM-1611.F03 & F04: GW Tank Sampling 1/2-HPP-3.06.006.F01: RWDA-G 1/2-HPP-3.07.003.F01: Air Sample Record 1/2-HPP-4.02.002.F01 Rad Monitor Sampling
4.11.2.1.2.C	Ventilation Systems	
4.11.2.1.2.C.1 thru 4.11.2.1.C.3 and 4.11.2.1.2.D.1 thru 4.11.2.1.2.D.3	BV-1 Grab and Continuous Samples	CHM CP 3: Sampling and Testing CHM CP 5: Radiochemical Procedures CHM CP 8: Logs and Forms (Analysis) CHM CP 9: Conduct of Operation 1/2-ADM-1611.F03 & F04: GW Tank Sampling 1/2-ENV-01.03.F01: Continuous Release Permit 1/2-HPP-4.02.002.F01: Rad Monitor Sampling 1/2-HPP-4.02.017.Fxx: RMS & DRMS Sample Flow Valve Line-Up 1-HPP-5.01.001: SA-9/10 Emergency Operation 1-HPP-5.01.002: SPING-4 Emergency Operation
4.11.2.1.2.C.4 thru 4.11.2.1.2.C.8 and 4.11.2.1.2.D.4 thru 4.11.2.1.2.D.8	BV-2 Grab and Continuous Samples	CHM CP 3: Sampling and Testing CHM CP 5: Radiochemical Procedures CHM CP 8: Logs and Forms (Analysis) CHM CP 9: Conduct of Operation 1/2-ADM-1611.F03 & F04: GW Tank Sampling 1/2-ENV-01.03.F01: Continuous Release Permit 1/2-HPP-4.02.002.F01: Rad Monitor Sampling 2-HPP-5.04.001: Emergency Operation of WRGM Assembly

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BV-1 AND 2 GASEOUS EFFLUENT AIR DOSE SURVEILLANCES

TABLE F:9
ODCM Control 3.11.2.2: Gaseous Effluent Air Doses
APPLICABILITY: At All Times

ODCM SR	DESCRIPTION	PROCEDURE
4.11.2.2.1	Using the ODCM - Determine the Noble Gas Cumulative Dose Contributions Every 31 Days	1/2-HPP-3.06.006.F01: RWDA-G 1/2-ENV-01.03.F01: Continuous Release Permit 1/2-HPP-3.06.012.F01: Abnormal Gaseous Releases 1/-HPP-4.02.002.F01: Rad Monitor Sampling 1OM-19.4E, H: RWDA-G for Unit 1 GWDT's 1/2OM-19.4A.B: RWDA-G for Unit 2 GWST's SHP Letter: Monthly Dose Projection

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ODCM CONTROLS PROCEDURE MATRIX

BV-1 AND 2 GASEOUS EFFLUENT PARTICULATE AND IODINE DOSE SURVEILLANCES

TABLE F:10
ODCM Control 3.11.2.3: Gaseous Effluent Particulate And Iodine Doses
APPLICABILITY: At All Times

ODCM SR	DESCRIPTION	PROCEDURE
4.11.2.3.1	Using the ODCM - Determine the Particulate & Radioiodine Cumulative Dose Contributions Every 31 Days	1/2-HPP-3.06.006.F01: RWDA-G 1/2-ENV-01.03.F01: Continuous Release Permit 1/2-HPP-3.06.012.F01: Abnormal Gaseous Releases 1/2-HPP-4.02.002.F01: Rad Monitor Sampling 1OM-19.4E, H: RWDA-G for Unit 1 GWDT's 1/2OM-19.4A.B: RWDA-G for Unit 2 GWST's SHP Letter: Monthly Dose Projection

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ODCM CONTROLS PROCEDURE MATRIX

BV-1 AND 2 GASEOUS EFFLUENT TREATMENT SURVEILLANCES

TABLE F:11
ODCM Control 3.11.2.4: Gaseous Effluent Treatment System
APPLICABILITY: At All Times

ODCM SR	DESCRIPTION	PROCEDURE
4.11.2.4.1	Using the ODCM - Project the Gas Release Dose from the Site Every 31 Days	1/2-HPP-3.06.006.F01: RWDA-G 1/2-ENV-01.03.F01: Continuous Release Permit 1/2-HPP-3.06.012.F01: Abnormal Gaseous Releases SHP Letter: Monthly Dose Projection 1OM-19.4E, H: RWDA-G for Unit 1 GWDT's 1/2OM-19.4A.B: RWDA-G for Unit 2 GWST's

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BV-1 GASEOUS STORAGE TANK ACTIVITY LIMIT SURVEILLANCES

TABLE F:12a
ODCM Control 3.11.2.5: Gas Storage Tank Activity Must be ≤52000 Curies Noble Gas (Considered Xe-133)
APPLICABILITY: At All Times

ODCM SR	DESCRIPTION	PROCEDURE
4.11.2.5.1	Determine Tank Gas Contents when Adding Rad Material & (RCS Activity >100uCi/ml)	1/2-HPP-3.06.003.F01: Activity Determination 1OM-19.4.G: GW Disposal System

BV-2 GASEOUS STORAGE TANK ACTIVITY LIMIT SURVEILLANCES

TABLE F:12b
ODCM Control 3.11.2.5: Connected Group of Gas Storage Tanks must be ≤19000 Curies Noble Gas (Considered Xe-133)
APPLICABILITY: At All Times

ODCM SR	DESCRIPTION	PROCEDURE
4.11.2.5.1	Determine Gaseous Waste Tank Rad Material When Adding Rad Material to the Tank.	1/2-HPP-3.06.003.F01: Activity Determination 2OM-19.2: GW Precautions & Limitations 2OM-19.4G: GW transfer from Unit 2 2OM-54.3 L5 Log Item 133:

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BV-1 AND 2 TOTAL DOSE SURVEILLANCES

TABLE F:13
ODCM Control 3.11.4.1: Liquid And Gaseous Doses
APPLICABILITY: At All Times

ODCM SR	DESCRIPTION	PROCEDURE
4.11.4.1.1	Using the ODCM - Determine Cumulative Gas & Liquid Dose per Control 3.11.1.2, 3.11.2.2, 3.11.2.3	1/2-ENV-01.05.F01: Annual RETS Report (40CFR190) 1/2-HPP-3.06.005.F01: RWDA-L 1/2-HPP-3.06.006.F01: RWDA-G 1/2-ENV-01.03.F01: Continuous Release Permit 1/2-HPP-3.06.012.F01: Abnormal Gaseous Releases 1/2-ENV-01.04: Effluent Data Logs (40CFR190)

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BV-1 AND 2 REMP PROGRAM SURVEILLANCES

TABLE F:14
ODCM Control 3.12.1: Radiological Environmental Monitoring Program (REMP)
APPLICABILITY: At All Times

ODCM SR	DESCRIPTION	PROCEDURE
4.12.1.1	Using Locations in the ODCM -Collect and Analyze Samples per Tables 3.12-1, 3.12-2 & 4.12-1	1/2-ENV-02.01: Description of overall REMP 1/2-ENV-03.01: Environmental Sampling

TABLE F:15
ODCM Control 3.12.2: Land Use Census
APPLICABILITY: At All Times

ODCM SR	DESCRIPTION	PROCEDURE
4.12.2.1	Using the Best Available Method - Conduct a Land Use Census Yearly Between 6/1 & 10/1	1/2-ENV-02.01: Description of overall REMP 1/2-ENV-4.02: Compliance to ODCM Control 3.12.2 Action a and b

TABLE F:16
ODCM Control 3.12.3: Interlaboratory Comparison Program
APPLICABILITY: At All Times

ODCM SR	DESCRIPTION	PROCEDURE
4.12.3.1	Include Analysis Results of the Interlaboratory Comparison Program in the Annual Radiological Environmental Report	1/2-ENV-02.01: Description of overall REMP

RTL #A9.621B

Beaver Valley Power Station

Unit 1/2

1/2-ODC-2.01

ODCM: LIQUID EFFLUENTS

Document Owner
Manager, Nuclear Environmental and Chemistry

Revision Number	3
Level Of Use	General Skill Reference
Safety Related Procedure	Yes

TABLE OF CONTENTS

1.0 PURPOSE

1.1 This procedure provides the calculational methodology to be used for determination of the following release parameters as denoted in the Administrative Controls Section of the Unit 1/2 Technical Specifications.[3.2.1]

1.1.1 Liquid effluent monitor alarm setpoints (Technical Specification 6.8.6.a, Item 1)

1.1.2 Liquid effluent release concentration calculations (Technical Specification 6.8.6.a, Item 2)

1.1.3 Liquid effluent dose projection and cumulative dose calculations (Technical Specification 6.8.6.a, Items 4 and 5)

1.2 This procedure also provides information related to the following:

1.2.1 Liquid Radwaste Treatment System (Technical Specification 6.8.6.a, Item 6)

1.2.2 Site Boundary used for liquid effluents

1.3 Prior to issuance of this procedure, these items were contained in Section 1 of the old ODCM.

2.0 SCOPE

2.1 This procedure is applicable to all station personnel that are qualified to perform activities as described and referenced in this procedure.

3.0 REFERENCES AND COMMITMENTS

3.1 References

3.1.1 References For BV-1 Liquid Effluent Monitor Setpoints

3.1.1.1 Beaver Valley Power Station, Appendix I Analysis - Docket No. 50-334 and 50-412; Table 2.1-3

3.1.1.2 Beaver Valley Power Station, Appendix I Analysis - Docket No. 50-334 and 50-412; Table 2.1-2

3.1.1.3 10 CFR 20, Appendix B, (20.1001-20.2402) Table 2, Column 2 EC's

3.1.1.4 Calculation Package No. ERS-SFL-92-039, Isotopic Efficiencies For Unit 1 Liquid Process Monitors

3.1.1.5 Calculation Package No. ERS-ATL-93-021, Process Alarm Setpoints For Liquid Effluent Monitors

3.1.1.6 Stone and Webster Calculation Package No. UR(B)-160, BVPS Liquid Radwaste Releases and Concentrations - Expect and Design Cases (per Unit and Site)

3.1.2 References for BV-2 Liquid Effluent Monitor Setpoints

3.1.2.1 10 CFR 20, Appendix B, (20.1001-20.2402) Table 2, Column 2 EC's

3.1.2.2 Calculation Package No. ERS-SFL-86-026, Unit 2 DRMS Isotopic Efficiencies

3.1.2.3 Stone and Webster Computer Code LIQ1BB; "Normal Liquid Releases From A Pressurized Water Reactor"

3.1.2.4 Calculation Package No. ERS-JWW-87-015, Isotopic Efficiencies For 2SGC-RQ100

3.1.2.4.1 The Isotopic Efficiencies for 2SGC-RQ100 are superceded by the values presented in Calculation Package No. ERS-SFL-86-026.

3.1.2.5 Calculation Package No. ERS-WFW-87-021, Conversion Factor for 2SGC-RQ100

3.1.2.5.1 The Monitor Conversion Factor (CF_{11}) for 2SGC-RQ100 is superceded by the value presented in Calculation Package No. ERS-ATL-93-021.

3.1.2.6 Calculation Package No. ERS-ATL-93-021, Process Alarm Setpoints For Liquid Effluent Monitors

3.1.2.7 Stone and Webster Calculation Package No. UR(B)-160, BVPS Liquid Radwaste Releases and Concentrations - Expect and Design Cases (per Unit and Site)

3.1.3 References used for Other Portions of this procedure

3.1.3.1 NUREG-0133, Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants

3.1.3.2 NUREG-1301, Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors (Generic Letter 89-01, Supplement No. 1)

3.1.3.3 NUREG-0017; Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from PWR's, Revision 0

3.1.3.4 Regulatory Guide 1.113; Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I, April 1977

3.1.3.5 Regulatory Guide 1.109; Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance to 10CFR Part 50, Appendix I

3.1.3.6 Calculation Package No. ERS-ATL-83-027; Liquid Waste Dose Factor Calculation for HPM-RP 6.5, Issue 3 and Later

3.1.3.7 NUREG-0172; Age-Specific Radiation Dose Commitment Factors for a One-Year Chronic Intake

3.1.3.8 UCRL-50564; Concentration Factors of Chemical Elements in Edible Aquatic Organisms, Revision 1, 1972

3.1.3.9 1/2-ADM-1640, Control of the Offsite Dose Calculation Manual

3.1.3.10 1/2-ADM-0100, Procedure Writers Guide

3.1.3.11 NOP-SS-3001, Procedure Review and Approval

3.1.3.12 1/2-ODC-3.03, ODCM: Controls for RETS and REMP Programs

3.1.3.13 CR 02-06174, Tracking of Activities for Unit 1 RCS Zinc Addition Implementation. CA-014, Revise ODCM Procedure 1/2-ODC-2.01 (Tables 1.1-1a and 1b) to include the addition of Zn-65 to the ODCM liquid source term.

3.1.3.14 CR 03-02466, RFA-Radiation Protection Effluent Control Provide Recommendation on Processing when Performing Weekly Sample of [1LW-TK-7A/7B]. CA-02, Revise ODCM Procedure 1/2-ODC-2.01, (Attachment D) to show the liquid waste flow path cross-connect between Unit 1 and Unit 2.

3.2 Commitments

3.2.1 Unit 1/2 Technical Specification 6.8.6.a

4.0 RECORDS AND FORMS

4.1 Records

4.1.1 Any calculation supporting ODCM changes shall be documented, as appropriate, by a retrievable document (e.g.; letter or calculation package) with an appropriate RTL number.

4.2 Forms

4.2.1 None

5.0 PRECAUTIONS AND LIMITATIONS

5.1 BV-1 and BV-2 utilize the concept of a shared liquid radioactive waste system according to NUREG 0133.[3.1.3.1] This permits the mixing of liquid radwaste for processing and allocating of dose due to release as defined in Section 8.4.

5.1.1 In Section 8.1 of this procedure, effluent monitor setpoints for a conservative mix are based on the individual Units' specific parameters, but effluent monitor setpoints for analysis prior to release permit use of the total dilution flow available at the site.

5.2 There is a difference in alarm setpoint terminology presentations for the radiation monitoring systems of BV-1 and BV-2.

5.2.1 Where HIGH and HIGH-HIGH terminology are used for BV-1 monitors, Alert and High terminology is used for BV-2 monitors.

5.2.2 BV-2 setpoints are presented in uCi/ml rather than cpm as in BV-1. This difference is due to BV-2 software which applies a conversion factor to the raw data (cpm). Note that the uCi/ml presentation is technically correct only for the specific isotopic mix used in the determination of the conversion factors. Therefore, BV-2 setpoints determined on analysis prior to release will be correct for properly controlling dose rate, but the indicated uCi/ml value may differ from the actual value.

5.3 This procedure also contains information that was previously contained in Section 5 of the previous BV-1 and 2 Offsite Dose Calculation Manual.

5.3.1 In regards to this, the site boundary for liquid effluents was included in this procedure.

5.3.2 The Site Boundary for Liquid Effluents is shown in ATTACHMENT E Figure 5-1.

6.0 ACCEPTANCE CRITERIA

6.1 All changes to this procedure shall contain sufficient justification that the change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50, and not adversely impact the accuracy or reliability of effluent dose or alarm setpoint calculation.[3.1.3.2]

6.1.1 All changes to this procedure shall be prepared in accordance with 1/2-ADM-0100[3.1.3.10] and 1/2-ADM-1640.[3.1.3.9]

6.1.2 All changes to this procedure shall be reviewed and approved in accordance with NOP-SS-3001[3.1.3.11] and 1/2-ADM-1640.[3.1.3.9]

7.0 PREREQUISITES

7.1 The user of this procedure shall be familiar with ODCM structure and format.

8.0 PROCEDURE

8.1 Alarm Setpoints

8.1.1 BV-1 Monitor Alarm Setpoint Determination

This procedure determines the monitor HIGH-HIGH Alarm Setpoint that indicates if the concentration of radionuclides in the liquid effluent released from the site to unrestricted areas exceeds 10 times the EC's specified in 10 CFR 20, Appendix B (20.1001-20.2402), Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases or exceeds a concentration of 2E-4 uCi/ml for dissolved or entrained noble gases. (3.1.1.5)

The methodology described in Section 8.1.1.2 is an alternative method to be used to determine the (RM-1LW-104 or RM-1LW-116) monitor HIGH-HIGH Alarm Setpoint (HHSP). The methodology in Section 8.1.1.2 may be used for any batch release and shall be used when the respective total gamma activity concentration of the liquid effluent prior to dilution exceeds 3.14E-3 uCi/ml and 7.33E-3 uCi/ml. This concentration is equivalent to the respective HHSP's derived in Section 8.1.1.1 and allows for respective tritium concentrations up to 4.26E+0 uCi/ml and 9.94E+0 uCi/ml.(3.1.1.5)

8.1.1.1 BV-1 Setpoint Determination Based On A Conservative Mix

The Alarm Setpoints for the liquid monitors shall be set at the values listed in the following table:

BV-1 LIQUID MONITOR SETPOINTS				
		cpm Above Background		
	Monitor	CR	HHSP	HSP
Liquid Waste Effluent Monitor	RM-1LW-104	3.53E+5	3.53E+5	2.47E+5
Laundry And Contaminated Shower Drains Monitor	RM-1LW-116	8.24E+5	8.24E+5	5.77E+5
Component Cooling/ Recirculation Spray Hx River Water Monitor	RM-1RW-100	2.57E+4	2.57E+4	1.80E+4
Component Cooling Hx River Water Monitor	RM-1RW-101	9.02E+3	9.02E+3	6.32E+3
Aux Feed Pump Bay Drain Monitor	RM-1DA-100	1.22E+4	1.22E+4	8.55E+3

The setpoints for RM-1LW-104 and RM-1LW-116 are based on the following conditions. The setpoint bases for RM-1RW-100 and RM-1DA-100, can be found in Calculation Package ERS-ATL-93-021.(3.1.1.5)

- Source terms given in ATTACHMENT A Table 1.1-1a. These source terms (without Zn-65) have been generated from the GALE Computer Code, as described in NUREG-0017.(3.1.3.3) The inputs to GALE are given in 1/2-ODC-3.01 Appendix B. The Zn-65 source term was generated via Calculation Package No. ERS-ATL-83-021.(3.1.1.5, 3.1.3.13)

- Dilution water flow rate of 22,800 gpm = (15,000 gpm BV-1 + 7,800 gpm BV-2).

- Discharge flow rate prior to dilution of 35 gpm for the Liquid Waste Effluent Monitor (RM-1LW-104).

- Discharge flow rate prior to dilution of 15 gpm for the Laundry and Contaminated Shower Drains Monitor (RM-1LW-116).

The above setpoints for (RM-1LW-104 and RM-1LW-116) can be varied based on actual operating conditions resulting in changes in the discharge and dilution flow rates as follows:

$$HHSP = \frac{542F}{f} \qquad [1.1(1)\text{-}1]$$

where:

HHSP = Monitor HIGH-HIGH Alarm Setpoint above background (ncpm).

542 = Most restrictive proportionality constant based on nominal flow conditions:
542 = 3.53E+5 ncpm x 35 gpm ÷ 22,800 gpm (RM-1LW-104)
542 = 8.24E+5 ncpm x 15 gpm ÷ 22,800 gpm (RM-1LW-116)

F = Dilution water flow rate (gpm), BV-1 plus BV-2 Cooling Tower Blowdown Rate (not including release through the Emergency Outfall Structure).

f = Discharge flow rate prior to dilution (gpm).

8.1.1.1.1 BV-1 Mix Radionuclides

The "mix" (radionuclides and composition) of the liquid effluent was determined as follows:

- The liquid source terms that are representative of the "mix" of the liquid effluent were determined. Liquid source terms are the radioactivity levels of the radionuclides in the effluent from ATTACMENT A Table 1.1-1a.

- The fraction of the total radioactivity in the liquid effluent comprised by radionuclide "i" (S_i) for each individual radionuclide in the liquid effluent was determined as follows:

$$S_i = \frac{A_i}{\sum_i A_i} \qquad [1.1(1)\text{-}2]$$

where:

A_i = Annual release of radionuclide "i" (Ci/yr) in the liquid effluent from ATTACHMENT A Table 1.1-1a.

8.1.1.1.2 BV-1 Maximum Acceptable Concentration (All Radionuclides)

The maximum acceptable total radioactivity concentration (uCi/ml) of all radionuclides in the liquid effluent prior to dilution (C_t) was determined by:

$$C_t = \frac{F}{f \sum_i \frac{S_i}{OEC_i}} \qquad [1.1(1)\text{-}3]$$

where:

F = Dilution water flow rate (gpm), BV-1 plus BV-2 Cooling Tower Blowdown Rate (not including release through the Emergency Outfall Structure).

= 22,800 gpm = (15,000 gpm BV-1 + 7,800 gpm BV-2)

f = Maximum acceptable discharge flow rate prior to dilution (gpm).

= 35 gpm for Liquid Waste Effluent Monitor (RM-1LW-104).

= 15 gpm for Laundry and Contaminated Shower Drains Monitor (RM-1LW-116).

OEC_i = The ODCM liquid effluent concentration limit for radionuclide "i" (uCi/ml) from ATTACHMENT A Table 1.1-1a. The OEC is set at 10 times the new 10 CFR 20, Appendix B (20.1001-20.2402) Table 2, Col. 2 EC values.

S_i = The fraction of total radioactivity attributed to radionuclide "i", from Equation [1.1(1)-2].

8.1.1.1.3 BV-1 Maximum Acceptable Concentration (Individual Radionuclide)

The maximum acceptable radioactivity concentration (uCi/ml) of radionuclide "i" in the liquid effluent prior to dilution (C_i) was determined by:

$$C_i = S_i\, C_t \qquad [1.1(1)\text{-}4]$$

8.1.1.1.4 BV-1 Monitor Count Rate

The calculated monitor count rate (ncpm) above background attributed to the radionuclides; (CR) was determined by:

$$CR = \sum_i C_i E_i \qquad [1.1(1)\text{-}5]$$

where:

E_i = Detection efficiency of the monitor for radionuclide "i" (cpm/uCi/ml) from ATTACHMENT A Table 1.1-1a. If not listed there, from Calculation Package ERS-SFL-92-039. (3.1.1.4)

8.1.1.1.5 BV-1 Monitor HHSP

The monitor HIGH-HIGH Alarm Setpoint above background (ncpm) should be set at the CR value. Since only one tank can be released at a time, adjustment of this value is not necessary to compensate for release from more than one source.

8.1.1.2 <u>BV-1 Setpoint Determination Based On Analysis Prior To Release</u>

The following method applies to liquid releases when determining the setpoint for the maximum acceptable discharge flow rate prior to dilution and the associated HIGH-HIGH Alarm Setpoint based on this flow rate for the Liquid Waste Effluent Monitor (RM-1LW-104) and the Laundry and Contaminated Shower Drains Monitor (RM-1LW-116) during all operational conditions.

The monitor alarm setpoint is set slightly above (a factor of 1.25) the count rate that results from the concentration of gamma emitting radionuclides in order to avoid spurious alarms. To compensate for this increase in the monitor alarm setpoint, the allowable discharge flow rate is reduced by the same factor.

When the discharge flow rate is limited by the radwaste discharge pump rate capacity or by administrative selection rather than the allowable flow rate determined form activity concentration, the alarm setpoint will be proportionally adjusted based upon the excess dilution factor provided.

8.1.1.2.1 BV-1 Maximum Acceptable Discharge Flow Rate

The maximum acceptable discharge flow rate (f) prior to dilution (gpm) is determined by:

$$f = \frac{F}{1.25 \sum_i \frac{C_i}{OEC_i}} \qquad [1.1(1)\text{-}6]$$

where:

F = Dilution water flow rate, BV-1 plus BV-2 Cooling Tower Blowdown (gpm).

The dilution water flow rate may include the combined cooling tower blowdown flow from both units exiting the discharge structure (but excluding emergency outfall structure flow) when simultaneous liquid discharges are administratively prohibited.

C_i = Radioactivity concentration of radionuclide "i" in the liquid effluent prior to dilution (uCi/ml) from analysis of the liquid effluent to be released.

1.25 = A factor to prevent spurious alarms caused by deviations in the mixture of radionuclides which affect the monitor response.

OEC_i = The ODCM liquid effluent concentration limit for radionuclide "i" (uCi/ml) from ATTACHMENT A Table 1.1-1a. The OEC is set at 10 times the new 10 CFR 20, Appendix B (20.1001-20.2402) Table 2, Col. 2 EC values.

8.1.1.2.2 BV-1 Monitor Count Rate

The calculated monitor count rate (ncpm) above background attributed to the radionuclides, (CR) is determined by:

$$CR = 1.25 \sum_i C_i E_i \qquad [1.1(1)\text{-}7]$$

where:

E_i = The detection efficiency of the monitor for radionuclide "i" (cpm/uCi/ml) from ATTACHMENT A Table 1.1-1a. If not listed there, from Calculation Package ERS-SFL-92-039.(3.1.1.4)

1.25 = A factor to prevent spurious alarms caused by deviations in the mixture of radionuclides which affect the monitor response.

8.1.1.2.3 BV-1 Monitor HHSP

The liquid effluent monitor HIGH-HIGH Alarm Setpoint above background (ncpm) should be set at the CR value adjusted by any excess dilution factor provided as defined in the following equation:

$$HHSP = CR \frac{f}{f'} \qquad [1.1(1)\text{-}8]$$

where:

HSP = Monitor HIGH-HIGH Alarm Setpoint above background.

CR = Calculated monitor count rate (ncpm) from equation [1.1(1)-7].

f = Maximum acceptable discharge flow rate prior to dilution determined by equation [1.1(1)-6].

f' = Actual maximum discharge flow rate to be maintained for the discharge. The reduced value of f' may be due to pump limitations or administrative selection.

8.1.2 BV-2 Monitor Alarm Setpoint Determination

This procedure determines the monitor HIGH Alarm Setpoint that indicates if the concentration of radionuclides in the liquid effluent released from the site to unrestricted areas exceeds 10 times the EC's specified in 10 CFR 20, Appendix B (20.1001-20.2402), Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases or exceeds a concentration of 2E-4 uCi/ml for dissolved or entrained noble gases.(3.1.2.6)

The methodology described in Section 8.1.2.2 is an alternative method to be used to determine the (2SGC-RQ100) monitor HIGH Alarm Setpoint (HSP). The methodology in Section 8.1.2.2 may be used for any batch release and shall be used when the total gamma radioactivity concentration of the liquid effluent prior to dilution exceeds 1.14E-3 uCi/ml. This concentration is equivalent to a monitor response and HIGH Alarm Setpoint derived in Section 8.1.2.1 and allows for a tritium concentration of up to 2.16E+0 uCi/ml. The setpoint was obtained by use of a conversion factor of 5.61E-9 uCi/ml/cpm determined for the nuclide mix.(3.1.2.6)

8.1.2.1 BV-2 Setpoint Determination Based On A Conservative Mix

The HIGH Alarm Setpoint for the liquid monitors shall be set at the values listed in the following Table:

BV-2 LIQUID MONITOR SETPOINTS				
		μCi/ml Above Background		
	Monitor	DV	HSP	ASP
Liquid Waste Effluent Monitor	2SGC-RQ100	1.14E-3	1.14E-3	7.99E-4
Service Water Monitor	2SWS-RQ101	4.28E-5	4.28E-5	2.99E-5
Service Water Monitor	2SWS-RQ102	4.30E-5	4.30E-5	3.01E-5

The setpoint for 2SGC-RQ100 is based on the following conditions, however, the setpoint bases for 2SWS-RQ101 and 2SWS-RQ102 can be found in Calculation Package ERS-ATL-93-021.(3.1.2.6)

- Source terms given in ATTACHMENT A Table 1.1-1b. These source terms (without Zn-65) have been generated by using models and input similar to NUREG-0017. The inputs are given in 1/2-ODC-3.01. The Zn-65 source term was generated via Calculation Package No. ERS-ATL-93-021.[3.1.2.6, 3.1.3.13]

- Dilution water flow rate of 22,800 gpm = (15,000 gpm BV-1 + 7,800 gpm BV-2).

- Discharge flow rate prior to dilution of 80 gpm for the Liquid Waste Effluent Monitor (2SGC-RQ100).

- A software conversion factor of 5.61E-9 uCi/ml/cpm associated with Liquid Waste Effluent Monitor (2SGC-RQ100).[3.1.2.6]

The above setpoint for (2SGC-RQ100) can be varied based on actual operating conditions resulting in the discharge and dilution flow rates as follows:

$$HSP = \frac{4.00E\text{-}6\ F}{f} \qquad [1.1(2)\text{-}1]$$

where:

HSP = Monitor HIGH Alarm Setpoint (uCi/ml) above background.

4.00E-6 = Proportionality constant based on nominal flow conditions:
4.00E-6 = 1.14E-3 net uCi/ml x 80 gpm ÷ 22,800 gpm

F = Dilution water flow rate, BV-1 plus BV-2 Cooling Tower Blowdown Rate (gpm).

f = Discharge flow rate prior to dilution (gpm).

8.1.2.1.1 BV-2 Mix Radionuclides

The "mix" (radionuclides and composition) of the liquid effluent was determined as follows:

- The liquid source terms that are representative of the "mix" of the liquid effluent were determined. Liquid source terms are the radioactivity levels of the radionuclides in the effluent from ATTACHMENT A Table 1.1-1b.

- The fraction of the total radioactivity in the liquid effluent comprised by radionuclide "i" (Si) for each individual radionuclide in the liquid effluent was determined as follows:

$$Si = \frac{Ai}{\sum_i A_i} \qquad [1.1(2)\text{-}2]$$

where:

Ai =Annual release of radionuclide "i" (Ci/yr) in the liquid effluent from ATTACHMENT A Table 1.1-1b.

8.1.2.1.2 BV-2 Maximum Acceptable Concentration (All Radionuclides)

The maximum acceptable total radioactivity concentration (uCi/ml) of all radionuclides in the liquid effluent prior to dilution (C_t) was determined by:

$$C_t = \frac{F}{f \Sigma_i \frac{S_i}{OEC_i}} \quad [1.1(2)\text{-}3]$$

where:

F = Dilution water flow rate (gpm), BV-1 plus BV-2 Cooling Tower Blowdown Rate (not including release out through the Emergency Outfall Structure).

= 22,800 gpm = (15,000 gpm BV-1 + 7,800 gpm BV-2).

f = Maximum acceptable discharge flow rate prior to dilution (gpm).

= 80 gpm for Liquid Waste Process Effluent Monitor (2SGC-RQ100).

OECi = The ODCM liquid effluent concentration limit for radionuclide "i" (uCi/ml) from ATTACHMENT A Table 1.1-1b. The OEC is set at 10 times the new 10 CFR 20, Appendix B (20.1001-20.2402) Table 2, Col. 2 EC values.

S_i = The fraction of total radioactivity attributed to radionuclide "i", from Equation [1.1(2)-2].

8.1.2.1.3 BV-2 Maximum Acceptable Concentration (Individual Radionuclide)

The maximum acceptable radioactivity concentration (uCi/ml) of radionuclide "i" in the liquid effluent prior to dilution (C_i) was determined by:

$$C_i = S_i C_t \quad [1.1(2)\text{-}4]$$

8.1.2.1.4 BV-2 Monitor Display Value

The calculated monitor Display Value (uCi/ml) above background attributed to the radionuclides; (DV), was determined by:

$$DV = 5.61E\text{-}9 \Sigma_i C_i E_i \quad [1.1(2)\text{-}5]$$

where:

5.61E-9 = Conversion factor (uCi/ml/cpm), an average determined for the source term mix.

E_i = Detection efficiency of the monitor for radionuclide "i" (cpm/uCi/ml) from ATTACHMENT A Table 1.1-1b. If not listed there, from Calculation Package ERS-SFL-86-026.[3.1.2.2]

8.1.2.1.5 BV-2 Monitor HSP

The monitor HIGH Alarm Setpoint above background (uCi/ml) should be set at the DV value.

8.1.2.2 <u>BV-2 Setpoint Determination Based On Analysis Prior To Release</u>

The following method applies to liquid releases when determining the setpoint for the maximum acceptable discharge flow rate prior to dilution and the associated HIGH Alarm Setpoint based on this flow rate for the Liquid Waste Effluent Monitor (2SGC-RQ100) during all operational conditions.

The monitor alarm setpoint is set slightly above (a factor of 1.25) the concentration reading that results from the concentration of gamma emitting radionuclides in order to avoid spurious alarms. To compensate for this increase in the monitor alarm setpoint, the allowable discharge flow rate is reduced by the same factor.

When the discharge flow rate is limited by the radwaste discharge pump rate capacity or by administrative selection rather than the allowable flow rate determined form activity concentration, the alarm setpoint will be proportionally adjusted based upon the excess dilution factor provided.

8.1.2.2.1 BV-2 Maximum Acceptable Discharge Flow Rate

The maximum acceptable discharge flow rate (f) prior to dilution (gpm) is determined by:

$$f = \frac{F}{1.25 \, \Sigma_i \frac{C_i}{OEC_i}} \qquad [1.1(2)\text{-}6]$$

where:

F = Dilution water flow rate, BV-1 plus BV-2 Cooling Tower Blowdown (gpm).

The dilution water flow rate may include the combined cooling tower blowdown flow from both units exiting the discharge structure (but excluding emergency outfall structure flow) when simultaneous liquid discharges from both plants are administratively prohibited.

C_i = Radioactivity concentration of radionuclide "i" in the liquid effluent prior to dilution (uCi/ml) from analysis of the liquid effluent to be released.

1.25 = A factor to prevent spurious alarms caused by deviations in the mixture of radionuclides which affect the monitor response.

OEC_i = The ODCM liquid effluent concentration limit for radionuclide "i" (uCi/ml) from Table 1.1-1b. The OEC is set at 10 times the new 10 CFR 20, Appendix B (20.1001-20.2402) ATTACHMENT A Table 2, Col. 2 EC values.

8.1.2.2.2 BV-2 Monitor Display Value

The calculated monitor Display Value (uCi/ml) above background attributed to the radionuclides; (DV) is determined by:

$$DV = (1.25)(5.61E\text{-}9)\,\Sigma_i\, C_i\, E_i \qquad [1.1(2)\text{-}7]$$

where:

E_i = The detection efficiency of the monitor for radionuclide "i" (cpm/uCi/ml) from ATTACHMENT A Table 1.1-1b. If not listed there, from Calculation Package ERS-SFL-86-026.(3.1.2.2)

1.25 = A factor to prevent spurious alarms caused by deviations in the mixture of radionuclides which affect the monitor response.

5.61E-9 = Conversion factor (uCi/ml/cpm), an average determined for the source term mix.

8.1.2.2.3 BV-2 Monitor HSP

The liquid effluent monitor HIGH Alarm Setpoint above background (uCi/ml) should be set at the DV value adjusted by any excess dilution factor provided as defined in the following equation:

$$HSP = DV\,\frac{f}{f'} \qquad [1.1(2)\text{-}8]$$

where:

HSP = Monitor HIGH Alarm Setpoint above background.

DV = Calculated monitor concentration reading (uCi/ml) from equation [1.1(2)-7].

f = Maximum acceptable discharge flow rate prior to dilution determined by equation [1.1(2)-6].

f' = Actual maximum discharge flow rate to be maintained for the discharge. The reduced value of f' may be due to pump limitations or administrative selection.

8.2 Compliance With 10 CFR 20 EC Limits (ODCM CONTROL 3.11.1.1)

8.2.1 Batch Releases

8.2.1.1 Pre-Release

The radioactivity content of each batch release will be determined prior to release in accordance with 1/2-ODC-3.03, Table 4.11-1. In order to assure representative samples, at least two tank volumes of entrained fluid from each tank to be discharged shall be recirculated through the mixing eductors. This will be accomplished by recirculating the tank contents for at least the time periods indicated in ATTACHMENT B Table 1.2-1a and 1.2-1b. BV-1 and BV-2 will show compliance with ODCM Control 3.11.1.1 in the following manner:

The activity of the various radionuclides in the batch release, determined in accordance with 1/2-ODC-3.03, Table 4.11-1, is divided by the minimum dilution flow to obtain the concentration at the unrestricted area. This calculation is shown in the following equation:

$$Conc_i = \frac{C_i \, R}{MDF} \qquad [1.2\text{-}1]$$

where:

$Conc_i$ = Concentration of radionuclide "i" at the unrestricted area (uCi/ml).

C_i = Concentration of radionuclide "i" in the potential batch release (uCi/ml).

R = Release rate of the batch (gpm).

MDF = Minimum dilution flow (gpm). (May be combined BV-1/BV-2 flow when simultaneous liquid discharges are administratively prohibited).

The projected concentrations in the unrestricted area are compared to the OEC's. Before a release is authorized, Equation [1.2-2] must be satisfied.

$$\Sigma_i (Conc_i/OEC_i) < 1 \qquad [1.2\text{-}2]$$

where:

OEC_i = The ODCM effluent concentration limit of radionuclide "i" (uCi/ml) from ATTACHMENT A Table 1.1-1a and 1.1-1b. The OEC is set at 10 times the new 10 CFR 20, Appendix B, (20.1001-20.2402) Table 2, Col. 2 EC values.(3.1.1.3, 3.1.2.1)

8.2.1.2 Post-Release

Following release from the batch tank, the Post Dose Correction Factor will be calculated in the following manner:

$$PDCF = \frac{(VA_t)/(DFA)}{(VI_t)/(DFI)} \qquad [1.2\text{-}3]$$

where:

PCDF = Post Dose Correction Factor.

VA_t = Actual Volume of tank released (gal).

DFA = Actual Dilution Flow during release (gpm).

VI_t = Initial Volume authorized for release (gal).

DFI = Initial Dilution Flow authorized for release (gpm).

The concentration of each radionuclide following release from the batch tank will be calculated in the unrestricted area in the following manner when the Post Dose Correction Factor shown in equation [1.2-3] is >1:

The average activity of radionuclide "i" during the time period of release is divided by the actual dilution flow during the period of release to obtain the concentration in the unrestricted area. This calculation is shown in the following equation:

$$Conc_{ik} = \frac{C_{ik}\, V_{tk}}{ADF_k} \qquad [1.2\text{-}4]$$

where:

$Conc_{ik}$ = The concentration of radionuclide "i" (uCi/ml) at the unrestricted area, during the release period of time k.

NOTE: Since discharge is from an isolated well-mixed tank at essentially a uniform rate, the difference between average and peak concentration within any discharge period is minimal.

C_{ik} = Concentration of radionuclide "i" (uCi/ml) in batch release during time period k.

V_{tk} = Volume of Tank released during time period k (gal).

ADF_k = Actual volume of Dilution Flow during the time period of release k (gal).

To show compliance with ODCM CONTROL 3.11.1.1, the following relationship must be satisfied:

$$\Sigma_i(Conc_{ik}/OEC_i) \leq 1 \qquad [1.2\text{-}5]$$

8.2.2 Continuous Releases

Continuous releases of liquid effluents do not normally occur at BV-1 or BV-2. When they do occur, the concentration of various radionuclides in the unrestricted area would be calculated using Equation [1.2-1] with C_{ik}, the concentration of isotope i in the continuous release. To show compliance with ODCM CONTROL 3.11.1.1, Equation [1.2-5] must again be satisfied.

8.3 Compliance With 10 CFR 50 Dose Limits (ODCM CONTROLS 3.11.1.2 And 3.11.1.3)

BV-1 and 2 utilize the concept of a shared liquid radioactive waste system according to NUREG 0133.[3.1.3.1] This permits mixing of the liquid radwaste for processing. Since the resulting effluent release cannot accurately be ascribed to a specific reactor unit, the treated effluent releases are allocated as defined below.

8.3.1 Cumulation Of Doses (ODCM CONTROL 3.11.1.2)

The dose contribution from the release of liquid effluents will be calculated monthly for each batch release during the month and a cumulative summation of the total body and organ doses will be maintained for each calendar month, current calendar quarter, and the calendar year to date. The dose contribution will be calculated using the following equation:

$$D_\tau = UAF \sum_{i} A_{i\tau} \sum_{k=1}^{m} \Delta t_k \, C_{ik} \, F_k \qquad [1.3\text{-}1]$$

where:

D_τ = The cumulative dose commitment to the total body or any organ, τ, from the liquid effluents for the total time period

$$\sum_{k=1}^{m} \Delta t_k \text{ (mrem)}$$

Δt_k = The length of the kth release over which C_{ik} and F_k are averaged for all liquid releases (hours).

C_{ik} = The average concentration of radionuclide, "i" (uCi/ml), in undiluted liquid effluent during time period Δt_k from any liquid release.

$A_{i\tau}$ = The site related ingestion dose commitment factor to the total body or any organ τ for each identified principal gamma and beta emitter (mrem-ml per hr-uCi) from ATTACHMENT C Table 1.3-1.

m = Number of releases contributing to the cumulative dose, D_t.

UAF = Unit allocation factor. Provides apportionment of dose between BV-1 and BV-2. Normally set at 0.5 for each unit. (Must total to $\leq$ 1.0).

F_k = The near field average dilution factor for Cik during any liquid effluent release. Defined as the ratio of the average undiluted liquid waste flow to the product of the average flow from the site discharge structure during the report period to unrestricted receiving waters, times 3. (3 is the site specific applicable factor for the mixing effect of the BV-1 and BV-2 discharge structure).

$$= \frac{\text{Waste Flow}}{\text{(3)(Dilution Water Flow)}}$$

The site specific applicable factor of 3 results in a conservative estimate of the near field dilution factor based upon Regulatory Guide 1.113[3.1.3.4] methodology and is a factor of 10 below the limit specified in NUREG-0133, Section 4.3.[3.1.3.1]

The dose factor $A_{i\tau}$ was calculated for an adult for each isotope using the following equation from NUREG-0133.[3.1.3.1]

$$A_{i\tau} = 1.14E5\ (730/D_w + 21BF_i)DF_{i\tau} \qquad [1.3\text{-}2]$$

where:

$$1.14E5 = \left[\frac{1E6\ pCi}{uCi}\right] x \left[\frac{1E3\ ml}{1}\right] x \left[\frac{1yr}{8760\ hr}\right]$$

730 = Adult water consumption rate (liters/yr).

D_w = Far field dilution factor from the near field area within 1/4 mile of the release point to the potable water intake for adult water consumption.

21 = Adult fish consumption (kg/yr).

BF_i = Bioaccumulation factor for radionuclide "i" in fish from Table A-1 of Regulatory Guide 1.109[3.1.3.5] (pCi/kg per pCi/l). However, if data was not available from that reference, it was obtained from Table 6 of UCRL-50564.[3.1.3.8]

The bioaccumulation factor for niobium (300 pCi/kg per pCi/l) was not obtained from either of the above references noted. It was otained from IAEA Safety Series No. 57. Justification for use of this value is documented in Appendix A to Calculation Package No. ERS-ATL-83-027.[3.1.3.6]

$DF_{i\tau}$ = Dose conversion factor for radionuclide "i" for adults for a particular organ τ (mrem/pCi) from Table E-11 of Regulatory Guide 1.109,[3.1.3.5] or NUREG-0172.[3.1.3.7]

A table of $A_{i\tau}$ values for an adult at BV-1 and BV-2 are presented in ATTACHMENT C Table 1.3-1.

The far field dilution factor (Dw) for BV-1 and BV-2 is 200. This value is based on a total dilution factor of 600 applicable to the Midland water intake located 1.3 miles downstream and on the opposite bank from BV-1 and BV-2 (i.e., 200 = 600 ÷ 3). The total dilution factor of 600 represents a conservative fully mixed annual average condition. Since the Midland intake is located on the opposite bank and is below the water surface, essentially fully mixed conditions would have to exist for the radioactive effluent to be transported to the intake.

The cumulative doses (from each reactor unit) for a calendar quarter and a calendar year are compared to ODCM CONTROL 3.11.1.2 as follows:

For the calendar quarter,

$D_\tau < 1.5$ mrem total body [1.3-3]

$D_\tau < 5$ mrem any organ [1.3-4]

For the calendar year,

$D_\tau < 3$ mrem total body [1.3-5]

$D_\tau < 10$ mrem any organ [1.3-6]

If any of the limits in Equation [1.3-3] through [1.3-6] are exceeded, a Special Report pursuant to ODCM Control 3.11.1.2 of 1/2-ODC-3.03 is requried.[3.1.3.12]

8.3.2 Projection Of Doses (ODCM CONTROL 3.11.1.3)

Doses due to liquid releases shall be projected at least once per 31 days in accordance with ODCM CONTROL 3.11.1.3 and this section. The Liquid Radwaste Treatment System shall be used to reduce the radioactive materials in each liquid waste batch prior to its discharge, when the projected doses due to liquid effluent releases from each reactor unit, when averaged over 31 days would exceed 0.06 mrem to the total body or 0.2 mrem to any organ. Doses used in the projection are obtained according to equation [1.3-1]. The 31-day dose projection shall be performed according to the following equations:

When including pre-release data,

$$D_{31} = \left[\frac{A+B}{T}\right] 31 + C \qquad [1.3\text{-}7]$$

When not including pre-release data,

$$D_{31} = \left[\frac{A}{T}\right] 31 + C \qquad [1.3\text{-}8]$$

where:

D_{31} = Projected 31 day dose (mrem).
A = Cumulative dose for quarter (mrem).
B = Projected dose from this release (mrem).
T = Current days into quarter.
C = Value which may be used to anticipate plant trends (mrem).

8.4 Liquid Radwaste System

The liquid radwaste system has the capability to control, collect, process, store, recycle, and dispose of liquid radioactive waste generated as a result of plant operations, including anticipated operational occurrences. This system also uses some of the components of the steam generator blowdown system for processing.

Simplified flow diagrams of the liquid radwaste systems for BV-1 and BV-2 are provided as ATTACHMENT D Figures 1.4-1 and 1.4-2 respectively. A diagram showing the liquid effluent release points is provided as ATTACHMENT D Figure 1.4-3. A diagram of the site boundary for liquid effluents is provided as ATTACHMENT E Figure 5-1.

Since the concept of a shared liquid radwaste system is used, then any liquid waste generated can be stored, processed and discharged from either BV-1 or BV-2.

8.4.1 BV-1 Liquid Radwaste System Components

8.4.1.1 1LW-TK-2A/2B: High Level Waste Drain Tanks

There are two of these tanks, each tank has a capacity of 5,000 gallons. They are located on the northwest wall of the Auxiliary Building (elevation 735'). They receive liquid wastes from the vent and drain system.

8.4.1.2 1LW-TK-3A/3B: Low Level Waste Drain Tanks

There are two of these tanks, each tank has a capacity of 2,000 gallons. They are located in the northwest corner of the Auxiliary Building (elevation 735'). They also receive liquid wastes from the vent and drain system.

8.4.1.3 1LW-I-2: Liquid Waste Pre-Conditioning Filter & Demineralizer

The main purpose of the pre-conditioning filter & demineralizer is to clean liquid waste water of particulate and dissolved radioactive contaminants that is stored in 1LW-TK-2A/2B and 1LW-TK-3A/3B. There are four resin beds and a pre-conditioning filter associated with this system. The pre-conditioning filter can be customized with varying grades of activated charcoal intended for removal of radionuclides in a colloidal state. Each of the demineralizer beds can be customized with different resins for effective removal of chemical contaminants along with radioactive contaminants. Generally, beds 1 and 2 contain a Cation Resin and beds 3 and 4 contain a Mixed Bed Resin. This system is located in the Decontamination Building (elevation 735').

8.4.1.3.1 An evaporator (6 gpm) was originally used to process liquid waste at Unit 1. However, this evaporator was retired prior to initial issue of the ODCM, because of concerns for creating a mixed-waste.

8.4.1.4 1LW-TK-7A/7B: Steam Generator Drain Tanks

There are two of these tanks, each tank has a capacity of 34,500 gallons. They are located in the Fuel Pool Leakage Monitoring Room (elevation 735'). They normally receive liquid waste that has been processed through the liquid waste demineralizer. These tanks can also receive liquid waste from Unit 2. Upon completion of filling operation, the tank is placed on recirculation through the demineralizer until the radioactivity concentration is acceptable for discharge. A minimum of two tank volumes must be recirculated prior to sampling for discharge permit preparation.

8.4.1.5 RM-1LW-104: Liquid Waste Discharge Radiation Monitor

This off-line gamma scintillator radiation monitor continuously analyzes liquid waste as it is being discharged. The upper activity alarm on this radiation monitor has a setpoint that would indicate we are approaching OEC limits for radioactive water leaving the site. If an upper activity alarm on this radiation monitor is received, it automatically terminates the discharge by closing the discharge line isolation valve.

8.4.2 BV-1 Laundry and Contaminated Shower Drain System Components

8.4.2.1 1LW-TK-6A/6B: Laundry and Contaminated Shower Drain Tanks

There are two of these tanks, each has a capacity of 1200 gallons. They are located in the northwest corner of the Auxiliary Building (elevation 722'). They receive laundry and contaminated shower drains waste from the Service Building. These tanks can also receive mop water waste from Unit 2. The waste in these tanks is not sent to the liquid waste demineralizer for cleanup because this waste may contain organic compounds that will deplete a resin bed. Upon completion of filling operation, the tank must be recirculated a minimum of two tank volumes prior to sampling for discharge permit preparation.

8.4.2.2 RM-1LW-116: Laundry and Contaminated Shower Drains Tank Discharge Radiation Monitor

This off-line gamma scintillator radiation monitor continuously analyzes laundry and contaminated shower drains waste as it is being discharged. The upper activity alarm on this radiation monitor has a setpoint that would indicate we are approaching OEC limits for radioactive water leaving the site. If an upper activity alarm on this radiation monitor is received, it automatically terminates the discharge by closing the discharge line isolation valve.

8.4.3 BV-2 Liquid Radwaste System Components

8.4.3.1 2LWS-TK21A/21B: Waste Drain Tanks

There are two of these tanks, each tank has a capacity of 10,000 gallons. They are located in the northeast corner of the Auxiliary Building (elevation 710'). They receive liquid wastes from the vent and drain system. These tanks can also receive liquid wastes from Unit 1. IF further processing is not necessary, THEN it may be placed on recirculation. A minimum of two tank volumes must be recirculated prior to sampling for discharge permit preparation.

8.4.3.2 2SGC-IOE21A/21B: Steam Generator Blowdown Cleanup Ion Exchangers

The main purpose of the ion exchangers is to clean liquid waste water of particulate and dissolved radioactive contaminants through an ion exchange process. There is a resin bed, outlets strainer, and cleanup filter associated with each of these ion exchangers. They are located in the Waste Handling Building (elevation 722').

8.4.3.2.1 Two evaporators (20 gpm each) were orignially used to process liquid waste at Unit 2. However, this evaporator was retired prior to initial issue of the ODCM, because of concerns for creating a mixed-waste.

8.4.3.3 2SGC-TK23A/23B: Steam Generator Blowdown Test Tanks

There are two of these tanks, each has a capacity of 18,000 gallons. They are located in the Auxiliary Building (elevation 755'). They receive liquid waste that has been processed through the cleanup ion exchangers. Upon completion of filling operation, the tank is placed on recirculation through the demineralizer until the radioactivity concentration is acceptable for discharge. A minimum of two tank volumes must be recirculated prior to sampling for discharge permit preparation.

8.4.3.4 2SGC-TK21A/21B: Steam Generator Blowdown Hold Tanks

There are two of these tanks, each has a capacity of 50,000 gallons. They are located in the Waste Handling Building (elevation 722'). These tanks are used to store liquid waste when the radioactive concentration of the steam generator blowdown test tank is not acceptable for discharge. . These tanks can also receive liquid wastes from Unit 1. The contents of this tank may be drained or processed through the Unit 1 or Unit 2 Liquid Radwaste Treatment System until the radioactivity concentration is acceptable for discharge. A minimum of two tank volumes must be recirculated prior to sampling for discharge permit preparation.

8.4.3.5 2SGC-RQ100: Liquid Waste Effluent Monitor

This off-line gamma scintillator radiation monitor continuously analyzes liquid waste as it is being discharged. The upper activity alarm on this radiation monitor has a setpoint that would indicate we are approaching OEC limits for radioactive water leaving the site. If an upper activity alarm is received, it automatically terminates the discharge by closing the discharge line isolation valves.

- END -

ATTACHMENT A
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LIQUID SOURCE TERMS

TABLE 1.1-1a
BV-1 LIQUID SOURCE TERM

NUCLIDE	(2) A_I ANNUAL RELEASE (Ci)	(3) OEC_i (uCi/ml)	(4) E_i DETECTION EFFICIENCY (cpm/uCi/ml)
Cr-51	1.3E-3	5E-3	1.18E+7
Mn-54	3.1E-4	3E-4	8.59E+7
Fe-55	1.6E-3	1E-3	(5)
Fe-59	8.3E-4	1E-4	9.17E+7
Co-58	1.4E-2	2E-4	1.16E+8
Co-60	2.0E-3	3E-5	1.73E+8
Zn-65 (3.1.3.13)	2.69E-2	5E-5	4.67E+7
Np-239	1.4E-4	2E-4	8.49E+7
Br-83	2.5E-5	9E-3	1.36E+6
Br-84	2.5E-5	4E-3	9.75E+7
Br-85	2.7E-6	(5)	6.19E+6
Rb-86	7.5E-5	7E-5	(5)
Sr-89	2.9E-4	8E-5	(5)
Sr-90	1.1E-5	5E-6	(5)
Y-90	9.4E-6	7E-5	(5)
Y-91m	8.7E-6	2E-2	8.98E+7
Y-91	5.7E-5	8E-5	2.60E+5
Y-93	7.4E-7	2E-4	(5)
Zr-95	5.1E-5	2E-4	8.60E+7
Nb-95	5.2E-5	3E-4	8.64E+7
Sr-91	1.3E-5	2E-4	6.97E+7
Mo-99	1.1E-2	2E-4	2.84E+7
Tc-99m	1.1E-2	1E-2	8.96E+7
Ru-103	3.4E-5	3E-4	9.5E+7
Ru-106	1.0E-5	3E-5	(5)
Rh-103m	3.4E-5	6E-2	(5)
Rh-106	1.0E-5	(5)	(5)
Te-125m	2.5E-5	2E-4	1.83E+5
Te-127m	2.6E-4	9E-5	4.09E+4
Te-127	2.7E-4	1E-3	1.38E+6
Te-129m	1.1E-3	7E-5	4.02E+6
Te-129	6.7E-4	4E-3	1.12E+7
I-130	1.2E-4	2E-4	3.08E+8
Te-131m	1.6E-4	8E-5	1.82E+8
Te-131	3E-5	8E-4	1.20E+8
I-131	1.6E-1	1E-5	1.11E+8
Te-132	4.3E-3	9E-5	1.17E+8
I-132	4.9E-3	1E-3	2.66E+8
I-133	4.0E-2	7E-5	9.90E+7

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LIQUID SOURCE TERMS

I-134	8.0E-5	4E-3	2.70E+8
Cs-134	4.6E-2	9E-6	1.99E+8
I-135	4.3E-3	3E-4	1.19E+8
Cs-136	8.9E-3	6E-5	2.80E+8
Cs-137	3.3E-2	1E-5	8.01E+7
Ba-137m	3.1E-2	1E-5	8.01E+7
Ba-140	1.1E-4	8E-5	4.37E+7
La-140	1.1E-4	9E-5	2.00E+8
Ce-141	5.1E-5	3E-4	5.07E+7
Ce-143	2.8E-6	2E-4	7.27E+7
Ce-144	3.2E-5	3E-5	1.06E+7
Pr-143	2.7E-5	2E-4	1.04E+0
Pr-144	3.2E-5	6E-3	2.25E+6
H-3	5.50E+2	1E-2	(5)
TOTAL(1)	4.05E-1		

(1) Excluding Tritium and Entrained Noble Gases
(2) Source Term for (RM-1LW-104 and RM-1LW-116) from Stone and Webster Calculation Package UR(B)-160 (3.1.1.6)
(3) ODCM Effluent Concentration Limit = 10 times the EC values of 10 CFR 20 (3.1.1.3)
(4) Detection Efficiency for (RM-1LW-104 and RM-1LW-116) from Calculation Package ERS-SFL-92-039 (3.1.1.4)
(5) Insignificant

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LIQUID SOURCE TERMS

TABLE 1.1-1b
BV-2 LIQUID SOURCE TERM

NUCLIDE	(2) A_i ANNUAL RELEASE (Ci)	(3) OEC_i (uCi/ml)	(4) DETECTION EFFICIENCY (cpm/uCi/ml)
Cr-51	1.00E-4	5E-3	2.01E+7
Mn-54	2.50E-5	3E-4	1.27E+8
Fe-55	1.30E-4	1E-3	(5)
Fe-59	6.50E-5	1E-4	1.26E+8
Co-58	1.10E-3	2E-4	1.82E+8
Co-60	1.60E-4	3E-5	2.38E+8
Zn-65 [3.1.3.13]	5.10E-2	5E-5	6.50E+7
Np-239	3.20E-5	2E-4	1.65E+8
Br-83	2.90E-5	9E-3	2.42E+6
Br-84	5.90E-9	4E-3	1.38E+8
Rb-86	3.70E-5	7E-5	1.04E+7
Sr-89	2.20E-5	8E-5	1.83E+4
Sr-90	8.50E-7	5E-6	(5)
Sr-91	5.30E-6	2E-4	1.04E+8
Mo-99	2.30E-3	2E-4	4.47E+7
Tc-99m	2.10E-3	1E-2	1.40E+8
Te-125m	1.90E-6	2E-4	3.94E+5
Te-127m	2.10E-5	9E-5	1.26E+5
Te-127	2.50E-5	1E-3	2.43E+6
Te-129m	8.20E-5	7E-5	6.53E+6
Te-129	5.30E-5	4E-3	1.96E+7
I-130	2.30E-4	2E-4	5.18E+8
Te-131m	5.20E-5	8E-5	2.85E+8
Te-131	9.40E-6	8E-4	1.88E+8
I-131	1.00E-1	1E-5	1.96E+8
Te-132	7.80E-4	9E-5	1.76E+8
I-132	2.30E-3	1E-3	4.22E+8
I-133	6.50E-2	7E-5	1.73E+8
I-134	4.60E-6	4E-3	4.06E+8
Cs-134	3.00E-2	9E-6	3.25E+8
I-135	9.20E-3	3E-4	1.71E+8
Cs-136	3.90E-3	6E-5	4.28E+8
Cs-137	2.20E-2	1E-5	1.28E+8
Ba-137m	2.10E-2	1E-5	1.33E+8
Ba-140	9.30E-6	8E-5	7.50E+7
La-140	8.40E-6	9E-5	3.08E+8

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LIQUID SOURCE TERMS

TABLE 1.1-1b (continued)
BV-2 LIQUID SOURCE TERM

NUCLIDE	(2) A_i ANNUAL RELEASE (Ci)	(3) OEC_i (uCi/ml)	(4) E_i DETECTION EFFICIENCY (cpm/uCi/ml)
Y-90	6.00E-7	7E-5	
Y-91m	3.60E-6	2E-2	1.59E+8
Y-91	4.40E-6	8E-5	3.55E+5
Y-93	3.00E-7	2E-4	2.03E+7
Zr-95	4.00E-6	2E-4	1.35E+8
Nb-95	4.00E-6	3E-4	1.33E+8
Ru-103	2.70E-6	3E-4	1.71E+8
Ru-106	8.20E-7	3E-5	(5)
Rh-103m	2.70E-6	6E-2	(5)
Rh-106	8.20E-7	--	5.65E+7
Ce-141	4.00E-6	3E-4	7.75E+7
Ce-143	8.60E-7	2E-4	1.20E+8
Ce-144	2.60E-6	3E-5	1.87E+7
Pr-143	2.30E-6	2E-4	1.63E+0
Pr-144	2.60E-6	6E-3	3.40E+6
H-3	5.50E+2	1E-2	(5)
TOTAL[1]	2.40E-1		

(1) Excluding Tritium and Entrained Noble Gases
(2) Source Term for (2SGC-RQ100) from Computer Code LIQ1BB [3.1.2.3]
(3) ODCM Effluent Concentration Limit = 10 times the EC values of 10 CFR 20 [3.1.2.1]
(4) Detection Efficiency for (2SGC-RQ100) from Calculation Package ERS-SFL-86-026 [3.1.2.2]
(5) Insignificant

ATTACHMENT B
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RECIRCULATION TIMES

TABLE 1.2-1a
BV-1 RECIRCULATION TIMES REQUIRED BEFORE SAMPLING OF LIQUID DISCHARGE TANKS

TANK DESCRIPTION	ASSET NO.	APPROXIMATE RECIRCULATION TIME(1) (Based on Historical Recirculation Rates)
Laundry And Contaminated Shower Dain Tanks	1LW-TK-6A/6B	2.5 hrs - (1200 gal) (2) / (16 gpm)
Low Level Waste Drain Tanks	1LW-TK-3A/3B	1.5 hrs = (2000 gal) (2) / (45 gpm)
High Level Waste Drain Tanks	1LW-TK-2A/2B	3.4 hrs = (5000 gal) (2) / (50 gpm)
Respirator Test Tanks	1LW-TK-5A/5B	1.4 hrs = (3000 gal) (2) / (73 gpm)
Steam Generator Drain Tanks	1LW-TK-7A/7B	17.2 hrs -(35000 gal) (2)/(68 gpm)
Boron Recovery Test Tanks	1BR-TK-2A/2B	9.7 hrs =(13,000 gal) (2)/(45 gpm)

(1) The times listed are those approximated for two recirculations of a full tank with one recirculation pump in operation (using historical recirculation rates). Recirculation times for a partially full tank are directly proportional to the fraction of the tank capacity occupied by the entrained liquid waste (after isolation). Actual recirculation times are determined prior to sampling using actual tank volumes and actual recirculation rates available in the BV-1 Control Room.

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RECIRCULATION TIMES

TABLE 1.2-1b

BV-2 RECIRCULATION TIMES REQUIRED BEFORE SAMPLING OF LIQUID DISCHARGE TANKS

TANK DESCRIPTION	ASSET NO.	APPROXIMATE RECIRCULATION TIME(1) (Based on Historical Recirculation Rates)
Liquid Waste Tanks	2LWS-TK21A/21B	11.5 hrs = (10,000 gal) (2)/(29 gpm)
Steam Generator Blowdown Hold Tanks	2SGC-TK21A/21B	25.8 hrs = (51,000 gal) (2)/(66 gpm)
Steam Generator Blowdown Test Tanks	2SGC-TK23A/23B	9.1 hrs = (18,000 gal) (2)/(66 gpm)

(1) The times listed are those approximated for two recirculations of a full tank with one recirculation pump in operation (using historical recirculation rates). Recirculation times for a partially full tank are directly proportional to the fraction of the tank capacity occupied by the entrained liquid waste (after isolation). Actual recirculation times are determined prior to sampling using actual tank volumes and actual recirculation rates available in the BV-2 Control Room.

ATTACHMENT C
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INGESTION DOSE COMMITMENT FACTORS

TABLE 1.3-1

A_{it} VALUES FOR THE ADULT FOR THE BEAVER VALLEY SITE
(mrem/hr per uCi/ml)

NUCLIDE	BONE	LIVER	T-BODY	THYROID	KIDNEY	LUNG	GI-LLI
H-3	0.00E-01	2.70E-01	2.70E-01	2.70E-01	2.70E-01	2.70E-01	2.70E-01
C-14	3.13E04	6.26E03	6.26E03	6.26E03	6.26E03	6.26E03	6.26E03
Na-24	4.08E02	4.08E02	4.08E02	4.08E02	4.08E02	4.08E02	4.08E02
P-32	4.62E07	2.87E06	1.79E06	0.00E-01	0.00E-01	0.00E-01	5.19E06
Cr-51	0.00E-01	0.00E-01	1.27E00	7.62E-01	2.81E-01	1.69E00	3.21E02
Mn-54	0.00E-01	4.38E03	8.35E02	0.00E-01	1.30E03	0.00E-01	1.34E04
Mn-56	0.00E-01	1.10E02	1.95E01	0.00E-01	1.40E02	0.00E-01	3.52E03
Fe-55	6.59E02	4.56E02	1.06E02	0.00E-01	0.00E-01	2.54E02	2.61E02
Fe-59	1.04E03	2.45E03	9.38E02	0.00E-01	0.00E-01	6.83E02	8.15E03
Co-57	0.00E-01	2.10E01	3.50E01	0.00E-01	0.00E-01	0.00E-01	5.33E02
Co-58	0.00E-01	8.95E01	2.01E02	0.00E-01	0.00E-01	0.00E-01	1.81E03
Co-60	0.00E-01	2.57E02	5.67E02	0.00E-01	0.00E-01	0.00E-01	4.83E03
Ni-63	3.12E04	2.16E03	1.05E03	0.00E-01	0.00E-01	0.00E-01	4.51E02
Ni-65	1.27E02	1.65E01	7.51E00	0.00E-01	0.00E-01	0.00E-01	4.17E02
Cu-64	0.00E-01	1.00E01	4.70E00	0.00E-01	2.52E01	0.00E-01	8.53E02
Zn-65	2.32E04	7.37E04	3.33E04	0.00E-01	4.93E04	0.00E-01	4.64E04
Zn-69	4.93E01	9.43E01	6.56E00	0.00E-01	6.13E01	0.00E-01	1.42E01
Br-83	0.00E-01	0.00E-01	4.04E01	0.00E-01	0.00E-01	0.00E-01	5.82E01
Br-84	0.00E-01	0.00E-01	5.24E01	0.00E-01	0.00E-01	0.00E-01	4.11E-04
Br-85	0.00E-01	0.00E-01	2.15E00	0.00E-01	0.00E-01	0.00E-01	0.00E-01
Rb-86	0.00E-01	1.01E05	4.71E04	0.00E-01	0.00E-01	0.00E-01	1.99E04
Rb-88	0.00E-01	2.90E02	1.54E02	0.00E-01	0.00E-01	0.00E-01	4.00E-09
Rb-89	0.00E-01	1.92E02	1.35E02	0.00E-01	0.00E-01	0.00E-01	1.12E-11
Sr-89	2.22E04	0.00E-01	6.39E02	0.00E-01	0.00E-01	0.00E-01	3.57E03
Sr-90	5.48E05	0.00E-01	1.34E05	0.00E-01	0.00E-01	0.00E-01	1.58E04
Sr-91	4.10E02	0.00E-01	1.65E01	0.00E-01	0.00E-01	0.00E-01	1.95E03
Sr-92	1.55E02	0.00E-01	6.72E00	0.00E-01	0.00E-01	0.00E-01	3.08E03
Y-90	5.80E-01	0.00E-01	1.55E-02	0.00E-01	0.00E-01	0.00E-01	6.15E03
Y-91m	5.48E-03	0.00E-01	2.12E-04	0.00E-01	0.00E-01	0.00E-01	1.61E-02
Y-91	8.50E00	0.00E-01	2.27E-01	0.00E-01	0.00E-01	0.00E-01	4.68E03
Y-92	5.09E-02	0.00E-01	1.49E-03	0.00E-01	0.00E-01	0.00E-01	8.92E02
Y-93	1.62E-01	0.00E-01	4.46E-03	0.00E-01	0.00E-01	0.00E-01	5.12E03
Zr-95	2.53E-01	8.11E-02	5.49E-02	0.00E-01	1.27E-01	0.00E-01	2.57E02
Zr-97	1.40E-02	2.82E-03	1.29E-03	0.00E-01	4.26E-03	0.00E-01	8.73E02
Nb-95	4.47E00	2.49E00	1.34E00	0.00E-01	2.46E00	0.00E-01	1.51E04
Nb-97	3.75E02	9.49E-03	3.46E-03	0.00E-01	1.11E-02	0.00E-01	3.50E01

ATTACHMENT C
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INGESTION DOSE COMMITMENT FACTORS

TABLE 1.3-1

A_{it} VALUES FOR THE ADULT FOR THE BEAVER VALLEY SITE
(mrem/hr per uCi/ml)

NUCLIDE	BONE	LIVER	T-BODY	THYROID	KIDNEY	LUNG	GI-LLI
Mo-99	0.00E-01	1.05E02	2.00E01	0.00E-01	2.38E02	0.00E-01	2.43E02
Tc-99m	8.97E-03	2.54E-02	3.23E-01	0.00E-01	3.85E-01	1.24E-02	1.50E01
Tc-101	9.23E-03	1.33E-02	1.30E-01	0.00E-01	2.39E-01	6.79E-03	4.00E-14
Ru-103	4.51E00	0.00E-01	1.94E00	0.00E-01	1.72E01	0.00E-01	5.26E02
Ru-105	3.75E-01	0.00E-01	1.48E-01	0.00E-01	4.85E00	0.00E-01	2.29E02
Ru-106	6.70E01	0.00E-01	8.48E00	0.00E-01	1.29E02	0.00E-01	4.34E03
Ag-110m	9.48E-01	8.77E-01	5.21E-01	0.00E-01	1.72E00	0.00E-01	3.58E02
Sb-124	7.87E00	1.49E-01	3.12E00	1.91E-02	0.00E-01	6.13E00	2.23E02
Sb-125	5.03E00	5.62E-02	1.20E00	5.11E-03	0.00E-01	3.88E00	5.54E01
Te-125m	2.57E03	9.30E02	3.44E02	7.72E02	1.04E04	0.00E-01	1.03E04
Te-127m	6.49E03	2.32E03	7.90E02	1.66E03	2.63E04	0.00E-01	2.17E04
Te-127	1.05E02	3.78E01	2.28E01	7.81E01	4.29E02	0.00E-01	8.32E03
Te-129m	1.10E04	4.11E03	1.74E03	3.78E03	4.60E04	0.00E-01	5.55E04
Te-129	3.01E01	1.13E01	7.33E00	2.31E01	1.26E02	0.00E-01	2.27E01
Te-131m	1.66E03	8.10E02	6.75E02	1.28E03	8.21E03	0.00E-01	8.05E04
Te-131	1.89E01	7.88E00	5.96E00	1.55E01	8.27E01	0.00E-01	2.67E00
Te-132	2.41E03	1.56E03	1.47E03	1.72E03	1.50E04	0.00E-01	7.39E04
Te-134	3.10E01	2.03E01	1.25E01	2.71E01	1.96E02	0.00E-01	3.44E-02
I-129	1.19E02	1.02E02	3.35E02	2.63E05	2.19E02	0.00E-01	1.61E01
I-130	2.75E01	8.10E01	3.20E01	6.87E03	1.26E02	0.00E-01	6.97E01
I-131	1.51E02	2.16E02	1.24E02	7.08E04	3.71E02	0.00E-01	5.70E01
I-132	7.37E00	1.97E01	6.90E00	6.90E02	3.14E01	0.00E-01	3.71E00
I-133	5.16E01	8.97E01	2.74E01	1.32E04	1.57E02	0.00E-01	8.06E01
I-134	3.85E00	1.05E01	3.74E00	1.81E02	1.66E01	0.00E-01	9.12E-03
I-135	1.61E01	4.21E01	1.55E01	2.78E03	6.76E01	0.00E-01	4.76E01
Cs-134	2.98E05	7.09E05	5.79E05	0.00E-01	2.29E05	7.61E04	1.24E04
Cs-136	3.12E04	1.23E05	8.86E04	0.00E-01	6.85E04	9.39E03	1.40E04
Cs-137	3.82E05	5.22E05	3.42E05	0.00E-01	1.77E05	5.89E04	1.01E04
Cs-138	2.64E02	5.22E02	2.59E02	0.00E-01	3.84E02	3.79E01	2.23E-03
Ba-139	9.69E-01	6.90E-04	2.84E-02	0.00E-01	6.45E-04	3.92E-04	1.72E00
Ba-140	2.03E02	2.55E-01	1.33E01	0.00E-01	8.66E-02	1.46E-01	4.18E02
Ba-141	4.71E-01	3.56E-04	1.59E-02	0.00E-01	3.31E-04	2.02E-04	2.22E-10
Ba-142	2.13E-01	2.19E-04	1.34E-02	0.00E-01	1.85E-04	1.24E-04	3.00E-19
La-140	1.51E-01	7.59E-02	2.01E-02	0.00E-01	0.00E-01	0.00E-01	5.57E03
La-142	7.71E-03	3.51E-03	8.74E-04	0.00E-01	0.00E-01	0.00E-01	2.56E01
Ce-141	2.63E-02	1.78E-02	2.02E-03	0.00E-01	8.26E-03	0.00E-01	6.80E01

ATTACHMENT C
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INGESTION DOSE COMMITMENT FACTORS

TABLE 1.3-1

A_{it} VALUES FOR THE ADULT FOR THE BEAVER VALLEY SITE
(mrem/hr per uCi/ml)

NUCLIDE	BONE	LIVER	T-BODY	THYROID	KIDNEY	LUNG	GI-LLI
Ce-143	4.64E-03	3.43E 00	3.79E-04	0.00E-01	1.51E-03	0.00E-01	1.28E 02
Ce-144	1.37E 00	5.73E-01	7.36E-02	0.00E-01	3.40E-01	0.00E-01	4.64E 02
Pr-143	5.54E-01	2.22E-01	2.75E-02	0.00E-01	1.28E-01	0.00E-01	2.43E 03
Pr-144	1.81E-03	7.53E-04	9.22E-05	0.00E-01	4.25E-04	0.00E-01	2.61E-10
Nd-147	3.79E-01	4.38E-01	2.62E-02	0.00E-01	2.56E-01	0.00E-01	2.10E 03
W-187	2.96E 02	2.47E 02	8.65E 01	0.00E-01	0.00E-01	0.00E-01	8.10E 04
Np-239	2.90E-02	2.85E-03	1.57E-03	0.00E-01	8.89E-03	0.00E-01	5.85E 02

ATTACHMENT D
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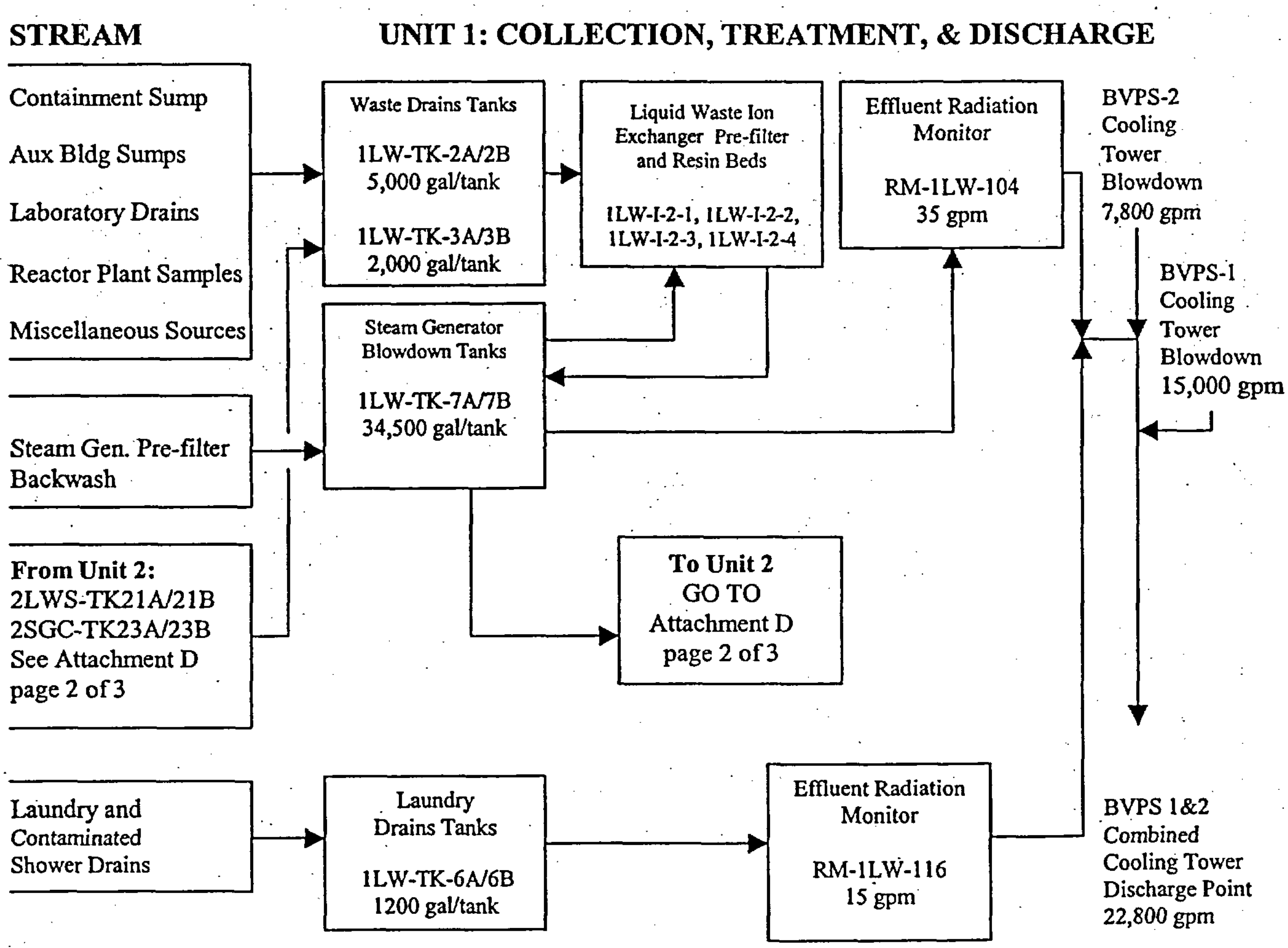
LIQUID RADWASTE SYSTEM



LIQUID WASTE DISCHARGES TO
BVPS-1 COOLING TOWER
BLOWDOWN AND ENVIRONMENT

ATTACHMENT D
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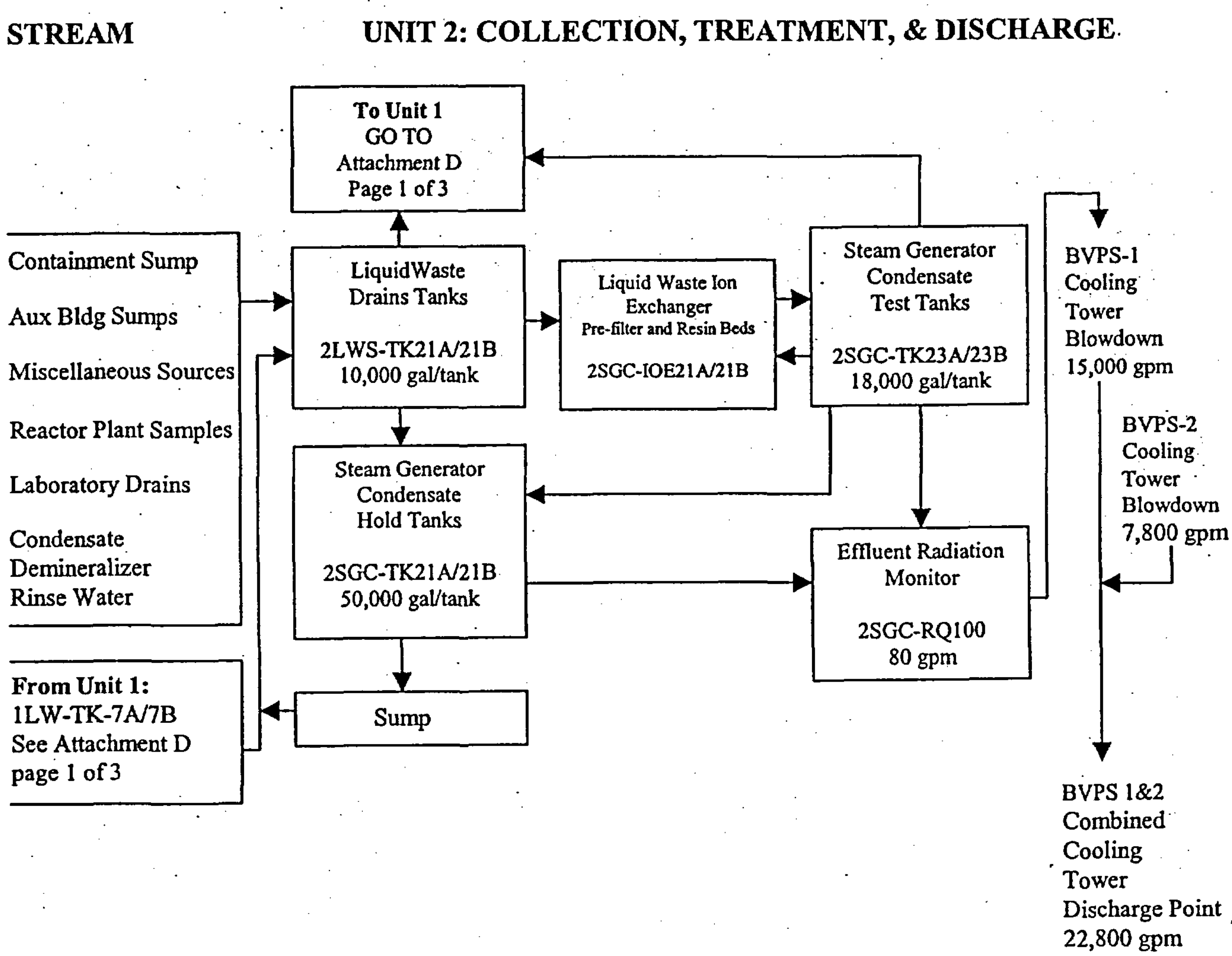
LIQUID RADWASTE SYSTEM



LIQUID WASTE DISCHARGES TO
BVPS-2 COOLING TOWER
BLOWDOWN AND ENVIRONMENT

11/08

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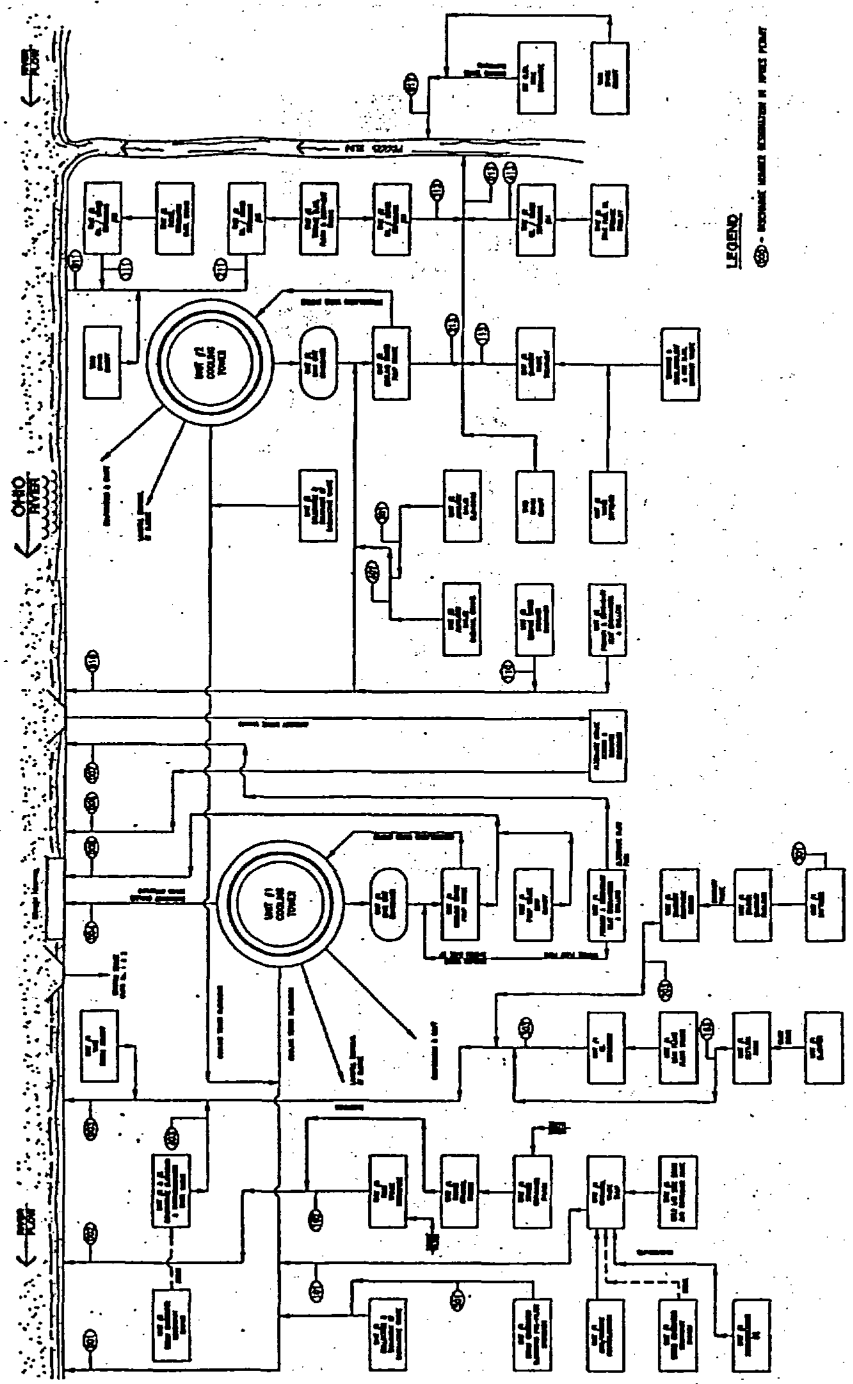
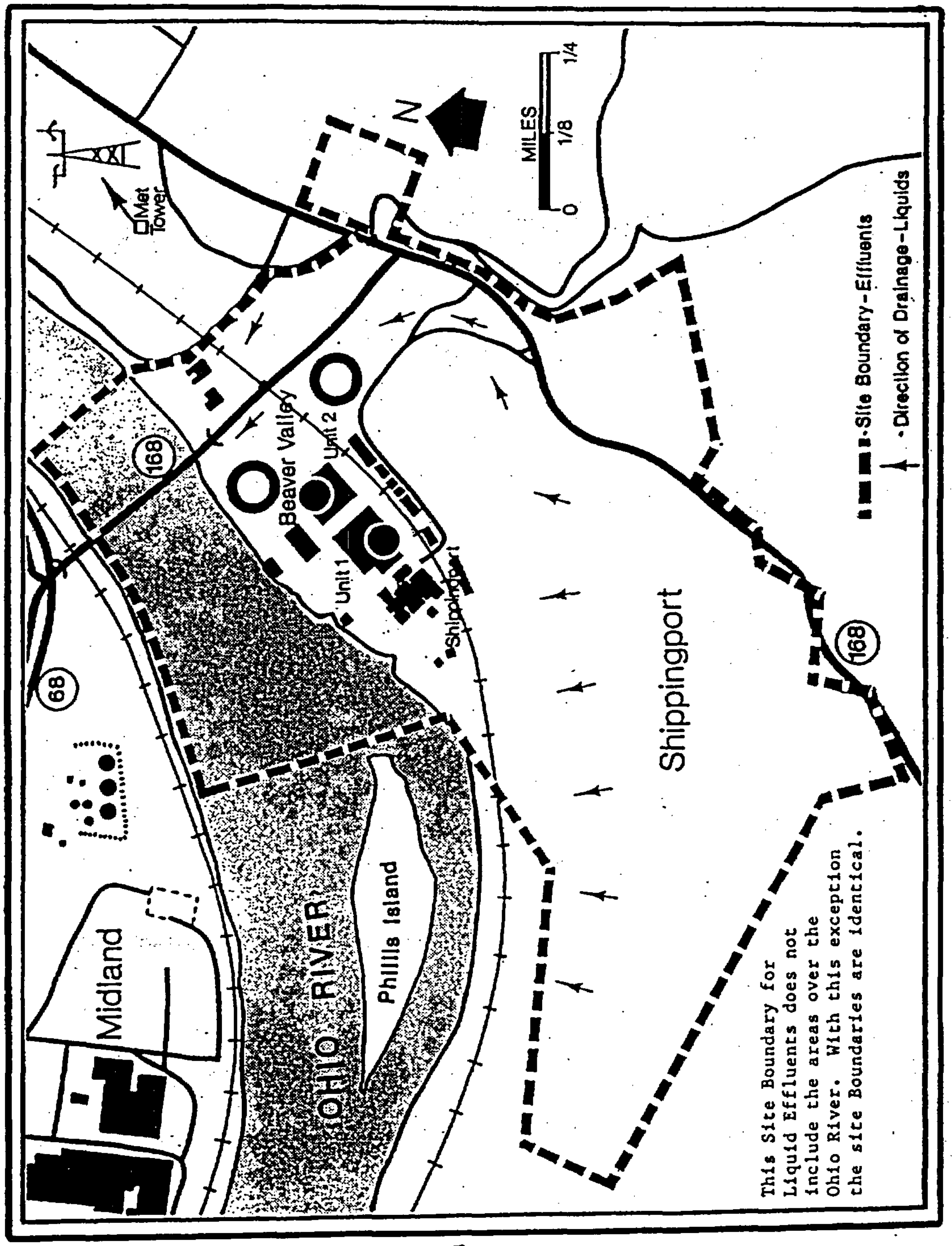
LIQUID RADWASTE SYSTEM

FIGURE 1.4-3
BV-1 AND 2 LIQUID EFFLUENT RELEASE POINTS



ATTACHMENT E
Page 1 of 1
SITE BOUNDARY FOR LIQUID EFFLUENTS

Figure 5-1



RTL #A9.621B

Beaver Valley Power Station

Unit 1/2

1/2-ODC-2.02

ODCM: GASEOUS EFFLUENTS

Document Owner
Manager, Radiation Protection

Revision Number	1
Level Of Use	In-Field Reference
Safety Related Procedure	Yes

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TABLE OF CONTENTS

1.0 PURPOSE

1.1 This procedure provides the calculational methodology to be used for determination of the following release parameters.

1.1.1 Gaseous effluent monitor alarm setpoints

1.1.2 Gaseous effluent dose rate calculations

1.1.3 Gaseous effluent dose calculations

1.2 This procedure also provides information related to the following:

1.2.1 Gaseous Radwaste Treatment System.

1.2.2 Site Boundary used for gaseous effluents.

1.3 Prior to issuance of this procedure, these items were located in Section 2 and Section 5 of the old ODCM.

2.0 SCOPE

2.1 This procedure is applicable to all station personnel (including subcontractors) that are qualified to perform activities as described and referenced in this procedure.

3.0 REFERENCES AND COMMITMENTS

3.1 References

3.1.1 References for BV-1 Gaseous Effluent Monitor Setpoints

3.1.1.1 Beaver Valley Power Station, Appendix I Analysis - Docket No. 50-334 and 50-412; Table 2.1-3

3.1.1.2 Beaver Valley Power Station, Unit 2 FSAR; Table 11.3-1

3.1.1.3 BVPS Specification No. BVS 414, Table V Nuclide Data,; Table 1 and Figure 1, Table 3, and Figure 2, May 30, 1974

3.1.1.4 Calculation Package No. ERS-SFL-85-031, Unit 1 Gaseous Effluent Monitor Efficiency Data

3.1.1.5 Calculation Package No. ERS-HHM-87-014, Unit 1/Unit 2 ODCM Gaseous Alarm Setpoint Determinations

3.1.1.6 Calculation Package No. ERS-ATL-87-026, BVPS-1 and BVPS-2 ODCM T Factor Justification

3.1.1.7 Letter ND1SHP:776, dated February 12, 1988, BVPS-1 ODCM Table 2.2-2, Appendix B

3.1.1.8 Stone and Webster Calculation No. UR(B)-262, Gaseous Releases From Containment Vacuum Pumps

3.1.2 References for BV-2 Gaseous Effluent Monitor Setpoints

3.1.2.1 Calculation Package No.ERS-SFL-86-026, Unit 2 DRMS Isotopic Efficiencies

3.1.2.2 Calculation Package No. ERS-HHM-87-014, Unit 1/Unit 2 ODCM Gaseous Alarm Setpoint Determinations

3.1.2.3 Beaver Valley Power Station, Unit 2 FSAR; Table 11.3-2

3.1.2.4 Calculation Package No. ERS-ATL-87-026, BVPS-1 and BVPS-2 ODCM T Factor Justification

3.1.2.5 Stone and Webster Calculation No. UR(B)-262, Gaseous Releases From Containment Vacuum Pumps

3.1.3 References Used for other portions of this procedure

3.1.3.1 NUREG-0133, Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants

3.1.3.2 NUREG-1301, Offsite Dose Calculation Manual Guidance; Standard Radiological Effluent Controls for Pressurized Water Reactors (Generic Letter 89-01, Supplement No. 1)

3.1.3.3 NUREG-0324; XOQDOQ Program for the Meteorological Evaluation of Routine Releases at Nuclear Power Stations, September 1977

3.1.3.4 NUREG-0017; Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents form PWR's Revision 0.

3.1.3.5 Regulatory Guide 1.109, Calculation of Annual Dose to Man from Routine Releases of Reactor Effluents for the Purpose of Implementing Appendix I, April 1977

3.1.3.6 NUREG-0172, Age - Specific Radiation Dose Commitment Factors for a one-year Chronic Intake

3.1.3.7 1/2-ADM-1640, Control of the Offsite Dose Calculation Manual

3.1.3.8 1/2-ADM-0100, Procedure Writers Guide

3.1.3.9 NOP-SS-3001, Procedure Review and Approval

A3

3.1.3.10 CR03-04830, Containment Vacuum Pump Replacement Increases ODCM Source Term. CA-03, Revise Unit 1 Containment Vacuum Pump Source-Term in ODCM procedure 1/2-ODC-2.02, Attachment A, Table 2.1-1a.

3.2 **Commitments**

3.2.1 None

4.0 RECORDS AND FORMS

4.1 Records

4.1.1 Any calculation supporting ODCM changes shall be documented, as appropriate, by a retrievable document (e.g.; letter or calculation package) with an appropriate RTL number.

4.2 Forms

4.2.1 None

5.0 PRECAUTIONS AND LIMITATIONS

5.1 ODCM CONTROLS applicable to dose rate apply to the site. The site dose rate is due to the summation of releases from both units.

5.2 ODCM CONTROLS applicable to accumulated dose apply individually to each unit.

5.3 Releases at the Beaver Valley site may be ground level or elevated in nature.

5.3.1 All ground level releases are identified with a specific unit in the determination of site dose rate and dose attributed to that unit.

5.3.2 Elevated releases from both units are considered to originate from a shared radwaste system and are discharged from a common release point, the Process Vent, at the top of the BV-1 cooling tower.

5.4 At BV-1 and BV-2, the dose from continuous and batch (Gas Waste Storage Tanks) releases via the shared radwaste system (Process Vent) are normally apportioned equally to the units. Other continuous and batch releases via non-shared radwaste systems shall be attributed to a specific unit. The only exception is a containment purge via the Process Vent which shall be attributed to a specific unit.

5.5 There is a difference in setpoint terminology presentations of the radiation monitoring systems of BV-1 and BV-2.

5.5.1 Where HIGH and HIGH-HIGH terminology are used for the BV-1 Victoreen monitors, ALERT and HIGH terminology are used for the BV-1 Eberline SPING monitors and the BV-2 monitors.

5.5.2 Also, BV-2 setpoints are presented in uCi/cc rather than cpm as in BV-1. This difference is due to BV-2 software which applies a conversion factor to the BV-2 raw data (cpm). The user is cautioned that the uCi/cc presentation is technically correct only for the specific isotopic mix used in the determination of the conversion factor. In practice, setpoints determined for a calculated mix are correct for that mix. Setpoints determined on analysis prior to release will be correct for properly controlling dose rate, but the indicated uCi/cc value may differ from the actual value.

5.5.3 All BV-1 and BV-2 effluent monitors specified herein have Upper Alarm Setpoints established at 60 percent of the site limit, and Lower Alarm Setpoints established at 30 percent of the site limit.

5.6 A release may be batch or continuous in nature. Batch refers to releases that are intermittent in radionuclide concentrations or flow, such as releases from gas storage tanks, containment purges and ventings of systems or components with infrequent use.

5.6.1 Batch releases may be due to operational variations which result in radioactive releases greater than 50% of the releases normally considered as continuous. Batch releases from these sources during normal operation, including anticipated operational occurrences, are defined as those which occur for a total of 500 hours or less in a calendar year, but not more than 150 hours in any quarter.

5.6.2 The batch relative concentration value has been calculated in accordance with the guidelines provided in NUREG-0324[3.1.3.3] for short-term release.

5.6.3 IF simultaneous batch and continuous release out of one vent occurs, THEN use the lowest setpoint obtained according to Sections 8.1.1.1 through 8.1.3.2.

5.7 This procedure also contains information that was previously contained in Section 5 of the previous BV-1 and BV-2 Offsite Dose Calculation Manual.

5.7.1 In regards to this, the site boundary for gaseous effluents was included in this procedure.

5.7.2 The Site Boundary for Gaseous Effluents is shown in ATTACHMENT P Figure 5-1.

6.0 ACCEPTANCE CRITERIA

6.1 All changes to this procedure shall contain sufficient justification that the change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50, and not adversely impact the accuracy of effluent dose or alarm setpoint calculation. [3.1.3.2]

6.1.1 All changes to this procedure shall be prepared in accordance with 1/2-ADM-0100[3.1.3.8] and 1/2-ADM-1640. [3.1.3.7]

6.1.2 All changes to this procedure shall be reviewed and approved in accordance with NOP-SS-3001[3.1.3.9] and 1/2-ADM-1640. [3.1.3.7]

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7.0 PREREQUISITES

7.1 The user of this procedure shall be familiar with ODCM structure and content.

8.0 PROCEDURE

8.1 Alarm Setpoints

8.1.1 BV-1 Monitor Alarm Setpoint Determination

ODCM CONTROL 3.11.2.1 require that the dose rate in unrestricted areas due to noble gas radionuclides in the gaseous effluent released from the site shall be limited to ≤ 500 mrem/yr to the total body and to ≤ 3000 mrem/yr to the skin.

This section describes the methodology used to maintain the release of noble gas radionuclides within ODCM CONTROL 3.11.2.1 for the site, and determines monitor setpoints for BV-1.

The methodologies described in Section 8.1.1.2, 8.1.2.2, and 8.1.3.2 provide an alternate means of determining monitor alarm setpoints that may be used when an analysis is performed prior to release.

Control of the site dose rate limit due to noble gases is shown in the following Table. Dose rate control is exercised through a total of 8 effluent stream monitors, of which 3 are located at BV-1 (alternates exists for these monitors), and 5 are located at BV-2. As previously noted, BV-1 and BV-2 elevated releases are via the PV-1/2 Process Vent.

Monitor Setpoint Specifications Based On Fraction Of Site Limit

UNIT RELEASE POINT MONITOR NO.	FRACTION OF SITE LIMITING DOSE RATE Upper Alarm	Lower Alarm
(VV-1) Unit 1, Auxiliary Building Vent		
Pri.: RM-1VS-101B or	60% (HIGH-HIGH)	30% (HIGH)
Alt.: RM-1VS-109 (5)	60% (HIGH)	30% (ALERT)
(CV-1) Unit 1, Rχ Containment/SLCRS Vent		
Pri.: RM-1VS-107B or	60% (HIGH-HIGH)	30% (HIGH)
Alt.: RM-1VS-110 (5)	60% (HIGH)	30% (ALERT)
(PV-1/2), Unit 1/2, Gaseous Waste/Process Vent		
Pri.: RM-1GW-108B or	60% (HIGH-HIGH)	30% (HIGH)
Alt.: RM-1GW-109 (5)	60% (HIGH)	30% (ALERT)
(CV-2), Unit 2, SLCRS Filtered Pathway		
2HVS-RQ109E	60% (HIGH)	30% (ALERT)
(VV-2), Unit 2, SLCRS Unfiltered Pathway		
2HVS-RQ101B	60% (HIGH)	30% (ALERT)
(WV-2), Unit 2, Waste Gas Storage Vault Vent		
2RMQ-RQ303B	60% (HIGH)	30% (ALERT)
(DV-2), Unit 2, Decontamination Building Vent		
2RMQ-RQ301B	60% (HIGH)	30% (ALERT)
(CB-2), Condensate Polishing Building Vent		
2HVL-RQ112B	60% (HIGH)	30% (ALERT)

With the monitor setpoints based on fractions of the site limit as defined above, the following criteria may be applied to determine that the dose rate due to noble gas released from the site complies with ODCM CONTROL 3.11.2.1:

- The site dose rate is 30% of the site dose rate limit when any monitor is indicating a Lower Alarm.
- The site dose rate is 60% of the site dose rate limit when any two monitors are indicating Lower Alarms.
- The site dose rate is 60% of the site dose rate limit when any monitor is indicating an Upper Alarm.
- The site dose rate is 90% of the site dose rate limit when any monitor is indicating an Upper Alarm and any other monitor is indicating a Lower Alarm.

8.1.1.1 BV-1 Setpoint Determination Based On A Calculated Mix For VV-1 and CV-1 Ground Releases

The table below gives the calculated monitor count rate above background (CR), in ncpm, and provides the equivalent monitor indication associated with the most limiting site dose rate limit (i.e.; 500 mrem/yr Total Border or 3000 mrem/yr skin). The monitor HIGH-HIGH alarm setpoint above background (HHSP), and the monitor HIGH alarm setpoint above background (HSP) for each vent and operational condition shall be as follows:

BV-1 ALARM SETPOINTS FOR GROUND RELEASES

	(P) PRIMARY* MONITOR (A) ALTERNATE MONITOR	CR	cpm ABOVE BACKGROUND 60% SITE LIMIT UPPER ALARM	30% SITE LIMIT UPPER ALARM
• Continuous Release Via The BV-1 Auxilary Building Vent (VV-1)	(P)RM-1VS-101B (A)RM-1VS-109(5)	3000 1470	1800 879	900 440
• Batch Release Of Containment Purge Via The BV-1 Auxiliary Building Vent (VV-1)	(P)RM-1VS-101B (A)RM-1VS-109(5)	1200 1430	718 860	359 430
• Continuous Release Via The BV-1 Rx Containment/SLCRS Vent (CV-1)	(P)RM-1VS-107B (A)RM-1VS-110(5)	6440 3380	3870 2030	1930 1010
• Batch Release Of Containment Purge Via The BV-1 Rx Containment/SLCRS Vent (CV-1)	(P)RM-1VS-107B (A)RM-1VS-110(5)	12,700 6660	7630 4000	3810 2000

*IF the primary monitor is out of service, THEN ODCM CONTROL 3.3.3.10 is met for the respective alternate monitor. The alternate setpoints shall be utilized.

The setpoints were determined using the following conditions and information:

- Source terms given in ATTACHMENT A Table 2.1-1a. The gaseous source terms were derived from Stone & Webster computer code GAS1BB (similar to NUREG-0017),[3.1.3.4] and computer code DRAGON 4 (for the containment vacuum pump sources). ATTACHMENT A Table 2.1-1a does not include particulates and iodines, which are not used in site noble gas dose rate calculations.

- Onsite meteorological data for the period January 1, 1976 through December 31, 1980.

- Discharge flow rate of 62,000 cfm for a VV-1 Continuous Release.

- Discharge flow rate of 92,000 cfm for a VV-1 Batch Release of Containment Purge. This is comprised of 30,000 cfm from the containment purge plus 62,000 cfm for VV-1.
- Discharge flow rate of 49,300 cfm for a CV-1 Continuous Release.
- Discharge flow rate of 56,800 cfm for a CV-1 Batch Release of Containment Purge. This is comprised of 7,500 cfm from the containment purge plus 49,300 cfm for CV-1.
- Information listed under References for BV-1 Gaseous Effluent Monitor Setpoints.

The calculation method given in Sections 8.1.1.1.1 through 8.1.1.1.7 was used to derive the monitor setpoints for the following operational conditions:

- Continuous release via VV-1.
- Continuous release via CV-1.
- Batch release of BV-1 Containment Purge via VV-1.
- Batch release of BV-1 Containment Purge via CV-2.

8.1.1.1.1 **BV-1 Mix Radionuclides**

The "mix" (noble gas radionuclides and composition) of the gaseous effluent was determined as follows:

- The gaseous source terms that are representative of the "mix" of the gaseous effluent were selected. Gaseous source terms are the radioactivity of the noble gas radionuclides in the effluent. Gaseous source terms can be obtained from ATTACHMENT A Table 2.1-1a.
- The fraction of the total radioactivity in the gaseous effluent comprised of noble gas radionuclide "i" (Si) for each individual noble gas radionuclide in the gaseous effluent was determined by:

$$S_i = \frac{A_i}{\sum_i A_i} \qquad [2.1(1)\text{-}1]$$

where:

A_i = The total radioactivity or radioactivity concentration of noble gas radionuclide "i" in the gaseous effluent from ATTACHMENT A Table 2.1-1a.

8.1.1.1.2 **BV-1 Maximum Acceptable Release Rate (Whole Body Exposure)**

The maximum acceptable total release rate (uCi/sec) of all noble gas radionuclides in the gaseous effluent (Q_t) based upon the whole body exposure limit was calculated by:

$$Q_t = \frac{500}{(X/Q) \sum_i K_i \ S_i} \qquad [2.1(1)\text{-}2]$$

where:

$(X/Q)_{vv}$ = The highest calculated annual average relative concentration of effluents released via VV-1 for any area at or beyond the unrestricted area boundary for all sectors (sec/m^3) from ATTACHMENT F Table 2.2-5.

= 1.03E-4 sec/m^3 for continuous releases.

$(X/q)_{vv}$ = The highest calculated short term relative concentration of effluents released via VV-1 for any area at or beyond the unrestricted area boundary for all sectors (sec/m^3) from ATTACHMENT M Table 2.3-36.

= 3.32E-4 sec/m^3 for batch release of containment purge.

$(X/Q)_{cv}$ = The highest calculated annual average relative concentration of effluents released via CV-1 for any area at or beyond the unrestricted area boundary for all sectors (sec/m^3) from ATTACHMENT F Table 2.2-4.

= 9.24E-5 sec/m^3 for continuous releases.

$(X/q)_{cv}$ = The highest calculated short term relative concentration of effluents released via CV-1 for any area at or beyond the unrestricted area boundary for any sectors (sec/m^3) from ATTACHMENT M Table 2.3-35.

= 3.08E-4 sec/m^3 for batch release of containment purge.

K_i = The total whole body dose factor due to gamma emissions from noble gas radionuclide "i" (mrem/year/uCi/m^3) from ATTACHMENT G Table 2.2-11.

S_i = From equation [2.1(1)-1] above.

8.1.1.1.3 **BV-1 Maximum Acceptable Release Rate (Skin Exposure)**

Q_t was also determined based upon the skin exposure limit by:

$$Q_t = \frac{3000}{(X/Q)\sum_i (L_i + 1.1M_i)\, S_i}$$

where:

L_i = The skin dose factor due to beta emissions from noble gas radionuclide "i"(mrem/year/uCi/m^3) from ATTACHMENT G Table 2.2-11.

M_i = The air dose factor due to gamma emissions from noble gas radionuclide "i"(mrad/year/uCi/m^3) from ATTACHMENT G Table 2.2-11.

1.1 = The ratio of the tissue to air absorption coefficients over the energy range of the photons of interest, (mrem/mrad).

(X/Q) = Same as in Section 8.1.1.1.2.

8.1.1.1.4 **BV-1 Maximum Acceptable Release Rate (Individual Radionuclide)**

The maximum acceptable release rate (uCi/sec) of noble gas radionuclide "i" in the gaseous effluent (Q_i) for each individual noble gas radionuclide in the gaseous effluent was determined by:

$$Q_i = S_i\, Q_t \qquad [2.1(1)\text{-}4]$$

NOTE: Use the lower of the Q_t values obtained in Section 8.1.1.1.2 and 8.1.1.1.3.

8.1.1.1.5 **BV-1 Maximum Acceptable Concentrations (Individual Radionuclide)**

The maximum acceptable radioactivity concentration (uCi/cc) of noble gas radionuclide "i" in the gaseous effluent (C_i) for each individual noble gas radionuclide "i" in the gaseous effluent was determined by:

$$C_i = \frac{2.12E\text{-}3\ Q_i}{F} \qquad [2.1(1)\text{-}5]$$

where:

F = The maximum acceptable effluent flow rate at the point of release (cfm) as listed in Section 8.1.1.1.

2.12E-3 = Unit conversion factor (60 sec/min x 3.53E-5 ft^3/cc).

8.1.1.1.6 **BV-1 Monitor Count Rate**

The calculated monitor count rate (ncpm) above background attributed to the noble gas radionuclide. CR was determined by:

$$CR = \sum_i C_i E_i \qquad [2.1(1)\text{-}6)]$$

where:

E_i = The detection efficiency of the monitor for noble gas radionuclide "i" (cpm/uCi/cc) from ATTACHMENT B Table 2.1-2a.

8.1.1.1.7 **BV-1 Monitor Setpoints**

The monitor alarm setpoints above background were determined as follows:

- The monitor HIGH-HIGH Alarm Setpoint above background (ncpm) was determined by:

  $$HHSP = 0.60 \times CR \qquad [2.1(1)\text{-}7]$$

- The monitor HIGH Alarm Setpoint above background (ncpm) was determined by:

  $$HSP = 0.30 \times CR \qquad [2.1(1)\text{-}8]$$

NOTE: The values 0.60 for the HHSP and 0.30 for the HSP are fractions of the total radioactivity concentration that may be released via the monitored pathway to ensure that the site boundary limit is not exceeded due to simultaneous releases from both units.

8.1.1.2 **BV-1 Setpoint Determination Based On Analysis Prior To Release For VV-1 and CV-1 Ground Releases**

When the setpoints established using "the calculated mix" for ground releases do not provide adequate flexibility for operational needs, the method described below may be used in lieu of that set forth in Step 8.1.1.1. In this case, the results of sample analysis are used to determine the source term "mix." This calculational method applies to gaseous releases via VV-1 and CV-1 when determining the setpoint for the maximum acceptable discharge flow rate and the associated HIGH-HIGH Alarm Setpoint based on this flow rate during the following operational conditions:

- Batch release of Containment Purge via VV-1.
- Batch release of Containment Purge via CV-1.

8.1.1.2.1 **BV-1 Maximum Acceptable Release Rate**

The maximum acceptable discharge flow rate from VV-1 and CV-1 during purging is determined as follows:

- The maximum acceptable gaseous discharge flow rate (f) from VV-1 and CV-1 (cfm) during purging based upon the whole body exposure limit is calculated by:

$$f = \frac{1.06\ S\ T}{(X/q) \sum_{i} K_i C_i} \qquad [2.1(1)\text{-}17]$$

where:

1.06 = 500 mrem/yr x 2.12E-3

500 mrem/yr = dose rate limit

2.12E-3 = unit conversion factor
= (60 sec/min x 3.53E-5 ft^3/cc)

S = Percent of site dose rate released via this pathway. Up to 60% of the site dose rate is permissible for one release point under the alarm set point rules of Section 8.1.1.

T = Maximum valve for T is 16 based on the limiting restriction in ODCM CONTROL 3.11.2.1 where the dose rate for a containment purge may be averaged over a time period not to exceed 960 minutes. (As containment air volume change time period is 60 minutes; T = 960/60 = 16).(3.1.1.6)

$(X/q)_{vv}$ = The highest calculated short term relative concentration of effluents released via VV-1 for any area at or beyond the unrestricted area boundary for all sectors (sec/m^3) from ATTACHMENT M Table 2.3-36.

= 3.32E-4 sec/m^3

$(X/q)_{cv}$ = The highest calculated short term relative concentration of effluents released via CV-1 for areas at or beyond the unrestricted area boundary for all sectors (sec/m^3) from ATTACHMENT M Table 2.3-37.

= 3.08E-4 sec/m^3

K_i = The total whole body dose factor due to gamma emissions from noble gas radionuclide "i" (mrem/year/uCi/m^3) from ATTACHMENT G Table 2.2-11.

C_i = The undiluted radioactivity concentration of noble gas radionuclide "i" in the gaseous source (uCi/cc) as determined by analysis of the gas to be released.

- The flow rate (f) is also determined based upon the skin exposure limit as follows:

$$f = \frac{6.36\,S\,T}{(X/q)\sum_{i}(L_i + 1.1M_i)\,C_i} \qquad [2.1(1)\text{-}18]$$

where:

6.36 = 3000 mrem/yr x 2.12E-3

3000 mrem/yr = dose rate limit

2.12E-3 = unit conversion factor
= (60 sec/min x 3.53E-5 ft^3/cc)

L_i = The skin dose factor due to beta emissions from noble gas radionuclide "i" (mrem/year/uCi/m^3) from ATTACHMENT G Table 2.2-11.

M_i = The air dose factor due to gamma emissions from noble gas radionuclide "i" (mrad/year/uCi/m^3) from ATTACHMENT G Table 2.2-11.

(X/q) = Same as above.

- The flow rate (f) is determined by selecting the smaller of the calculated (f) values based on the whole body exposure limit, or the skin exposure limit shown above. The actual purge flow rate (cfm) must be maintained at or below this calculated (f) value or the discharge cannot be made from the vent.

8.1.1.2.2 **BV-1 Monitor Setpoints**

The monitor alarm setpoints above background are determined as follows:

- The calculated monitor HIGH-HIGH Alarm Setpoint above background (ncpm) attributed to noble gas radionuclides is determined by:

$$HHSP = \frac{f \sum_i C_i E_i}{F'} \qquad [2.1(1)\text{-}19]$$

where:

f = The maximum acceptable gaseous discharge flow rate (cfm) determined in Section 8.1.1.2.1.

F′ = The maximum actual or design effluent flow rate (cfm) at the point of release.

= 92,000 cfm for VV-1

= 56,800 cfm for CV-1

C_i = The undiluted radioactivity concentration of noble gas radionuclide "i" in the gaseous source (uCi/cc) as determined by analysis of the gas to be released.

E_i = The detection efficiency of the monitor for noble gas radionuclide "i" (cpm/uCi/cc) from ATTACHMENT B Table 2.1-2a.

- When a HIGH-HIGH set point has been calculated according to this section, the monitor HIGH Alarm Setpoint above background (ncpm) is determined as follows:

$$HSP = HHSP \times 0.5 \qquad [2.1(1)\text{-}20]$$

8.1.2 **BV-2 Monitor Alarm Setpoint Determination**

See Section 8.1.1 for a description of Monitor Alarm Setpoint Determinations.

8.1.2.1 **BV-2 Setpoint Determination Based On A Calculated Mix For VV-2, CV-2, DV-2, WV-2 and CB-2 Ground Releases.**

The table below gives the calculated monitor count rate above background (CR) in ncpm, and provides the equivalent monitor indication (DV) in net uCi/cc associated with the most limiting site dose rate limit (i.e., 500 mrem/yr Total Body or 3000 mrem/yr Skin). The HIGH alarm setpoint (HSP) in uCi/cc above background, and the ALERT alarm setpoint (ASP) in uCi/cc above background for each vent and operational condition shall be as follows:

BV2 ALARM SETPOINTS FOR GROUND RELEASES
uCi/cc ABOVE BACKGROUND
(unless otherwise specified)

	MONITOR	CR ncpm	DV	60% SITE LIMIT UPPER ALARM	30% SITE LIMIT LOWER ALARM
• Continuous Release Via The BV-2 SLCRS Unfiltered Pathway (VV-2)	2HVS-RQ101B	8260	3.01E-4	1.81E-4	9.04E-5
• Batch Release Of Containment Purge Via The BV-2 SLCRS Unfiltered Pathway (VV-2)	2HVS-RQ101B	2020	7.39E-5	4.43E-5	2.22E-5
• Continuous Release Via The BV-2 SLCRS Filtered Pathway (CV-2)	2HVS-RQ109E	4320	2940 μCi/sec	1770 μCi/sec	883 μCi/sec
• Batch Release Of Containment Purge Via The BV-2 SLCRS Filtered Pathway (CV-2)	2HVS-RQ109E	16,400	1130 μCi/sec	676 μCi/sec	338 μCi/sec
• Continuous Release Via The BV-2 Condensate Polishing Building Vent (CB-2)	2HVL-RQ112B	28,900	1.61E-3	9.63E-4	4.82E-4
• Continuous Release Via The BV-2 Decontamination Building Vent (DV-2)	2RMQ-RQ301B	56,600	3.15E-3	1.89E-3	9.44E-4
• Continuous Release Via The BV-2 Waste Gas Storage Vault Vent (WV-2)	2RMQ-RQ303B	912,000	2.58E-2	1.55E-2	7.74E-3

The setpoints were determined using the following conditions and information:

- Source terms given in ATTACHMENT A Table 2.1-1b. These gaseous source terms were derived from Stone & Webster computer code GAS1BB (similar to NUREG-0017)[3.1.3.4] and computer code DRAGON 4 (for the containment vacuum pump sources). ATTACHMENT A Table 2.1-1b does not include particulates and iodines, which are not used in site noble gas dose rate calculations.

- The Containment Building Purge radionuclide mix was utilized for the purposes of determining an alarm setpoint for the SLCRS Unfiltered Pathway on the basis of the proximity of the contiguous areas.

- The Decontamination Building and Condensate Polishing Building ventilation exhaust are not expected to be radioactive. However, for purposes of determining an alarm setpoint, it is conservatively assumed that Xe-133 is in the ventilation exhaust at concentrations that would result in the appropriate dose rate limits.

- The Waste Gas Storage Vault ventilation exhaust is also not normally radioactive. However, the monitor alarm setpoint is based on the assumption that the ventilation exhaust radionuclide spectrum is similar to the gaseous inventory in the system housed by the waste gas storage vault. This spectrum is listed in ATTACHMENT A Table 2.1-1b under Gaseous Waste System.

- Onsite meteorological data for the period January 1, 1976 through December 31, 1980.

- Discharge flow rate of 23,700 cfm for a VV-2 Continuous Release.

- Discharge flow rate of 53,700 cfm for a VV-2 Batch Release of Containment Purge. This is comprised of 30,000 cfm from the containment purge plus 23,700 cfm from the CV-2.

- Discharge flow rate of 59,000 cfm for a CV-2 Continuous Release.

- Discharge flow rate of 59,000 cfm for a CV-2 Batch Release of Containment Purge. This is comprised of 7,500 cfm from the containment purge plus 51,500 cfm from CV-2.

- Discharge flow rate of 30,556 cfm for a CB-2 Continuous Release.

- Discharge flow rate of 12,400 cfm for DV-2 Continuous Release.

- Discharge flow rate of 2,000 cfm for WV-2 Continuous Release.

- Information listed under References for BV-2 Gaseous Effluent Monitor Setpoints.

The calculation method given in Sections 8.1.2.1.1 through 8.1.2.1.7 was used to derive the alarm setpoints for the following operational conditions:

- Continuous release via VV-2.
- Continuous release via CV-2.
- Batch release of BV-2 Containment Purge via VV-2.
- Batch release of BV-2 Containment Purge via CV-2.
- Continuous release via CB-2.
- Continuous release via DV-2.
- Continuous release via WV-2.

8.1.2.1.1 **<u>BV-2 Mix Radionuclides</u>**

The "mix" (noble gas radionuclides and composition) of the gaseous effluent was determined as follows:

- The gaseous source terms that are representative of the "mix" of the gaseous effluent were selected based on the relative stream composition and volumetric flowrate. Gaseous source terms are the radioactivity of the noble gas radionuclides in the effluent. Gaseous source terms can be obtained from ATTACHMENT A Table 2.1-1b.
- The fraction of the total radioactivity in the gaseous effluent comprised of noble gas radionuclide "i" (Si) for each individual noble gas radionuclide in the gaseous effluent was determined by:

$$S_i = \frac{A_i}{\sum_i A_i} \qquad [2.1(2)\text{-}1]$$

where:

A_i = The radioactivity concentration of noble gas radionuclide "i" in the gaseous effluent (for VV-2, CV-2 and WV-2) is from ATTACHMENT A Table 2.1-1b. However, <u>SINCE</u> releases via CB-2 and DV-2 do not have a valid source term mix, <u>THEN</u> the noble gas radioactivity concentration is assumed to be Xe-133.

8.1.2.1.2 **BV-2 Maximum Acceptable Release Rate (Whole Body Exposure)**

The maximum acceptable total release rate (uCi/sec) of all noble gas radionuclides in the gaseous effluent (Q_t) based upon the whole body exposure limit was calculated by:

$$Q_t = \frac{500}{(X/Q) \sum_i K_i S_i} \qquad [2.1(2)\text{-}2]$$

where:

$(X/Q)_{vv}$ = The highest calculated annual average relative concentration of effluents released via VV-2 for any area at or beyond the unrestricted area boundary for all sectors (sec/m^3) from ATTACHMENT F Table 2.2-5.

= 1.03E-4 sec/m^3 for continuous releases.

$(X/q)_{vv}$ = The short term relative concentration of effluents released via VV-2 for any area at or beyond the unrestricted area boundary for all sectors (sec/m^3) from ATTACHMENT M Table 2.3-36.

= 3.32E-4 sec/m^3 for batch release of containment purge.

$(X/Q)_{cv}$ = The highest calculated annual average relative concentration of effluents released via CV-2 for any area at or beyond the unrestricted area boundary for all sectors (sec/m^3) from ATTACHMENT F Table 2.2-4.

= 9.24E-5 sec/m^3 for continuous releases.

$(X/q)_{cv}$ = The short term relative concentration of effluents released via CV-2 for any area at or beyond the unrestricted area boundary for all sectors (sec/m^3) from ATTACHMENT M Table 2.3-35.

= 3.08E-4 sec/m^3 for batch release of containment purge.

$(X/Q)_{cp}$ = The highest calculated annual average relative concentration of effluents released via CB-2 for any area at or beyond the unrestricted area boundary for all sectors (sec/m^3) from ATTACHMENT F Table 2.2-10.

= 7.35E-5 sec/m^3 for continuous releases.

$(X/Q)_{dv}$ = The highest calculated annual average relative concentration of effluents released via DV-2 for any area at or beyond the unrestricted area boundary for all sectors (sec/m^3) from ATTACHMENT F Table 2.2-8.

= 9.24E-5 sec/m^3 for continuous releases.

$(X/Q)_{wv}$ = The highest calculated annual average relative concentration of effluents released via WV-2 for any area at or beyond the unrestricted area boundary for all sectors (sec/m^3) from ATTACHMENT F Table 2.2-9.

= 9.24E-5 sec/m^3 for continuous releases.

K_i = The total whole body dose factor due to gamma emissions from noble gas radionuclide "i" (mrem/year/uCi/m^3)from ATTACHMENT G Table 2.2-11.

S_i = From equation [2.1(2)-1].

8.1.2.1.3 **BV-2 Maximum Acceptable Release Rate (Skin Exposure)**

Q_t was also determined based upon the skin exposure limit by:

$$Q_t = \frac{3000}{(X/Q)\sum_i (L_i + 1.1M_i)\,S_i} \qquad [2.1(2)\text{-}3]$$

where:

L_i = The skin dose factor due to beta emissions from noble gas radionuclide "i"(mrem/year/uCi/m^3) from ATTACHMENT G Table 2.2-11.

M_i = The air dose factor due to gamma emissions from noble gas radionuclide "i"(mrad/year/uCi/m^3) from ATTACHMENT G Table 2.2-11.

1.1 = The ratio of the tissue to air absorption coefficients over the energy range of the photons of interest, (mrem/mrad).

(X/Q) = Same as in Section 8.1.2.1.2.

8.1.2.1.4 **BV-2 Maximum Acceptable Release Rate (Individual Radionuclide)**

The maximum acceptable release rate (uCi/sec) of noble gas radionuclide "i" in the gaseous effluent (Q_i) for each noble gas radionuclide in the gaseous effluent was determined by:

$$Q_i = S_i Q_t \qquad [2.1(2)\text{-}4]$$

NOTE: Use the lower of the Q_t values obtained in Section 8.1.2.1.2 and 8.1.2.1.3.

8.1.2.1.5 **BV-2 Maximum Acceptable Concentrations (Individual Radionuclide)**

The maximum acceptable radioactivity concentration (uCi/cc) of noble gas radionuclide "i" in the gaseous effluent (Ci) for each individual noble gas radionuclide in the gaseous effluent was determined by:

$$C_i = \frac{2.12E\text{-}3\, Q_i}{F} \qquad [2.1(2)\text{-}5]$$

where:

F = The maximum acceptable effluent flow rate at the point of release (cfm) as listed in Section 8.1.2.1.

2.12E-3 = Unit conversion factor (60 sec/min x 3.53E-5 ft^3/cc).

8.1.2.1.6 **BV-2 Monitor Count Rate**

The calculated monitor count rate (ncpm) above background attributed to the noble gas radionuclide (CR) was determined by:

$$CR = \sum_i C_i E_i \qquad [2.1(2)\text{-}6)]$$

where:

Ei = The detection efficiency of the monitor for noble gas radionuclide "i" (cpm/uCi/cc) from ATTACHMENT B Table 2.1-2b.

8.1.2.1.7 **BV-2 Monitor Setpoints**

The monitor alarm setpoints above background were determined as follows:

- The monitor HIGH Alarm Setpoint above background (uCi/cc) was determined by:

$$HSP = \frac{0.60 \text{ x } CR}{E_{i\,ave}} \qquad [2.1(2)\text{-}7]$$

where;

$E_{i\,ave}$ = The CR of equation [2.1(2)-6] divided by the sum of the C_i for the respective mix.

- The monitor ALERT Alarm Setpoint above background (uCi/cc) was determined by:

$$ASP = \frac{0.30 \text{ x } CR}{E_{i\,ave}} \qquad [2.1(2)\text{-}8]$$

8.1.2.2 **BV-2 Setpoint Determination Based On Analysis Prior To Release for VV-2 and CV-2 Ground Releases**

When the setpoints established using "the calculated mix" do not provide adequate flexibility for operational needs, the method described below may be used in lieu of that set forth in Section 8.1.2.1. In this case, the results of sample analysis are used to determine the appropriate nuclide mix. This calculational method applies when determining the setpoint for the maximum acceptable discharge flow rate and the associated HIGH Alarm Setpoint based on respective vent flow rate during the following operational conditions:

- Batch release of Containment Purge via VV-2.
- Batch release of Containment Purge via CV-2.

8.1.2.2.1 **BV-2 Maximum Acceptable Release Rate**

The maximum acceptable discharge flow rate from VV-2 or CV-2 during purging is determined as follows:

- The maximum acceptable gaseous discharge flow rate (f) from VV-2 or CV-2 (cfm) during purging based upon the whole body exposure limit is calculated by:

$$f = \frac{1.06 \, S \, T}{(X/q) \sum_i K_i \, C_i} \qquad [2.1(2)\text{-}17]$$

where:

1.06 = 500 mrem/yr x 2.12E-3

500 mrem/yr = dose rate limit, whole body exposure

2.12E-3 = unit conversion factor
= (60 sec/min x 3.53E-5 ft^3/cc)

S = Percent of site dose rate released via this pathway. Up to 60% of the site dose rate is permissible for one release point under the alarm setpoint rules of Section 8.1.2.

T = Maximum value for T is 16 based on the limiting restriction in ODCM CONTROL 3.11.2.1 where the dose rate for a containment purge may be averaged over a time period not to exceed 960 minutes. (As containment air volume change time period is 60 minutes; T = 960/60 = 16).(3.1.2.4)

$(X/q)_{vv}$ = The highest calculated short term relative concentration of effluents released via VV-2 for any area at or beyond the unrestricted area boundary for all sectors (sec/m^3) from ATTACHMENT M Table 2.3-36.

= 3.32E-4 sec/m^3

$(X/q)_{cv}$ = The highest calculated short term relative concentration of effluents released via CV-2 for any area at or beyond the unrestricted area boundary for all sectors (sec/m^3) from ATTACHMENT M Table 2.3-37.

= 3.08E-4 sec/m^3

K_i = The total whole body dose factor due to gamma emissions from noble gas radionuclide "i" (mrem/year/uCi/m^3) from ATTACHMENT G Table 2.2-11.

C_i = The undiluted radioactivity concentration of noble gas radionuclide "i" in the gaseous source (uCi/cc) as determined by analysis of the gas to be released.

- The flow rate (f) is also determined based upon the skin exposure limit as follows:

$$f = \frac{6.36\, S\, T}{(X/q) \sum_i (L_i + 1.1 M_i)\, C_i} \qquad [2.1(2)\text{-}18]$$

where:

6.36 = 3000 mrem/yr x 2.12E-3

3000 mrem/yr = dose rate limit, skin exposure

2.12E-3 = unit conversion factor
= (60 sec/min x 3.53E-5 ft^3/cc)

L_i = The skin dose factor due to beta emissions from noble gas radionuclide "i" (mrem/year/uCi/m^3) from ATTACHMENT G Table 2.2-11.

M_i = The air dose factor due to gamma emissions from noble gas radionuclide "i" (mrad/year/uCi/m^3) from ATTACHMENT G Table 2.2-11.

(X/q) = Same as above.

- The flow rate (f) is determined by selecting the smaller of the calculated (f) values based on the whole body exposure limit, or the skin exposure limit shown above. The actual purge flow rate (cfm) must be maintained at or below this calculated (f) value or the discharge cannot be made from the vent.

8.1.2.2.2 **BV-2 Monitor Setpoints**

The monitor alarm setpoints above background are determined as follows:

- The calculated monitor HIGH Alarm Setpoint above background (net uCi/cc) attributed to the noble gas radionuclides is determined by:

$$HSP = \frac{f \sum_i C_i E_i}{F' E_{i\,ave}} \qquad [2.1(2)\text{-}19]$$

where:

f = The maximum acceptable containment purge flow rate (cfm) determined in Section 8.1.2.2.1.

F′ = The maximum actual or design effluent flow rate (cfm) at the point of release.

= 53,700 cfm for VV-2

= 59,000 cfm for CV-2

C_i = The undiluted radioactivity concentration of noble gas radionuclide "i" in the gaseous source (uCi/cc) as determined by analysis of the gas to be released.

E_i = The detection efficiency of the monitor for noble gas radionuclide "i" (cpm/uCi/cc) from ATTACHMENT B Table 2.1-2b.

$E_{i\,ave}$ = The CR of equation [2.1(2)-6] divided by the sum of the Ci for the respective mix.

NOTE: To enable maintaining a constant conversion factor from cpm to uCi/cc in the Digital Radiation Monitoring System software, the "calculated mix" is used rather than the analysis mix to calculate $E_{i\ ave}$ above. This does not cause any change in the function of the monitor setpoint to properly control dose rate. However, the monitor indicated uCi/cc value may differ from the actual value.

- When a HIGH Alarm Setpoint has been calculated according to this section, the monitor ALERT Alarm Setpoint above background (net uCi/cc) is determined as follows:

ASP = HSP x 0.5 [2.1(2)-20]

8.1.3 **BV-1/2 Monitor Alarm Setpoint Determination**

See Section 8.1.1 for a description of Monitor Alarm Setpoint Determination.

8.1.3.1 **BV-1/2 Setpoint Determination Based On A Calculated Mix For PV-1/2 Elevated Releases**

The calculated monitor count rate above background (CR), in ncpm, the monitor HIGH-HIGH alarm setpoint above background (HHSP), and the monitor HIGH alarm setpoint above background (HSP) for each operational condition are shown in the following Table:

BV-1/2 ALARM SETPOINTS FOR ELEVATED RELEASES
cpm ABOVE BACKGROUND

	(P)PRIMARY* MONITOR (A)ALTERNATE MONITOR	CR	60% SITE LIMIT UPPER ALARM	30% SITE LIMIT LOWER ALARM
• Continuous Release	(P)RM-1GW-108B	3.49E7	3.60E5	1.20E5
	(A)RM-1GW-109(5)	2.61E7	3.60E5	1.20E5
• Batch Release Of BV-1 Decay Tanks or BV-2 Storage Tanks	(P)RM-1GW-108B	3.93E5	2.36E5	1.18E5
	(A)RM-1GW-109(5)	7.87E6	3.60E5	1.20E5

*IF the primary monitor is out of service, THEN ODCM CONTROL 3.3.3.10 is met for the respective alternate monitor. The alternate setpoints shall be utilized:

The setpoints were determined using a calculated mix from the FSAR and discharge flow rate of 1450 cfm for PV-1/2.

The calculational method below was used to derive the monitor setpoints for the following operational conditions:

- Continuous release via PV-1/2.
- Batch release of BV-1 or BV-2 Waste Gas Decay Tank via PV-1/2.
- Batch release of BV-1 or BV-2 Containment Purge via PV-1/2 is not shown in the above table. However, if it is necessary to perform a BV-1 or BV-2 Containment Purge via this release point, the alarm setpoint shall be calculated in accordance with Section 8.1.3.2.

8.1.3.1.1 **BV-1/2 Mix Radionuclides**

The "mix" (noble gas radionuclides and composition) of the gaseous effluent was determined as follows:

- The gaseous source terms that are representative of the "mix" of the gaseous effluent were evaluated. Gaseous source terms are the radioactivity of the noble gas radionuclides in the effluent. The gaseous source terms can be obtained from ATTACHMENT A Tables 2.1-1a. and 2.1-1b.
- The fraction of the total radioactivity in the gaseous effluent comprised by noble gas radionuclide "i" (Si) for each individual noble gas radionuclide in the gaseous effluent was calculated by:

$$S_i = \frac{A_i}{\sum_i A_i} \qquad [2.1\text{-}9]$$

where:

A_i = The total radioactivity or radioactivity concentration of noble gas radionuclide "i" in the gaseous effluent from ATTACHMENT A Table 2.1-1a and 2.1.1b.

8.1.3.1.2 **BV-1/2 Maximum Acceptable Release Rate (Whole Body Exposure)**

The maximum acceptable total release rate (uCi/sec) of all noble gas radionuclides in the gaseous effluent (Q_t) based upon the whole body exposure limit was determined by:

$$Q_t = \frac{500}{\sum_i V_i \, S_i} \qquad [2.1.10]$$

where:

V_i = The constant for noble gas radionuclide "i" accounting for the gamma radiation from the elevated finite plume (mrem/year/uCi/sec) from ATTACHMENT G Table 2.2-12.

S_i = From equation [2.1-9]

8.1.3.1.3 **BV-1/2 Maximum Acceptable Release Rate (Skin Exposure)**

Q_t was also determined based upon the skin exposure limit as follows:

$$Q_t = \frac{3000}{\sum_i [L_i (X/Q)_{pv} + 1.1B_i]S_i} \qquad [2.1\text{-}11]$$

where:

L_i = The skin dose factor due to beta emissions from noble gas radionuclide "i"(mrem/year/uCi/m^3) from ATTACHMENT G Table 2.2-11.

$(X/Q)_{pv}$ = The highest calculated annual average relative concentration of effluents releases via PV-1/2 for any area at or beyond the unrestricted area boundary for all sectors (sec/m^3) from ATTACHMENT F Table 2.2-6.

= 2.31E-6 sec/m^3 (0.5 – 1.0 miles)

$(X/q)_{pv}$ = The highest calculated short term relative concentration of effluents released via PV-1/2 for any area at or beyond the unrestricted area boundary for all sectors (sec/m^3) from ATTACHMENT N Table 2.3-38.

= 1.07E-5 sec/m^3 (0.5 – 1.0 miles)

B_i = The constant for long term releases (greater than 500 hrs/year) for noble gas radionuclide "i" accounting for the gamma radiation dose from the elevated finite plume (mrad/year/uCi/sec) from ATTACHMENT G Table 2.2-12.

8.1.3.1.4 **BV-1/2 Maximum Acceptable Release Rate (Individual Radionuclide)**

The maximum acceptable release rate (uCi/sec) of noble gas radionuclide "i" in the gaseous effluent (Q_i) for each individual noble gas radionuclide in the gaseous effluent was determined by:

$$Q_i = S_i\, Q_t \qquad [2.1\text{-}12]$$

NOTE: Use the lower of the Q_t values obtained in Section 8.1.3.1.2 and 8.1.3.1.3.

8.1.3.1.5 **BV-1/2 Maximum Acceptable Concentrations (Individual Radionuclide)**

The maximum acceptable radioactivity concentration (uCi/cc) of noble gas radionuclide "i" in the gaseous effluent (C_i) for each individual noble gas radionuclide in the gaseous effluent was determined by:

$$C_i = \frac{2.12E-3\ Q_i}{F} \quad [2.1\text{-}13]$$

where:

2.12E-3 = Unit conversion factor (60 sec/min x 3.53E-5 ft^3/cc).

F = The maximum acceptable effluent flow rate at the point of release (cfm) as listed in Section 8.1.3.1.

8.1.3.1.6 **BV-1/2 Monitor Count Rate**

The calculated monitor count rate (ncpm) above background attributed to the noble gas radionuclide. (CR) was determined by:

$$CR = \sum_i C_i E_i \quad [2.1\text{-}14]$$

where:

E_i = The detection efficiency of the monitor for noble gas radionuclide "i" (cpm/uCi/cc) from ATTACHMENT B Table 2.1-2a and 2.1-2b.

8.1.3.1.7 **BV-1/2 Monitor Setpoints**

The monitor alarm setpoints above background were determined as follows:

- The monitor HIGH-HIGH Alarm Setpoint above background (ncpm) was determined by:

  $$HHSP = 0.60 \times CR \quad [2.1\text{-}15]$$

- The monitor HIGH Alarm Setpoint above background (ncpm) was determined by:

  $$HSP = 0.30 \times CR \quad [2.1\text{-}16]$$

8.1.3.2 **BV-1/2 Setpoint Determination Based On Analysis Prior To Release For PV-1/2 Elevated Releases**

The following calculation method applies to gaseous releases via the PV-1/2 Gaseous Waste/Process Vent when the "calculated mix" does not provide adequate operational flexibility. This method is used to determine the setpoint for the maximum acceptable discharge flow rate and the associated HIGH-HIGH Alarm Setpoint based on this flow rate for the BV-1/2 Gaseous Waste Gas Monitor (RM-GW-108B) or alternate (RM-1GW-109 CH 5) during the following operational conditions:

- Continuous release via PV-1/2.
- Batch release of BV-1 or BV-2 Waste Gas Decay Tank via PV-1/2.
- Batch release of BV-1 or BV-2 Containment Purge via PV-1/2.

8.1.3.2.1 **BV-1/2 Maximum Acceptable Release Rate**

Determine the maximum acceptable discharge flow rate for the release from the Process Vent for the analyzed mix.

- The maximum acceptable gaseous discharge flow rate (f) from the Process Vent (cfm) based upon the whole body exposure limit is determined by:

$$f = \frac{1.06\,S}{\sum_i V_i\, C_i} \qquad [2.1\text{-}21]$$

where:

1.06 = 500 mrem/yr x 2.12E-3

500 mrem/yr = dose rate limit, whole body exposure

2.12E-3 = unit conversion factor
= (60 sec/min x 3.53E-5 ft^3/cc)

S = Percent of site dose rate released via this pathway. Up to 60% of the site dose rate is permissible for one release point under the alarm setpoint rules of Section 8.1.3.

V_i = The constant for noble gas radionuclide "i" accounting for the gamma radiation from the elevated plume (mrem/year/uCi/sec) from ATTACHMENT G Table 2.2-12.

C_i = The undiluted radioactivity concentration of noble gas radionuclide "i" in the gaseous source (uCi/cc) as determined by analysis of the gas to be released.

- Based upon the skin exposure limit, (f) is calculated by:

$$f = \frac{6.36\,S}{\sum_i [L_i\,(X/Q)_{pv} + 1.1B_i]\,C_i} \qquad [2.1\text{-}22]$$

where:

6.36 = 3000 mrem/yr x 2.12E-3

3000 mrem/yr = dose rate limit, skin exposure

2.12E-3 = unit conversion factor
= (60 sec/min x 3.53E-5 ft^3/cc)

L_i = The skin dose factor due to beta emissions from noble gas radionuclide "i" (mrem/year/uCi/m^3) from ATTACHMENT G Table 2.2-11.

$(X/Q)_{pv}$ = The highest calculated annual average relative concentration of effluents released via PV-1/2 for any area at or beyond the unrestricted area boundary for all sectors (sec/m^3) from ATTACHMENT F Table 2.2-6.

= 2.31E-6 sec/m^3

$(X/q)_{pv}$ = The highest calculated short term relative concentration of effluents released via PV-1/2 for any area at or beyond the unrestricted area boundary for all sectors (sec/m^3) from ATTACHMENT N Table 2.3-38.

= 1.07E-5 sec/m^3

B_i = The constant for long-term releases (greater than 500 hrs/year) for noble gas radionuclide "i" accounting for the gamma radiation from the elevated finite plume (mrad/year/uCi/sec) from ATTACHMENT G Table 2.2-12.

- Select the smaller of the calculated f values based on the whole body exposure limit and based on the skin exposure limit shown above. The actual discharge flow rate (cfm) must be maintained at or below this (f) value.

8.1.3.2.2 **BV-1/2 Monitor Setpoints**

The monitor alarm setpoints above background are determined as follows:

- The calculated monitor HIGH-HIGH Alarm Setpoint above background (ncpm) attributed to the noble gas radionuclides is determined by:

$$HHSP = \frac{f \sum_i C_i E_i}{F'} \qquad [2.1\text{-}23]$$

where:

f = The maximum acceptable gaseous discharge flow rate (cfm) determined in Section 8.1.3.2.1.

F′ = The maximum actual or design effluent flow rate (cfm) at the point of release.

= 1450 cfm for PV-1/2

C_i = The undiluted radioactivity of noble gas radionuclide "i" in the gaseous source (uCi/cc) as determined by analysis of the gas to be released.

E_i = The detection efficiency of the respective monitor (RM-1GW-108B) or (RM-1GW-109 CH 5) for noble gas radionuclide "i" (cpm/uCi/cc) from ATTACHMENT B Table 2.1-2a and 2.1-2b.

When a HIGH-HIGH Alarm Setpoint has been calculated according to this section the monitor HIGH Alarm setpoint above background (ncpm) is determined by:

$$HSP = HHSP \times 0.5 \qquad [2.1\text{-}24]$$

8.2 Compliance With 10 CFR 20 Dose Rate Limits (ODCM CONTROL 3.11.2.1)

8.2.1 Dose Rate Due To Noble Gases

The dose rate in unrestricted areas resulting from noble gas effluents from the site is limited to 500 mrem/yr to the total body and 3,000 mrem/yr to the skin. Site gaseous effluents are the total of BV-1 and BV-2 specific ground releases and a shared elevated release, the PV-1/2 Gaseous Waste/Process Vent. Based upon NUREG-0133 (3.1.3.1) the following equations are used to show compliance with ODCM CONTROL 3.11.2.1.a.

$$\sum_i \left[V_i Q_{is} + K_i \overline{(X/Q)}_v \, Q_{iv}\right] < 500 \text{ mrem/yr} \qquad [2.2\text{-}1]$$

$$\sum_i \left[[L_i \overline{(X/Q)}_s + 1.1 B_i]\, Q_{is} + [L_i + 1.1 M_i]\, \overline{(X/Q)}_v \, Q_{iv}\right] \leq 3000 \text{ mrem/yr} \qquad [2.2\text{-}2]$$

where:

K_i = The total body dose factor due to gamma emissions for each identified noble gas radionuclide "i", mrem/year/uCi/m^3.

L_i = The skin dose factor due to beta emissions for each identified noble gas radionuclide "i", mrem/year/uCi/m^3.

M_i = The air dose factor due to gamma emissions for each identified noble gas radionuclide "i", mrad/year/uCi/m^3.

V_i = The constant for each identified noble gas radionuclide "i" accounting for the gamma radiation from the elevated finite plume, mrem/year/uCi/sec.

B_i = The constant for long-term releases (greater than 500 hrs/year) for each identified noble gas radionuclide "i" accounting for the gamma radiation from the elevated finite plume, mrad/year/uCi/sec.

1.1 = The ratio of the tissue to air absorption coefficients over the energy range of the photon of interest, mrem/mrad.

Q_{is} = The release rate of noble gas radionuclide "i" in gaseous effluents from free-standing stack, uCi/sec.

Q_{iv} = The release rate of noble gas radionuclide "i" in gaseous effluents from all vent releases, uCi/sec.

$\overline{(X/Q)}_s$ = The highest calculated annual average relative concentration for any area at or beyond the unrestricted area boundary for elevated releases (sec/m^3).

$\overline{(X/Q)}_v$ = The highest calculated annual average relative concentration for any area at or beyond the unrestricted area boundary for elevated releases (sec/m^3).

At the Beaver Valley site gaseous releases may occur from the following Release Points (RP's) as shown in ATTACHMENT P Figure 2.4.2:

RP 1 & 4. The BV-1 Auxiliary Building Vent and the BV-2 SLCRS Unfiltered Pathway atop the Auxiliary Buildings (VV-1 and VV-2)

RP 2 & 5. The BV-1 Rx Containment/SLCRS Vent and the BV-2 SLCRS Filtered Pathway atop the Containment Domes (CV-1 and CV-2)

RP 3. The BV-1/2 Gaseous Waste/Process Vent atop the BV-1 Cooling Tower (PV-1/2)

RP 6. The BV-2 Condensate Polishing Building Vent (CB-2)

RP 7. The BV-2 Waste Gas Storage Vault Vent (WV-2)

RP 8. The BV-2 Decontamination Building Vent (DV-2)

RP 9. The BV-2 Turbine Building Vent (TV-2)

- The effluents from Release Point 1 & 4 are ground level in nature. At BV-1 the sources of these releases are Containment Purges and normal Auxiliary Building Ventilation. At BV-2 the sources of these releases are Containment Purges and Contiguous Area ventilation.

- Effluent from the Release Point 2 & 5 are assumed ground level in nature. At BV-1 the source of these releases is the Supplementary Leak Collection and Release System (SLCRS). At BV-2 the source of these releases is normal Auxiliary Building Ventilation. It is also possible to release Containment Purges from these vents.

- Release Points 6, 7, 8 and 9 are not normally radioactive release points.

- The effluent from Release Point 3 are elevated, and the sources of these releases are the Main Condenser Air Ejectors, the Waste Gas Decay Tanks and the Containment Vacuum Pumps.

Noble gas releases may normally occur from Release Points 1 through 5 above. To show compliance with the site limits of ODCM CONTROL 3.11.2.1.a, Equations [2.2-1] and [2.2-2] are expressed in terms of the actual release points for the site. Note that the expressions for release points 6, 7, 8 and 9 are included for use if radioactive releases via these release points are identified in the future.

8.2.1.1 **Total Body Dose Rate (All Release Points)**

$$\sum_i V_i Q_{i_{pv}} + \Sigma_i K_i [(\overline{X/Q})_{cv} Q_{i_{cv1}} + (\overline{X/Q})_{vv} Q_{i_{vv1}} + (\overline{X/Q})_{cv} Q_{i_{cv2}} + (\overline{X/Q})_{vv} Q_{i_{vv2}} + (\overline{X/Q})_{tv} Q_{i_{tv2}} + (\overline{X/Q})_{cb} Q_{i_{cb2}} + (\overline{X/Q})_{dv} Q_{i_{dv2}} + (\overline{X/Q})_{wv} Q_{i_{wv2}}]$$

$$\leq 500 \text{ mrem/yr} \qquad [2.2\text{-}3]$$

8.2.1.2 **Skin Dose Rate (All Release Points)**

$$\sum_i \left[L_i (\overline{X/Q})_{pv} + 1.1 B_i\right] Q_{i_{pv}} + \sum_i \left[L_i + 1.1 M_i\right] [(\overline{X/Q})_{cv} Q_{i_{cv2}} + (\overline{X/Q})_{vv} Q_{i_{vv1}} + (\overline{X/Q})_{cv} Q_{i_{cv2}} + (X/Q)_{vv} Q_{i_{vv2}} + (\overline{X/Q})_{tv} Q_{i_{tv2}} + (\overline{X/Q})_{cb} Q_{i_{cb2}} + (\overline{X/Q})_{dv} Q_{i_{dv2}} + (\overline{X/Q})_{wv} Q_{i_{wv2}}] \leq 3000 \text{ mrem/yr} \qquad [2.2\text{-}4]$$

where:

$Q_{i_{pv}}$ = Release rate of radionuclide "i" from the PV-1/2, uCi/sec.

$Q_{i_{cv1}}$ = Release rate of radionuclide "i" from CV-1, uCi/sec.

$Q_{i_{cv2}}$ = Release rate of radionuclide "i" from CV-2, uCi/sec.

$Q_{i_{vv1}}$ = Release rate of radionuclide "i" from VV-1 Auxiliary Building, uCi/sec.

$Q_{i_{vv2}}$ = Release rate of radionuclide "i" from VV-2, uCi/sec.

$Q_{i_{tv2}}$ = Release rate of radionuclide "i" from TV-2, uCi/sec.

$Q_{i_{cb}}$ = Release rate of radionuclide "i" from CB-2, uCi/sec.

$Q_{i_{dv2}}$ = Release rate of radionuclide "i" from DV-2, uCi/sec.

$Q_{i_{wv2}}$ = Release rate of radionuclide "i" from WV-2, uCi/sec.

$(\overline{X/Q})_{pv}$ = Highest calculated annual average relative concentration for releases from the PV-1/2, sec/m^3.

$(\overline{X/Q})_{cv}$ = Highest calculated annual average relative concentration for releases from CV-1 and CV-2, sec/m^3.

$(\overline{X/Q})_{vv}$ = Highest calculated annual average relative concentration for releases from VV-1 and VV-2, sec/m^3.

$(\overline{X/Q})_{tv}$ = Highest calculated annual average relative concentration for releases for TV-2, sec/m^3.

$(\overline{X/Q})_{cb}$ = Highest calculated annual average relative concentration for releases for CB-2, sec/m^3.

$(\overline{X/Q})_{dv}$ = Highest calculated annual average relative concentration for releases for DV-2, sec/m^3.

$(\overline{X/Q})_{wv}$ = Highest calculated annual average relative concentration for releases for WV-2, sec/m^3.

The release rate for a containment purge is based on an averaged release rate in uCi/sec for the entire purge (not to exceed 960 min in accordance with ODCM CONTROL 3.11.2.1).

All other terms remain the same as those defined previously.

For the site, 4 potential modes of release are possible. The release modes identify the various combinations of sources of radioactivity and their release points which are used to determine the controlling locations. They are presented in ATTACHMENT C Table 2.2-1. For Release Modes 1, 2, and 3, the controlling location for implementation of ODCM CONTROL 3.11.2.1.a is 0.35 miles NW. Inserting the appropriate X/Q's from ATTACHMENT F Tables 2.2-4 through 2.2-10 for this location, Equations [2.2-3] and [2.2-4] become:

8.2.1.3 **Total Body Dose Rate (at 0.35 Miles NW)**

$$\sum_i V_i Q_{i_{pv}} + \sum_i K_i\,[9.24E-5\,Q_{i_{cv^1}} + 1.03E-4\,Q_{i_{vv^1}} + 9.24E-5\,Q_{i_{cv^2}} + 1.03E-4\,Q_{i_{vv^2}} + 7.35E-5\,Q_{i_{tv^2}} + 9.24E-5\,Q_{i_{dv^2}} + 9.24E-5\,Q_{i_{wv^2}} + 7.35E-5\,Q_{i_{cb^2}}\,] \le 500\text{mrem/yr} \qquad [2.2\text{-}5]$$

8.2.1.4 **Skin Dose Rate (at 0.35 Miles NW)**

$$\sum_i [7.0E-10\,L_i + 1.1B_i]\,Q_{i_{pv}}\ \sum_i [L_i + 1.1M_i] + 9.24E-5\,Q_{i_{cv^1}} + 1.03E-4\,Q_{i_{vv^1}} + 9.24E-5\,Q_{i_{cv^2}} + 1.03E-4\,Q_{i_{vv^2}} + 7.35E-5\,Q_{i_{tv^2}} + 9.24E-5\,Q_{i_{dv^2}} + 9.24E-5\,Q_{i_{wv^2}} + 7.35E-5\,Q_{i_{cb^2}}\,] \le 3000\text{ mrem/yr} \qquad [2.2\text{-}6]$$

For Release Mode 4, the controlling location is 0.75 miles N. Inserting the appropriate X/Q's from ATTACHMENT F Tables 2.2-4 through 2.2-10 for this location, Equations [2.2-3 and 2.2-4] become:

8.2.1.5 **Total Body Dose Rate (at 0.75 Miles N)**

$$\sum_i V_i\,Q_{i_{pv}} + \sum_i K_i\,[3.95E-6\,Q_{i_{cv^1}} + 4.99E-6\,Q_{i_{vv^1}} + 3.95E-6\,Q_{i_{cv^2}} + 4.99E-6\,Q_{i_{vv^2}} + 4.26E-6\,Q_{i_{tv^2}} + 3.95E-6\,Q_{i_{dv^2}} + 3.95E-6\,Q_{i_{wv^2}} + 4.26E-6\,Q_{i_{cb^2}}\,] \le 500\text{ mrem/yr} \qquad [2.2\text{-}7]$$

8.2.1.6 **Skin Dose Rate (at 0.75 Miles N)**

$$\sum_i \left[2.31E-6\,L_i + 1.1B_i\right]Q_{i_{pv}} + \sum_i \left[L_i + 1.1M_i\right][3.95E-6\,Q_{i_{cv^1}} + 4.99E-6\,Q_{i_{vv^1}} + 3.95E-6\,Q_{i_{cv^2}} + 4.99E-6\,Q_{i_{vv^2}} + 4.26E-6\,Q_{i_{tv^2}} + 3.95E-6\,Q_{i_{dv}} + 3.95E-6\,Q_{i_{wv}} + 4.26E-6\,Q_{i_{cb}}\,] \le 3000\text{ mrem/yr} \qquad [2.2\text{-}8]$$

8.2.1.7 **Determination of Controlling Location**

The determination of controlling location for implementation of ODCM CONTROL 3.11.2.1.a for noble gases is a function of the following parameters:

- Radionuclide mix and their isotopic release rate
- Release Mode
- Meteorology

The incorporation of these 3 parameters into Equations [2.2-3] and [2.2-4] resulted in the equations for the controlling locations as presented in Equations [2.2-5 through 2.2-8].

The radionuclide mix used to determine controlling locations was based on source terms calculated with the Stone and Webster Engineering Corporation computer code GAS1BB (similar to NUREG-0017.[3.1.3.4]) Inputs were based on operating modes of the respective plants. The code inputs utilized are presented in 1/2-ODC-3.01. The source term is presented in ATTACHMENT D Tables 2.2-2a and 2.2-2b as a function of release type and Release Point.

The X/Q values utilized in the equations for implementation of ODCM CONTROL 3.11.2.1.a are based upon the maximum long-term annual average X/Q in the unrestricted area. ATTACHMENT E Table 2.2-3 presents the distances from the Release Points to the nearest unrestricted area for each of the 16 sectors as well as to the nearest vegetable garden, cow, goat, and beef animal. ATTACHMENT F Tables 2.2-4 through 2.2-10 present the long-term annual average (X/Q) values for all Release Points to the special locations presented in ATTACHMENT E Table 2.2-3. A description of their derivation is provided in 1/2-ODC-3.01.

For Release Modes 1, 2, and 3, dose calculations were performed using the highest calculated site boundary X/Q values applicable to the release points involved and the projected radionuclide mix applicable to the release source. In that a simultaneous, continuous elevated release could contribute to the dose at a given location, the selection of the two highest sector X/Q values at the site boundary considered this contribution. From these results, the distance and sector associated with the highest calculated site boundary dose were selected as the controlling location.

For Release Modes 1, 2, and 3 the controlling location is 0.35 miles NW. In Release Mode 1, the dominant release is via VV-1 and CV-2. In Release Modes 2 and 3, the dominant release is a Containment Purge from the VV-1 or VV-2.

For Release Mode 4, a similar evaluation was performed. Long-term annual average X/Q values were calculated at the mid-point of the 10 standard distances listed in ATTACHMENT F Table 2.2-4 through 2.2-10. In that a simultaneous, ground level release could contribute to the dose at a given location, the selection of the two highest X/Q values at the controlling distance considered this contribution. Since the two maximum X/Q values occurred in the 0.5 - 1.0 mile radial band, the controlling distance was selected at 0.75 miles. From the calculated dose results, the controlling sector was shown to be North. In this Release Mode, the dominant release is a Containment Purge via the PV-1/2 Gaseous Waste/Process Vent. Neither of the controlling receptor locations are presently inhabited.

Values for K_i, L_i, and M_i, which were used in the determination of the controlling receptor location and which are to be used in Equations [2.2-5] through [2.2-8] to show compliance with ODCM CONTROL 3.11.2.1.2, are presented in Table 2.2-11. Values taken from Table B-1 of NRC Regulatory Guide 1.109, Revision 1,[3.1.3.5] were multiplied by 1E6 to convert picocuries to microcuries for use in ATTACHMENT G Table 2.2-11.

Values for V_i and B_i for the finite plume model can be expressed as shown in Equation [2.2-9] and [2.2-10]. Values were calculated using the NRC code RABFIN at the site boundary location which would receive the highest total dose from all Release Points. These values are presented in ATTACHMENT G Table 2.2-12 and calculated from the following equation:

$$B_i = \frac{K}{r_d} \sum_j \sum_k \sum_l \frac{f_{jk}\, A_{li}\, u_a\, E_l\, I}{u_j} \qquad [2.2\text{-}9]$$

where:

I = The results of numerical integration over the plume spatial distribution of the airborne activity as defined by the meteorological condition of wind speed (u_j) and atmospheric stability class "k" for a particular wind direction.

K = A numerical constant representing unit conversions.

$$= \frac{(260\ \text{mrad})(\text{radians})\ (\text{m}^3)\ (\text{transformation})}{(\text{sec})(\text{Mev})(\text{Ci})} \left[\frac{16\ \text{sectors}}{2\pi\ \ \text{radians}}\right]$$

$$\left[1\text{E}-6\,\frac{\text{Ci}}{\text{uCi}}\right]\left[3.15\text{E}7\,\frac{\text{sec}}{\text{yr}}\right]$$

= 2.1E4 mrad (m^3) (transformation)/yr(Mev)(uCi).

r_d = The distance from the release point to the receptor location, meters.

u_j = The mean wind speed assigned to the "j" th wind speed class, meters/sec.

f_{jk} = The joint frequency of occurrence of the "j" th wind speed class and kth stability class (dimensionless).

A_{li} = The number of photons of energy corresponding to the "l" th energy group emitted per transformation of the "i" th radionuclide, number/transformation.

E_l = The energy assigned to the "l" th energy group, Mev.

u_a = The energy absorption coefficient in air for photon energy H_l, meters $^{-1}$.

The V_i factor is computed with conversion from air dose to tissue depth dose, thus:

$$V_i = 1.1 \frac{K}{r_d} \sum_j \sum_k \sum_l \frac{f_{jk} A_{li} u_a E_l I_e - u_T T_d}{u_j} \qquad [2.2\text{-}10]$$

where:

u_T = The tissue energy absorption coefficient for photons of energy E_l, cm^2/gm.

T_d = The tissue density thickness taken to represent the total body dose ($5 gm/cm^2$).

1.1 = The ratio of the tissue to air absorption coefficients over the energy range of photons of interest, mrem/mrad.

8.2.2 **Dose Rate Due To Radioiodines And Particulates**

The dose rate in unrestricted areas resulting from the of inhalation of I-131, tritium, and all radionuclides in particulate form (excluding C-14) with half lives greater than 8 days released in gaseous effluents from the site shall be limited to 1,500 mrem/yr to any organ. Based upon NUREG-0133,[3.1.3.1] the following basic equation is used to show compliance with ODCM CONTROL 3.11.2.1.b:

$$\sum_i P_{i\tau} \left[\overline{(X/Q)}_s Q_{is} + \overline{(X/Q)}_v Q_{iv} \right] \leq 1{,}500 \text{ mrem/yr} \qquad [2.2\text{-}11]$$

where:

$P_{i\tau}$ = Dose parameter for any organ τ for each identified radionuclide "i", mrem/yr per uCi/m3.

Q_{is} = The release rate of radionuclide "i", in gaseous effluents from elevated releases, uCi/sec.

Q_{iv} = The release rate of radionuclide "i", in gaseous effluents from ground level releases, uCi/sec.

$\overline{(X/Q)}_s$ = The highest calculated annual average relative concentration at the unrestricted area boundary for elevated releases, sec/m^3.

$\overline{(X/Q)}_v$ = The highest calculated annual average relative concentration at the unrestricted area boundary for ground level releases, sec/m^3.

NOTE: The dispersion parameters specified in Section 8.2.2 are limited to the site boundary as defined above.

Releases may occur from any Release Point in the Release Modes listed in ATTACHMENT C Table 2.2-1. To show compliance with ODCM CONTROL 3.11.2.1.b, Equation [2.2-11] is now expressed in terms of the actual Release Points for the site.

$$\sum_i P_{i\tau}\,[\overline{(X/Q)}_{pv}\,Q_{i_{pv}} + \overline{(X/Q)}_{cv}\,Q_{i_{cv^1}} + \overline{(X/Q)}_{vv}\,Q_{i_{vv^1}} + \overline{(X/Q)}_{cv}\,Q_{i_{cv^2}} + \overline{(X/Q)}_{vv}$$

$$\overline{(X/Q)}_{tv}\,Q_{i_{tv^2}} + \overline{(X/Q)}_{cb}\,Q_{i_{cb^2}} + \overline{(X/Q)}_{dv}\,Q_{i_{dv^2}} + \overline{(X/Q)}_{wv}\,Q_{i_{wv^2}}\,] \leq 1500 \text{ mrem/y}$$

[2.2-12]

where:

$\overline{(X/Q)}_{pv}$ = Highest calculated annual average relative concentration for releases from PV-1/2, sec/m^3.

$\overline{(X/Q)}_{cv}$ = Highest calculated annual average relative concentration for releases from CV-1 and CV-2, sec/m^3.

$\overline{(X/Q)}_{vv}$ = Highest calculated annual average relative concentration for releases from VV-1 and VV-2, sec/m^3.

$\overline{(X/Q)}_{tv}$ = Highest calculated annual average relative concentration for releases from TV-2, sec/m^3.

$\overline{(X/Q)}_{cb}$ = Highest calculated annual average relative concentration for releases from CB-2, sec/m^3.

$\overline{(X/Q)}_{dv}$ = Highest calculated annual average relative concentration for releases from DV-2, sec/m^3.

$\overline{(X/Q)}_{wv}$ = Highest calculated annual average relative concentration for release from WV-2, sec/m^3.

$Q_{i_{pv}}$ = Long-term release rate of radionuclide "i" from PV-1/2, uCi/sec.

$Q_{i_{cv1}}$ = Long-term release rate of radionuclide "i" from CV-1, uCi/sec.

$Q_{i_{cv2}}$ = Long-term release rate of radionuclide "i" from CV-2, uCi/sec.

$Q_{i_{vv1}}$ = Long-term release rate of radionuclide "i" from VV-1, uCi/sec.

$Q_{i_{vv2}}$ = Long-term release rate of radionuclide "i" from VV-2, uCi/sec.

$Q_{i_{tv2}}$ = Long-term release rate of radionuclide "i" from TV-2, uCi/sec.

$Q_{i_{cb2}}$ = Long-term release rate of radionuclide "i" from CB-2, uCi/sec.

$Q_{i_{dv2}}$ = Long-term release rate of radionuclide "i" from DV-2, uCi/sec.

$Q_{i_{wv2}}$ = Long-term release rate of radionuclide "i" from WV-2, uCi/sec.

All other terms are the same as those defined previously.

TV-2, CB-2, DV-2 and WV-2 are not normal radioactive Release Points. These Release Points are included only for use if radioactive releases via these vents are identified in the future. In the calculation to show compliance with ODCM CONTROL 3.11.2.1.b only the inhalation pathway is considered.

Values of the organ dose parameters, $P_{i\tau}$, were calculated using methodology given in NUREG-0133.[3.1.3.1] For the child age group, the following equation was used for all nuclides. The $P_{i\tau}$, values are presented in ATTACHMENT H Table 2.2-13.

$$P_{i\tau} = 3.79E9\ DFA_{i\tau} \qquad [2.2\text{-}13]$$

where:

3.7E9 = Breathing rate of child (3,700 m^3/yr) x unit conversion factor (1E6 pCi/uCi).

$DFA_{i\tau}$ = The organ inhalation dose factor for a child from Table 6 of NUREG-0172,[3.1.3.6] for organ τ, nuclide "i", in units of mrem/pCi.

For Release Modes 1 through 4, the controlling location is the site boundary, 0.35 miles NW.

Equation [2.2-12] becomes:

$$\sum_i P_{i\tau}\,[7.00E-10\,Q_{i_{pv}} + 9.24E-5\,Q_{i_{cv1}} + 1.03E-4\,Q_{i_{vv1}} + 7.35E-5\,Q_{i_{tv1}} + 9.24E-5\,Q_{i_{cv2}} + 1.03E-4\,Q_{i_{vv2}} + 7.35E-5\,Q_{i_{tv2}} + 7.35E-5\,Q_{i_{cb2}} + 9.24E-5\,Q_{i_{dv2}} + 9.24E-5\,Q_{i_{wv2}}] \le 1500\ \text{mrem/yr} \quad [2.2\text{-}14]$$

8.2.2.1 **Determination of Controlling Location**

The determination of the controlling location for implementation of ODCM CONTROL 3.11.2.1.b for radioiodines and particulates is a function of the same 3 parameters as for noble gases plus a fourth, the actual receptor pathways. The incorporation of these parameters into Equation [2.2-12] results in the respective equations for each Release Mode at the site boundary controlling locations. The radionuclide mix was again based upon the source terms presented in ATTACHMENT D Tables 2.2-2a and 2.2-2b as a function of release type and Release Point.

In the determination of the controlling site boundary for each Release Mode, the highest 2 site boundary X/Q values for each Release Point were utilized in conjunction with the radionuclide mix and the release rate for each Release Point to determine the controlling location.

The $P_{i\tau}$ values are presented in ATTACHMENT H Table 2.2-13.

The X/Q values in Equation [2.2-14] were obtained from ATTACHMENT F Tables 2.2-4 through 2.2-10.

A description of the derivation of the X/Q values is provided in 1/2-ODC-3.01.

8.3 Compliance With 10 CFR 50 Dose Limits (ODCM CONTROLS 3.11.2.2 And 3.11.2.3) (Gaseous)

At the Beaver Valley site all elevated gaseous releases are considered to originate from a shared radwaste system. The effluent from both units are mixed and discharged from a common Release Point, the PV-1/2 Gaseous Waste/Process Vent, at the top of the Unit 1 Cooling Tower. The resulting dose for the purpose of implementing 10 CFR 50 is normally apportioned equally to each unit. The only exception would be a Containment Purge via the Process Vent. The resulting dose shall be attributed to the contributing reactor unit. Since this operation is expected to be rare, equations are shown throughout this section with the apportionment set at 0.5.

8.3.1 Dose Due To Noble Gases

8.3.1.1 Cumulation Of Doses

Section II.B.1 of Appendix I of 10 CFR 50 (ODCM CONTROL 3.11.2.2) limits the releases of gaseous effluents from each reactor such that the estimated annual gamma air dose is limited to 10 millirad and the beta air dose is limited to 20 millirad. In addition, ODCM CONTROL 3.11.2.4 requires use of radwaste system if air doses when averaged over 31 days exceed 0.2 mrad for gamma and 0.4 mrad for beta. Based upon NUREG-0133,[3.1.3.1] the air dose limits in the unrestricted area due to noble gases released in gaseous effluents are defined by the following equations:

8.3.1.1.1 Gamma Radiation Quarter Limit

$$3.17E-8 \sum_i \left[M_i \left[\overline{(X/Q)}_v Q_{iv} + \overline{(X/q)}_v q_{iv}\right] + \left[B_i Q_{is} + b_i q_{is}\right]\right] \leq 5 \text{ mrad} \qquad [2.3\text{-}1]$$

8.3.1.1.2 Beta Radiation Quarter Limit

$$3.17E-8 \sum_i N_i \left[\overline{(X/Q)}_v Q_{iv} + \overline{(X/q)}_v q_{iv} + \overline{(X/Q)}_s Q_{is} + \overline{(X/q)}_s q_i s\right] \leq 10 \text{ mrad} \qquad [2.3\text{-}2]$$

8.3.1.1.3 Gamma Radiation Year Limit

$$3.17E-8 \sum_i [M_i[\overline{(X/Q)}_v Q_{iv} + \overline{(X/q)}_v q_{iv}] + [B_i Q_{is} + b_i q_{is}]] \leq 10 \text{ mrad}$$

8.3.1.1.4 Beta Radiation Year Limit

$$3.17E-8 \sum_i N_i \left[\overline{(X/Q)}_v Q_{iv} + \overline{(X/q)}_v q_{iv} + \overline{(X/Q)}_s Q_{is} + \overline{(X/q)}_s q_i s\right] \leq 20 \text{ mrad}$$

[2.3-4]

8.3.1.1.5 **Gamma Radiation Projection Averaged Over 31 Days**

$$3.17E-8 \sum_i \left[M_i \left[\overline{(X/Q)}_v Q_{iv} + \overline{(X/q)}_v q_{iv} \right] + \left[B_i Q_{is} + b_i q_{is} \right] \right] \leq 0.2 \text{ mrad} \quad [2.3\text{-}5]$$

8.3.1.1.6 **Beta Radiation Projection Averaged Over 31 Days**

$$3.17E-8 \sum_i N_i \left[\overline{(X/Q)}_v Q_{iv} + \overline{(X/q)}_v q_{iv} + \overline{(X/Q)}_s Q_{is} + \overline{(X/q)}_s q_i s \right] \leq 0.4 \text{ mrad} \quad [2.3\text{-}6]$$

where:

M_i = The air dose factor due to gamma emissions for each identified noble gas radionuclide "i" (mrad/yr per uCi/m^3).

N_i = The air dose factor due to beta emissions for each identified noble gas radionuclide "i" (mrad/yr per uCi/m^3).

$\overline{(X/Q)}_v$ = The annual average relative concentration for areas at or beyond the unrestricted area boundary for long-term vent releases greater than 500 hrs/year (sec/m^3).

$\overline{(X/q)}_v$ = The relative concentration for areas at or beyond the unrestricted area boundary for short-term vent releases equal to or less than 500 hrs/year (sec/m^3).

$\overline{(X/Q)}_s$ = The annual average relative concentration for areas at or beyond the unrestricted area boundary for long-term free standing stack releases greater than 500 hrs/year (sec/m^3).

$\overline{(X/q)}_s$ = The relative concentration for areas at or beyond the unrestricted area boundary for short-term free standing stack releases equal to or less than 500 hrs/year (sec/m^3).

q_{is} = Release of noble gas radionuclide "i" in gaseous effluents for short-term stack releases equal to or less than 500 hrs/year (uCi).

q_{iv} = Release of noble gas radionuclide "i" in gaseous effluents for short-term vent releases equal to or less than 500 hrs/year (uCi).

Q_{is} = Release of noble gas radionuclide "i" in gaseous effluents for long-term free standing stack releases greater than 500 hrs/year (uCi).

Q_{iv} = Release of noble gas radionuclide "i" in gaseous effluents for long-term vent releases greater than 500 hrs/year (uCi).

B_i = The constant for long-term releases (greater than 500 hrs/year) for each identified noble gas radionuclide "i" accounting for the gamma radiation from the elevated finite plume (mrad/yr per uCi/sec).

b_i = The constant for short-term releases (equal to or less than 500 hrs/year) for each identified noble gas radionuclide "i" accounting for the gamma radiation from the elevated finite plume (mrad/yr per uCi/sec).

3.17E-8 = The inverse of the number of seconds in a year.

NUREG 0133(3.1.3.1) permits eliminating the short-term release term and short-term meteorological terms in the determination of doses when short-term releases are sufficiently random in both time of day and duration to be represented by annual average dispersion conditions. This special consideration is applied in Equations [2.3-1] through [2.3-6], however, a summary of the "real time" meteorological data coupled with the corresponding releases shall be included in the Annual Radioactive Effluent Release Report.

Short-term releases are also evaluated annually in computer codes technically consistent with XOQDOQ and GASPAR for inclusion in the Annual Radiological Environmental Report.

The incorporation of this option and the Release Modes of ATTACHMENT I Table 2.3-1 results in the following equations to show compliance with 10 CFR 50 for the calendar quarter or year.

8.3.1.1.7 **Gamma Radiation Dose Equation**

$$3.17E-8 \sum_i [M_i\, [(\overline{X/Q})_{cv} Q_{i_{cv}} + (\overline{X/Q})_{vv} Q_{i_{vv}} + (\overline{X/Q})_{cb} Q_{i_{cb}} + (\overline{X/Q})_{dv} Q_{i_{dv}} + (\overline{X/Q})_{wv} Q_{i_{wv}}] + 0.5\, B_i Q_{i_{pv}}] \qquad [2.3\text{-}7]$$

$\leq$ 0.2 mrad (per 31 days), or
$\leq$ 5.0 mrad (per quarter), or
$\leq$ 10.0 mrad (per year)

8.3.1.1.8 **Beta Radiation Dose Equation**

$$3.17E-8 \sum_i N_i \, [(\overline{X/Q})_{cv} Q_{i_{cv}} + (\overline{X/Q})_{vv} Q_{i_{vv}} + (\overline{X/Q})_{cb} Q_{i_{cb}} + (\overline{X/Q})_{dv} Q_{i_{dv}} + (\overline{X/Q})_{wv} Q_{i_{wv}} + 0.5\,(\overline{X/Q})_{pv} Q_{i_{pv}}] \quad [2.3\text{-}8]$$

$\leq$ 0.4 mrad (per 31 days), or
$\leq$ 10.0 mrad (per quarter), or
$\leq$ 20.0 mrad (per year)

where:

$(\overline{X/Q})_{cv}$ = Annual average relative concentration for releases from CV-1 and CV-2 (sec/m^3).

$(\overline{X/Q})_{vv}$ = Annual average relative concentration for releases from VV-1 and VV-2 (sec/m^3).

$(\overline{X/Q})_{pv}$ = Annual average relative concentration for releases from PV-1/2 (sec/m^3).

$(\overline{X/Q})_{tv}$ = Annual average relative concentration for releases from TV-2 (sec/m^3).

$Q_{i_{cv}}$ = Release of radionuclide "i" from CV-1 and CV-2 (uCi).

$Q_{i_{vv}}$ = Release or radionuclide "i" from VV-1 and VV-2 (uCi).

$Q_{i_{pv}}$ = Release of radionuclide "i" from PV-1/2 (uCi).

$Q_{i_{tv}}$ = Release of radionuclide "i" from TV-2 (uCi).

$Q_{i_{cb}}$ = Release of radionuclide "i" from the CB-2 (uCi).

$Q_{i_{dv}}$ = Release of radionuclide "i" from DV-2 (uCi).

$Q_{i_{wv}}$ = Release of radionuclide "i" from WV-2 (uCi).

For Release Modes 1, 2, 3, and 4 the controlling location is 0.35 miles NW. Substitution of the appropriate X/Q values into Equations [2.3-7] and [2.3-8] results in the following:

8.3.1.1.9 **Gamma Radiation Dose Determination**

$$3.17E-8 \sum_i [M_i [9.24E-5\, Q_{i_{cv}} + 1.03E-4\, Q_{i_{vv}} + 7.35E-5\, Q_{i_{tv}} + 7.35E-5\, Q_{i_{cb}} + 9.24E-5\, Q_{i_{dv}} + 9.24E-5\, Q_{i_{wv}}] + 0.5\, B_i Q_{i_{pv}} \tag{2.3-9}$$

≤ 0.2 mrad (per 31 days), or
≤ 5.0 mrad (per quarter), or
≤ 10.0 mrad (per year)

8.3.1.1.10 **Beta Radiation Dose Determination**

$$3.17E-8 \sum_i N_i [9.24E-5\, Q_{i_{cv}} + 1.03E-4\, Q_{i_{vv}} + 7.35E-5\, Q_{i_{tv}} + 7.35E-5\, Q_{i_{cb}} + 9.24E-5\, Q_{i_{dv}} + 9.24E-5\, Q_{i_{wv}} + (0.5)\, 7.0E-10\, Q_{i_{pv}}] \tag{2.3-10}$$

≤ 0.4 mrad (per 31 days), or
≤ 10.0 mrad (per quarter), or
≤ 20.0 mrad (per year)

8.3.1.1.11 **Determination of Controlling Location**

The determination of the controlling locations for implementation of 10 CFR 50 is a function of the following parameters:

- Radionuclide mix and their isotopic release
- Release Mode
- Meteorology

The incorporation of these parameters into Equations [2.3-7] and [2.3-8] resulted in the equations for the controlling locations as presented in Equations [2.3-9] and [2.3-10]. The radionuclide mix was based upon source terms calculated using the NRC GALE Code (see 1/2-ODC-3.01 for inputs) and are shown in ATTACHMENT D Tables 2.2-2a and 2.2-2b as a function of release type and Release Point.

As in Section 8.2.1, for each Release Mode, the two highest boundary X/Q values for each release point and release duration were utilized in conjunction with the radionuclide mix and release for each release point to determine the controlling site boundary location. Since elevated releases occur from the BVPS site and their maximum X/Q values may not decrease with distance (i.e., the site boundary may not have highest X/Q values), the two highest X/Q values for those distances, greater than the site boundary, were also considered in conjunction with the radionuclide mix to determine the controlling location. These values of X/Q were obtained for the midpoint of the 10 standard distance intervals previously presented in ATTACHMENT F Tables 2.2-4 through 2.2-10.

For each Release Mode, a particular combination of Release Point mix and meteorology dominates in the determination of the controlling location. For Release Modes 1, 2, 3, and 4 the controlling release is VV-1 and VV-2. For Release Mode 3, the controlling release is CV-1 and CV-2.

Values for M_i and N_i, which were used in the determination of the controlling location and which are to be used by BV-1 and BV-2 in Equations [2.3-9] and [2.3-10] to show compliance with 10 CFR 50 were presented in ATTACHMENT G Table 2.2-11. Values taken from Table B-1 of Regulatory Guide 1.109, Revision 1[3.1.3.5] were multiplied by 1E6 to convert from picocuries to microcuries for use in ATTACHMENT G Table 2.2-11.

In determination of the controlling location for Release Modes 1, 2, 3, and 4, ATTACHMENT F Tables 2.2-4 through 2.2-7 are utilized for X/Q values. The B_i values to be utilized are the same values which were presented in ATTACHMENT G Table 2.2-12. A description of the derivation of the various X/Q values is presented in 1/2-ODC-3.01.

The following relationship must hold for BV-1 or BV-2 to show compliance with ODCM CONTROL 3.11.2.2:

<u>For The Calendar Quarter</u>

$D_\gamma \leq 5.0$ mrad [2.3-11]

$D_\beta \leq 10$ mrad [2.3-12]

<u>For The Calendar Year</u>

$D_\gamma \leq 10$ mrad [2.3-13]

$D_\beta \leq 20$ mrad [2.3-14]

where:

D_γ = The air dose from gamma radiation (mrad).

D_β = The air dose from beta radiation (mrad).

The quarterly limits given above represent one-half the annual design objective of Section II.B.1 of Appendix I of 10 CFR 50. If any of the limits of Equations [2.3-11] through [2.3-14] are exceeded, a special report pursuant to both Section IV.A of Appendix I of 10 CFR 50 and ODCM CONTROL 3.11.2.2.a must be filed with the NRC at the identified locations.

In addition, ODCM CONTROL 3.1.2.4 requires that the gaseous radwaste system must be used to reduce radioactive materials in that waste when projected doses from each reactor unit when averaged over 31 days exceed any of the following:

$$D_\gamma \leq 0.2 \text{ mrad} \qquad [2.3\text{-}15]$$

$$D_\beta \leq 0.4 \text{ mrad} \qquad [2.3\text{-}16]$$

8.3.1.2 **Projection Of Doses (Noble Gas)**

Doses due to gaseous releases from BV-1 and BV-2 shall be projected at least once per 31 days in accordance with ODCM CONTROL 4.11.2.4 and this section. (Also see Section 8.3.2.2 Projection Of Doses for additional specifications). The Gaseous Radwaste Treatment System and the Ventilation Exhaust Treatment System shall be used to reduce radioactive materials in gaseous waste prior to their discharge in accordance with ODCM CONTROL 3.11.2.4 when the projected gaseous effluent air dose due to gaseous effluent releases from each reactor unit, when averaged over 31 days, would exceed 0.2 mrad for gamma radiation and 0.4 mrad for beta radiation. (Also see Section 8.3.2.2 Projection Of Doses for additional specifications). The doses used in the 31-day dose projection will be calculated using Equations [2.3-9] and [2.3-10] as appropriate. The 31-day dose projection shall be performed according to the following equations:

8.3.1.2.1 **When Including Pre-Release Data,**

$$D_{31} = \left[\frac{A+B}{T}\right](31) + C \qquad [2.3\text{-}17]$$

8.3.1.2.2 **When Not Including Pre-Release Data,**

$$D_{31} = \left[\frac{A}{T}\right](31) + C \qquad [2.3\text{-}18]$$

where:

D_{31} = Projected 31 day dose (mrad).

A = Cumulative dose for quarter (mrad).

B = Projected dose from this release (mrad).

T = Current days into quarter.

C = Value which may be used to anticipate plant trends (mrad).

8.3.2 **Dose Due To Radioiodines And Particulates**

8.3.2.1 **Cumulation Of Doses**

Section II.C of Appendix I of 10 CFR 50 (ODCM CONTROLS 3.11.2.3 and 3.11.2.4) limits the release of radioiodines and radioactive material in particulate form from each reactor unit such that estimated dose or dose commitment to an individual in an unrestricted area from all pathways of exposure is not in excess of 15 mrem to any organ. In addition, ODCM CONTROL 3.11.2.4 requires the use of gaseous radwaste treatment system when the projected dose due to gaseous effluent releases from each reactor unit, when averaged over 31 days, would exceed 0.3 mrem to any organ. Based upon NUREG-0133,[3.1.3.1] the dose to an organ of an individual from radioiodines and particulates, and radionuclides other than noble gases with half-lives greater than 8 days in gaseous effluents released to unrestricted areas, can be determined by the following equation:

8.3.2.1.1 **Radioiodines and Particulates Month, Quarter, and Year Limits**

$$3.17E-8 \sum_i R_{i\tau} [W_s Q_{is} + w_s q_{is} + W_v Q_{iv} + w_v q_{iv}]$$

$$\begin{aligned} &\le 0.3 \text{ mrem (per 31 days), or} \qquad [2.3\text{-}19] \\ &\le 7.5 \text{ mrem (per quarter), or} \\ &\le 15.0 \text{ mrem (per calendar year)} \end{aligned}$$

where:

Q_{is} = Release of radionuclide "i" for long-term free standing stack releases greater than 500 hrs/yr (uCi).

Q_{iv} = Release of radionuclide "i" for long-term vent releases greater than 500 hrs/yr (uCi).

q_{is} = Release of radionuclide "i" for short-term free standing stack releases equal to or less than 500 hrs/yr (uCi).

q_{iv} = Release of radionuclide "i" for short-term vent releases equal to or less than 500 hrs/yr (uCi).

W_s = Dispersion parameter for estimating dose to an individual at the controlling location for long-term free standing stack releases greater than 500 hrs/yr.

= sec/m^3 for the inhalation pathway, $(\overline{W/Q})$s.

= meters^{-2} for the food and ground plane pathway, $(\overline{D/Q})$s.

W_v = The dispersion parameter for estimating the dose to an individual at the controlling location for long-term vent releases greater than 500 hrs/yr.

= sec/m^3 for the inhalation pathway, $(\overline{X/Q})_v$.

= meters^{-2} for the food and ground plane pathway, $(\overline{D/Q})_v$.

w_s = Dispersion parameter for estimating the dose to an individual at the controlling location for short-term stack releases equal to or less than 500 hrs/yr.

= sec/m^3 for the inhalation pathway, $(\overline{W/q})_s$.

= meters^{-2} for the food and ground plane pathway, $(\overline{D/q})_s$.

w_v = The dispersion parameter for estimating the dose to an individual at the controlling location for short-term vent releases equal to or less than 500 hrs/yr.

= sec/m^3 for the inhalation pathway, $(\overline{X/q})_v$.

= meters^{-2} for the food and ground plane pathway, $(\overline{D/q})_v$.

3.17E-8 = The inverse of the number of seconds in a year.

$R_{i\tau}$ = The dose factor for each identified radionuclide "i" for the organ "τ" of interest (mrem/yr per uCi/sec per m^{-2} or mrem/yr per uCi/m^3).

Radionuclides and particulates may be released from any of the BV-1 and BV-2 Release Points in the Release Modes identified in ATTACHMENT I Table 2.3-1. As described previously in Section 8.3.1.1, NUREG 0133[3.1.3.1] permits use of long-term annual average dispersion calculations (which with the release modes of Table 2.3-1 results in the following equations) to show compliance with ODCM CONTROLS 3.11.2.3 and 3.11.2.4. For a particular organ, Equation [2.3-19] becomes:

8.3.2.1.2 **Radioiodines and Particulates Dose Equation**

$$3.17E-8 \sum_i R_{i\tau} [0.5\, W_{pv} Q_{i_{pv}} + W_{cv} Q_{i_{cv}} + W_{vv} Q_{i_{vv}} + W_{tv} Q_{i_{tv}} + W_{cb} Q_{i_{cb}} + W_{dv} Q_{i_{dv}} + W_{wv} Q_{i_{wv}}] \quad [2.3\text{-}20]$$

$\leq$ 0.3 mrem (per 31 days), or
$\leq$ 7.5 mrem (per quarter), or
$\leq$ 15.0 mrem (per calendar year)

where:

$0.5\, W_{pv}$ = Dispersion parameter for releases from PV-1/2. The value of 0.5 represents the portion of dose assigned to each Unit due to this being a shared Release Point

W_{cv} = Dispersion parameter for releases from CV-1 and CV-2.

W_{vv} = Dispersion parameter for releases from VV-1 and VV-2.

W_{tv} = Dispersion parameter for releases from TV-2.

W_{cb} = Dispersion parameter for releases from CB-2.

W_{dv} = Dispersion parameter for releases from DV-2.

W_{wv} = Dispersion parameter for releases from WV-2.

$Q_{i_{pv}}$ = Release of radionuclide "i" from PV-1/2 (uCi).

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$Q_{i_{cv}}$ = Release of radionuclide "i" from CV-1 and CV-2 (uCi).

$Q_{i_{vv}}$ = Release of radionuclide "i" from VV-1 and VV-2 (uCi).

$Q_{i_{tv}}$ = Release of radionuclide "i" from TV-2 (uCi).

$Q_{i_{cb}}$ = Release of radionuclide "i" from CB-2 (uCi).

$Q_{i_{dv}}$ = Release of radionuclide "i" from DV-2 (uCi).

$Q_{i_{wv}}$ = Release of radionuclide "i" from WV-2 (uCi).

TV-2, CB-2, DV-2 and WV-2 are not normally radioactive Release Points. These are included only for use if a radioactive release is identified in the future.

In determining the dose at a particular location, dispersion parameter W is a function of the pathway. For the food and ground plane pathway, W is in terms of D/Q. If the inhalation pathway is considered, W is in terms of X/Q. Incorporation of the various pathways into Equation [2.3-20] results in the following equation for a particular organ:

8.3.2.1.2.1 **Radioiodines and Particulates Dose Determination**

$$3.17E-8\sum_i [[R_{i\tau_G} + R_{i\tau_M} + R_{i\tau_V} + R_{i\tau_B}][0.5\,W_{pv}Q_{i_{pv}} + W_{cv}Q_{i_{cv}} + W_{vv}Q_{i_{vv}} + W_{tv}Q_{i_{tv}} + W_{cb}Q_{i_{cb}} + W_{dv}Q_{i_{dv}} + W_{wv}Q_{i_{wv}}] + R_{i\tau_I}[0.5\,(X/Q)_{pv}Q_{i_{pv}} + (X/Q)_{cv}Q_{i_{cv}} + (X/Q)_{vv}Q_{i_{vv}} + (X/Q)_{tv}Q_{i_{tv}} + (X/Q)_{cb}Q_{i_{cb}} + (X/Q)_{dv}Q_{i_{dv}} + (X/Q)_{wv}Q_{i_{wv}}] \quad [2.3\text{-}21]$$

$\leq$ 0.3 mrem (per 31 days), or
$\leq$ 7.5 mrem (per quarter), or
$\leq$ 15.0 mrem (per year)

where:

$R_{i\tau_G}$ = Dose factor for an organ "τ" for radionuclide "i" for the ground plane exposure pathway (mrem/yr per uCi/sec per m^{-2}).

$R_{i\tau_M}$ = Dose factor for an organ "τ" for radionuclide "i" for either the cow milk or goat milk pathway (mrem/yr per uCi/sec per m^{-2}).

$R_{i\tau_V}$ = Dose factor for an organ "τ" for radionuclide "i" for the vegetable pathway (mrem/yr per uCi/sec per m^{-2}).

$R_{i\tau_B}$ = Dose factor for an organ "τ" for radionuclide "i" for the meat pathway (mrem/yr per uCi/sec per m^{-2}).

$R_{i\tau_I}$ = Dose factor for an organ "τ" for radionuclide "i" for the inhalation pathway (mrem/yr per uCi/m^3).

It should be noted that W_{pv}, W_{cv}, W_{vv}, W_{tv}, W_{cp}, W_{dv}, and W_{wv} in Equation [2.3-21] are in terms of D/Q(m^{-2}).

Values of the dose factor, $R_{i\tau}$, were calculated using the methodology of NUREG-0133.[3.1.3.1] The following equations were used for all nuclides except tritium:

8.3.2.1.2.2 **Dose Factors For Inhalation Pathway**

$$R_{i\tau_I} = K'(BR)_a(DFA_{i\tau})_a$$

$$= \text{mrem/yr per uCi/m}^3 \qquad [2.3\text{-}22]$$

where:

K' = A constant of unit conversion (1E6 pCi/uCi).

$(BR)_a$ = The breathing rate of the receptor of age group "a" (m^3/yr).

$(DFA_{i\tau})_a$ = Each organ inhalation dose factor for the receptor of age group "a" for the "i" th radionuclide (mrem/pCi). Inhalation dose factors ($DFA_{i\tau}$) by organ for the various age groups are given in Table E-7 through E-10 of Regulatory Guide 1.109, Rev. 1[3.1.3.5] or Tables 5 through 8 of NUREG-0172.[3.1.3.6]

The breathing rates (BR)a used for the various age groups are tabulated below, as given in Table E-5 of the Regulatory Guide 1.109.(3.1.3.5)

Age Group(a)	Breathing Rate (m^3/yr)
Infant	1400
Child	3700
Teen	8000
Adult	8000

8.3.2.1.2.3 **Dose Factors For Ground Plane Pathway**

$$R_{i\tau_G} = K'K''\,(SF)DFG_{i\tau}[(1 - e^{-\lambda_i t})/\lambda_i]$$

$$= m^2\text{-mrem/yr per uCi/sec} \qquad [2.3\text{-}23]$$

where:

K' = A constant of unit conversion (1E6 pCi/uCi).

K'' = A constant of unit conversion (8760 hr/year).

λi = The decay constant for the "i" th radionuclide (sec^{-1}).

t = The exposure time (4.73E8 sec or 15 years).

$DFG_{i\tau}$ = The groundplane dose conversion factor for organ "τ" for the "i" th radionuclide (mrem/hr per pCi/m^2). A tabulation of $DFG_{i\tau}$ values is presented in Table E-6 of Regulatory Guide 1.109.(3.1.3.5)

SF = The shielding factor (dimensionless). A shielding factor of 0.7 as suggested in Table E-15 of Regulatory Guide 1.109 is used.(3.1.3.5)

8.3.2.1.2.4 **Dose Factors For Cow Milk or Goat Milk Pathway**

$$R_{i\tau_M} = K'\frac{Q_F(U_{ap})}{\lambda_i + \lambda_w}F_m(r)(DFL_{i\tau})_a\left[\frac{f_p f_s}{Y_p} + \frac{(1 - f_p f_s)e^{-\lambda_i t_h}}{Y_s}\right]e^{-\lambda_i t_f}$$

$$= m^2\text{-mrem/yr per uCi/sec} \qquad [2.3\text{-}24]$$

where:

K' = A constant of unit conversion (1E6 pCi/uCi).

QF = The animal's consumption rate, wet weight (kg/day).

U_{ap} = The receptor's milk consumption rate, for age "a" (liters/yr).

Y_p = The agricultural productivity by unit area of pasture feed grass (kg/m2).

Y_S = The agricultural productivity by unit area of stored feed (kg/m2).

F_m = The stable element transfer coefficients (days/liter).

r = Fraction of deposited activity retained on animals feed grass.

$(DFL_{i\tau})_a$ = The maximum organ ingestion dose factor for the "i" th radionuclide for the receptor in age group "a" (mrem/pCi). Ingestion dose factors $(DFL_{i\tau})_a$ for the various age groups are given in Table E-11 through E-14 of Regulatory Guide 1.109[3.1.3.5] or Tables 1 through 4 of NUREG-0172.[3.1.3.6]

λ_i = The decay constant for the "i" th radionuclide (sec-1).

λ_w = The decay constant for removal of activity on leaf and plant surfaces by weathering 5.73E-7 sec^{-1} (corresponding to a 14 day half-life).

t_f = The transport time from pasture, to animal, to milk, to receptor (sec).

t_h = The transport time from pasture, to harvest, to animal, to milk, to receptor (sec).

f_p = Fraction of the year that the animal is on pasture (dimensionless).

f_s = Fraction of the animal feed that is pasture grass while the animal is on pasture (dimensionless).

Tabulated below are the parameter values used for cow's milk and their reference to Regulatory Guide 1.109.[3.1.3.5]

Parameter	Value	RG. 1.109 Table
r (dimensionless)	1.0 for radioiodine	E-15
	0.2 for particulates	E-15
F_m (days/liter)	each stable element	E-1 (cow milk)
		E-2 (goat milk)
U_{ap} (liters/yr) - infant	330	E-5
child	330	E-5
teen	400	E-5
adult	310	E-5
$(DLF_{i\tau})_a$ (mrem/pCi)	each radionuclide	E-11 to E-14
Y_p (kg/m^2)	0.7	E-15
Y_s (kg/m^2)	2.0	E-15
t_f (seconds)	1.73E5 (2 days)	E-15
t_h (seconds)	7.78E6 (90 days)	E-15
Q_F (kg/day)	50	E-3
f_p	0.5	--
f_s	1.0	--

For goat's milk, all values remain the same except for Q_F, which is 6 kg/day.

8.3.2.1.2.5 **Dose Factors For Meat Pathway**

$$R_{i\tau_B} = K' \frac{Q_F\left(U_{ap}\right)}{\lambda_i + \lambda_w} F_f\,(r)(DFL_{i\tau})_a \left[\frac{f_p f_s}{Y_p} + \frac{\left(1 - f_p f_s\right) e^{-\lambda_i t_h}}{Y_S}\right] e^{-\lambda_i t_f}$$

$= m^2$ -mrem/yr per uCi/sec [2.3-25]

where:

F_f = The stable element transfer coefficients (days/kg).

U_{ap} = The receptor's meat consumption rate for age "a" (kg/yr).

t_f = The average time from slaughter of meat animal to consumption (sec).

t_h = The transport time from crop field to receptor (sec).

All parameter values are the same as the milk pathway parameter values except F_f which is obtained from Table E-1. Parameter t_f is obtained from Table E-15, and U_{ap} is obtained from Table E-5. These values, as obtained from Regulatory Guide 1.109,[(3.1.3.5)] are as follows:

Parameter	Value	RG-1.109 Table
F_f (days/kg)	each stable element	E-1
t_f (seconds)	1.73E6 (20 days)	E-15
U_{ap} (kg/yr) - infant	0	E-5
Child	41	E-5
Teen	65	E-5
Adult	110	E-5

Man is considered to consume 2 types of vegetation (fresh and stored) that differ only in the time period between harvest and consumption; therefore:

8.3.2.1.2.6 **Dose Factors For Vegetation Pathway**

$$R_{i\tau_V} = K'\left[\frac{(r)}{Y_V(\lambda_i + \lambda_W)}\right](DFL_{i\tau})_a\left[U_a^L f_L e^{-\lambda_i t_L} + U_a^S f_g e^{-\lambda_i t_h}\right]$$

$$= m^2\text{-mrem/yr per uCi/sec} \qquad [2.3\text{-}26]$$

where:

K' = A constant of unit conversion (1E6 pCi/uCi).

U_a^L = The consumption rate of fresh leafy vegetation by the receptor in age group "a" (kg/yr).

U_a^S = The consumption rate of stored vegetation by the receptor in age group "a" (kg/yr).

f_L = The fraction of the annual intake of fresh leafy vegetation grown locally.

f_g = The fraction of the annual intake of stored vegetation grown locally.

t_L = The average time between harvest of leafy vegetation and its consumption (seconds).

t_h = The average time between harvest of stored vegetation and its consumption (seconds).

Y_v = The vegetation area density (kg/m^2).

all other factors are defined previously.

Tabulated below are the appropriate parameter values and their reference to Regulatory Guide 1.109.(3.1.3.5)

Parameter		Value	RG-1.109 Table
r (dimensionless)		1.0 for radioiodines	E-15
		0.2 for particulates	E-15
$(DFL_{i\tau})_a$ (mrem/pCi)		each stable element	E-11 to E-14
U_a^L (kg/yr) -	infant	0	E-5
	Child	26	E-5
	teen	42	E-5
	adult	64	E-5
U_a^S (kg/yr) -	infant	0	E-5
	child	520	E-5
	teen	630	E-5
	adult	520	E-5
f_L (dimensionless)		1.0	E-15
F_g (dimensionless)		0.76	E-15
t_L (seconds)		8.6E4 (1 day)	E-15
t_h (seconds)		5.18E6 (60 days)	E-15
Y_v (kg/m^2)		2.0	E-15

As discussed in Section 8.2.2 for tritium, the parameter W for the food pathway is based upon X/Q. The ground plane pathway is not appropriate for tritium. Therefore, the left-hand portion of Equation [2.3-20] may be expressed for purposes of implementation of 40 CFR 190, discussed in 1/2-ODC-2.04, as follows:

8.3.2.1.2.7 **Tritium Dose Equation**

$$3.17E-8\,(R_{T\tau_M} + R_{T\tau_V} + R_{T\tau_B} + R_{T\tau_I})\ [0.5\,(X/Q)_{pv} Q_{T_{pv}} + (X/Q)_{cv} Q_{T_{cv}} + (X/Q)_{vv} Q_{T_{vv}} + (X/Q)_{tv} Q_{T_{tv}} + (X/Q)_{cb} Q_{\tau_{cb}} + (X/Q)_{dv} Q_{\tau_{dv}} + (X/Q)_{wv} Q_{\tau_{wv}}]$$

[2.3-27]

where:

$R_{T\tau_M}$ = Dose factor for organ "τ" for tritium for the milk pathway (mrem/yr per uCi/m^3).

$R_{T\tau_V}$ = Dose factor for organ "τ" for tritium for the vegetable pathway (mrem/yr per uCi/m^3).

$R_{T\tau_B}$ = Dose factor for organ "τ" for tritium for the beef pathway (mrem/yr per uCi/m^3).

$R_{T\tau_I}$ = Dose factor for organ "τ" for tritium for the inhalation pathway (mrem/yr per uCi/m^3).

Equation [2.3-27] is used to show compliance with 40 CFR 190, as discussed in 1/2-ODC-2.04.

The concentration of tritium in milk is based on the airborne concentration rather than the deposition. Therefore, the $R_{T\tau_M}$ is based on [X/Q]:

8.3.2.1.2.8 **Tritium Dose Factors For Milk Pathway**

$$R_{T\tau_M} = K'K'' F_m Q_F U_{ap} (DLF_{i\tau})_a [0.75(0.5/H)]$$

$$= \text{mrem/yr per uCi/m}^3$$

[2.3-28]

where:

K" = A constant of unit conversion (1000 gm/kg).

H = Absolute humidity of the atmosphere (8 gm/m^3).

0.75 = The fraction of total feed that is water.

0.5 = The ratio of the specific activity of the feed grass water to the atmospheric water.

and other parameters and values are the same as for $R_{i\tau_M}$.

The concentration of tritium in vegetation is based on the airborne concentration rather than the deposition. Therefore, the $R_{\tau\tau_V}$ is based on [X/Q]:

8.3.2.1.2.9 **Tritium Dose Factors For Vegetation Pathway**

$$R_{T\tau_V} = K'K''\left[U_a^L f_L + U_a^S f_g\right]\left(DFL_{i\tau}\right)_a \,[0.75(0.5/H)]$$

$$= \text{mrem/yr per uCi/m}^3 \qquad [2.3\text{-}29]$$

where all terms have been defined above.

The concentration of tritium in meat is based on its airborne concentration rather than the deposition. Therefore, the $R_{T\tau_B}$ is based on [X/Q]:

8.3.2.1.2.10 **Tritium Dose Factors For Beef Pathway**

$$R_{T\tau_B} = K'K''F_f Q_F U_{ap}\left(DFL_{i\tau}\right)_a \,[0.75(0.5/H)]$$

$$= \text{mrem/yr per uCi/m}^3 \qquad [2.3\text{-}30]$$

where all terms have been defined above.

To show compliance with ODCM CONTROLS 3.11.2.3 and 3.11.2.4, Equation [2.3-21] is evaluated at the controlling pathway location. For Release Modes 1 through 4, the controlling location is a residence 0.89 miles in the NW sector. Inserting appropriate X/Q values from ATTACHMENT F Tables 2.2-4 to 2.2-10 and D/Q values from ATTACHMENT L Tables 2.3-28 to 2.3-34, Equation [2.3-21] becomes:

8.3.2.1.3 **Radioiodines and Particulates Dose Determination**

$$3.17E-8\,\Sigma_i\,[[R_{i\tau_G} + R_{i\tau_V}][(0.5)4.22E-10\,Q_{i_{pv}} + 1.56E-8\,Q_{cv} + 1.56E-8\,Q_{i_{vv}} + 1.55E-8\,Q_{i_{tv}} + 1.55E-8\,Q_{i_{cb}} + 1.56E-8\,Q_{i_{dv}} + 1.56E-8\,Q_{i_{wv}}] + R_{i\tau_I}\,[(0.5)\,7.30E-9\,Q_{i_{pv}} + 2.00E-5\,Q_{i_{cv}} + 2.71E-5\,Q_{i_{vv}} + 2.22E-5\,Q_{i_{tv}} + 2.22E-5\,Q_{i_{cb}} + 2.00E-5\,Q_{i_{dv}} + 2.00E-5\,Q_{i_{wv}}]$$

$\leq$ 0.3 mrem (per 31 days), or [2.3-31]
$\leq$ 7.5 mrem (per quarter), or
$\leq$15.0 mrem (per year)

For tritium, for purposes of implementation of 40 CFR 190, as discussed in 1/2-ODC-2.04, Equation [2.3-28] reduces to:

$$3.17E-8\,[R_{T\tau_V} + R_{T\tau_I}]\,[(0.5)7.30E-9\,Q_{i_{pv}} + 2.00E-5\,Q_{i_{cv}} + 2.71E-5Q_{i_{vv}} + 2.22E-5\,Q_{i_{tv}} + 2.22E-5\,Q_{i_{cb}} + 2.00E-5Q_{i_{dv}} + 2.00E-5\,Q_{i_{wv}}] \quad [2.3\text{-}32]$$

8.3.2.1.4 **Determination of Controlling Location**

The determination of a controlling locating for implementation of ODCM CONTROLS 3.11.2.3 and 3.11.2.4 for radioiodines and particulates is a function of:

- Radionuclide mix and their isotopic release
- Release Mode
- Meteorology
- Exposure pathway
- Receptor's age

The incorporation of these parameters into Equation [2.3-19] results in the respective equations for each Release Mode at the controlling location.

In determination of the controlling location for each Release Mode, the radionuclide mix of radioiodines and particulates was based upon the source terms calculated using the GALE code. This mix was presented in ATTACHMENT D Tables 2.2-2a and 2.2-2b as a function of Release Mode and Release Point. For the ground plane exposure pathway, all radionculides (excluding H-3 and C-14) were considered in determination of the controlling location. For the inhalation and food pathways H-3 and C-14 were also considered in determination of the controlling location.

In determination of the controlling location for each Release Mode, all of the exposure pathways, as presented in ATTACHMENT E Table 2.2-3, were evaluated. These include cow milk, goat milk, beef and vegetable ingestion and inhalation and ground plane exposure. An infant was assumed to be present at all milk pathway locations. A child was assumed to be present at all vegetable garden and beef animal locations. The ground plane and inhalation exposure pathways were considered to be present at all locations.

For determination of the controlling location, the highest D/Q and X/Q values for each Release Point and Release Mode for the vegetable garden, cow milk, and goat milk pathways were selected. The organ dose was calculated at each of these locations using the radionuclide mix and Release Points of ATTACHMENT D Tables 2.2-2a and 2.2-2b Based upon these calculations, it was determined that the controlling location for Release Modes 1 through 4 is the residence (vegetable garden)/child pathway.

For Release Modes 1 through 4, the controlling Release Point and mix is VV-1 and VV-2.

ATTACHMENT J Tables 2.3-2 through 2.3-20 present Ri values for the total body, GI-LLI, bone, liver, kidney, thyroid, and lung organs for the ground plane, inhalation, cow milk, goat milk, vegetable, and meat ingestion pathways for the infant, child, teen, and adult age groups as appropriate to the pathways. These values were calculated using the methodology described in NUREG-0133[3.1.3.1] using a grazing period of 6 months.

In determination of the controlling location for Release Modes 1-4, ATTACHMENT F Tables 2.2-4 through 2.2-10 are utilized for X/Q's, and ATTACHMENT L Tables 2.3-28 through 2.3-34 are utilized for long term D/Q values. A description of the derivation of the various X/Q and D/Q values is presented in 1/2-ODC-3.01.

Long-term D/Q values for PV-1/2, CV-1, CV-2, VV-1, VV-2, TV-2, CB-2, DV-2 AND WV-2 are provided for the midpoints of the following distances:

0.0-0.5 mi., 0.5-1.0 mi., 1.0-1.5 mi., 1.5-2.0 mi., 2.0-2.5 mi.,
2.5-3.0 mi., 3.0-3.5 mi., 3.5-4.0 mi., 4.0-4.5 mi., 4.5-5.0 mi.

The values appear in ATTACHMENT K Tables 2.3-21 through 2.3-27. These values may be utilized if an additional special location arises different from those presented in the special locations of ATTACHMENT E Table 2.2-3.

The following relationship must hold for BV-1 or BV-2 to show compliance with ODCM CONTROL 3.11.2.3.

<u>For The Calendar Quarter:</u>

$D_\tau \leq 7.5$ mrem to any organ [2.3-33]

<u>For The Calendar Year:</u>

$D_\tau \leq 15$ mrem to any organ [2.3-34]

where:

D_τ = The dose to any organ from radioiodines and particulates (mrem).

The quarterly limits given above represent one-half the annual design objective of Section II.C of Appendix I of 10 CFR 50. If any of the limits of Equations [2.3-33] and [2.3-34] are exceeded, a Special Report pursuant to both Section IV.A of Appendix I of 10 CFR 50 and ODCM CONTROL 3.11.2.3.a must be filed with the NRC at the identified locations.

8.3.2.2 **Projection Of Doses (Radioiodines And Particulates)**

Doses due to gaseous releases from BV-1 or BV-2 shall be projected at least once per 31 days in accordance with ODCM CONTROL 4.11.2.4 and this section. (Also see Section 8.3.1.2, Projection Of Doses for additional specifications). The appropriate portions of the Ventilation Exhaust Treatment System shall be used to reduce radioactive materials in gaseous waste prior to their discharge in accordance with ODCM CONTROL 3.11.2.4 when the projected doses due to gaseous effluent releases from each reactor unit, when averaged over 31 days, would exceed 0.3 mrem to any organ. (Also see Section 8.3.1.2, Projection Of Doses for additional specifications). Doses resulting from the gaseous effluent release of radioiodines and particulates will be calculated for use in the 31-day dose projection using Equation [2.3-31]. The 31-day dose projection shall be performed according to the following equations:

8.3.2.2.1 **When Including Pre-Release Data,**

$$D_{31} = \left[\frac{A+B}{T}\right](31) + C \qquad [2.3\text{-}35]$$

8.3.2.2.2 **When Not Including Pre-Release Data,**

$$D_{31} = \left[\frac{A}{T}\right](31) + C \qquad [2.3\text{-}36]$$

where:

D_{31} = Projected 31 day dose (mrem).

A = Cumulative dose for quarter (mrem).

B = Projected dose for this release (mrem).

T = Current days into quarter.

C = Value which may be used to anticipate plant trends (mrem).

8.4 Gaseous Radwaste System

The gaseous radwaste system has the capability to control, collect, process, store, recycle, and dispose of gaseous radioactive waste generated as a result of plant operations, including anticipated operational occurrences.

A simplified flow diagram of the gaseous radwaste system for BV-1 and BV-2 is provided as ATTACHMENT N Figure 2.4-1. A diagram showing the gaseous effluent Release Points is provided as ATTACHMENT P Figure 2.4-2. Since the concept of a shared gaseous radwaste system is used, then gaseous waste generated can be stored, processed, and discharged from either BV-1 or BV-2.

8.4.1 BV-1 Gaseous Radwaste System Components

8.4.1.1 BR-1EV-2A/2B: Degasifiers

There are two Degasifiers. They are designed to continuously process reactor coolant letdown for reducing entrained noble gases in the liquid.

8.4.1.2 GW-1E-1A/1B: Waste Gas Chillers

There are two Chillers. Non-condensable gases from the degasifiers are directed by system pressure to the Waste Gas Chillers.

8.4.1.3 GW-1TK-3A thru 3D: Gaseous Waste Charcoal Delay Beds

There are four Charcoal Beds. The dry effluent from the Chillers is directed to the Waste Gas Charcoal Delay Beds for holdup of xenon and krypton and adsorption of radioiodines. When four beds are operated in series, they provide a holdup of xenon isotopes for about 30 days.

8.4.1.4 GW-1FL-5A/5B: Overhead Gas Compressor Prefilters

There are two Prefilters. The gaseous effluent (primarily hydrogen) is directed from the Gaseous Waste Charcoal Delay Beds to one of the Overhead Gas Compressor Prefilters. The filters remove carbon solids from the gas stream.

8.4.1.5 GW-1C-1A/1B: Gas Compressors

There are two Compressors. The waste gas enters one of the compressors after passing through the Prefilters.

8.4.1.6 GW-1TK-2: Gaseous Waste Surge Tank

There is one Surge Tank. It has a capacity of 52 cuft. After compression to about 65 psig, the waste gas is sent to the Surge Tank. This can be done automatically or manually.

8.4.1.7 GW-1TK-1A thru 1C: Waste Gas Decay Tanks

There are three Decay Tanks. Each has a capacity of 132 cuft. The contents of the Surge Tank is transferred to the Decay Tanks for storage and decay. After 30 days of storage, all xenon and iodine should have decayed, and the resulting predominant nuclide should be krypton 85.

8.4.1.8 RM-1GW-108 And RM-1GW-109: Gaseous Effluent Radiation Monitors

There are redundant Radiation Monitors on the combined PV-1/2 Gaseous Waste/Process Vent release path. These Radiation Monitors continuously analyze gaseous waste as it is being discharged. Gaseous Monitor RM-1GW-108B is an off-line gamma scintillator, while RM-1GW-109 Channel 5 is an off-line beta scintillator. The upper activity alarm on the gaseous Channels of these Radiation Monitors have setpoints that would indicate we are approaching the Total Body Dose Rate or Skin Dose Rate limits for radioactive gas leaving the site. If an upper activity alarm on RM-1GW-108B is received, it automatically terminates the discharge by closing an isolation valve downstream of the Decay Tanks.

8.4.2 BV-2 Gaseous Radwaste System Components

8.4.2.1 2BRS-EV21A/21B: Degasifiers

There are four Degasifiers (two at Unit 1 and two at Unit 2). They are designed to continuously process reactor coolant letdown for reducing entrained noble gases in the liquid.

8.4.2.2 2GWS-E21A/21B: Waste Gas Chillers

There are four Chillers (two at Unit 1 and two at Unit 2). Non-condensable gases from the degasifiers are directed by system pressure to the Waste Gas Chillers.

8.4.2.3 2GWS-TK22A thru 22D: Waste Gas Charcoal Delay Beds

There are four Charcoal Beds (four at Unit 1 and four at Unit 2). The dry effluent from the Chillers is directed to the Waste Gas Charcoal Delay Beds for holdup of xenon and krypton and adsorption of radioiodines. When four beds are operated in series, they provide a holdup of xenon isotopes for about 30 days.

8.4.2.4 2GWS-FLT24A/24B: Overhead Gas Compressor Prefilters

There are two Prefilters. The gaseous effluent (primarily hydrogen) is directed from the Waste Gas Charcoal Delay Beds to one of the Overhead Gas Compressor Prefilters. The filters remove carbon solids from the gas stream.

8.4.2.5 **2GWS-C21A/21B: Gas Compressors**

There are two Compressors. The waste gas enters one of the compressors after passing through the Prefilters.

8.4.2.6 **2GWS-TK21: Gaseous Waste Surge Tank**

There is one Surge Tank. It has a capacity of 52 cuft. After compression to about 65 psig, the waste gas is sent to the Surge Tank. This can be done automatically or manually.

8.4.2.7 **2GWS-TK25A thru 25G: Gaseous Waste Storage Tanks**

There are seven Storage Tanks. Each has a capacity of 132 cuft. The contents of the Surge Tank is transferred to the Storage Tanks for storage and decay. After 30 days of storage, all xenon and iodine should have decayed, and the resulting predominant nuclide should be krypton 85.

8.4.2.8 **RM-1GW-108 And RM-1GW-109: Gaseous Effluent Radiation Monitors**

Previously described in Section 8.4.1.

- END -

ATTACHMENT A
Page 1 of 2
GASEOUS SOURCE TERM

TABLE 2.1-1a

BV-1 RADIONUCLIDE MIX FOR GASEOUS EFFLUENTS
(Ci/yr)

	RX CONTAINMENT/ SLCRS VENT	AUXILIARY BUILDING VENT	GASEOUS WASTE/PROCESS VENT		
	Long Term, And				
NUCLIDE(2)	CONTAINMENT BUILDING(1)	AUXILIARY BUILDING VENTILATION	MAIN CONDENSER/ AIR EJECTOR	CONTAINMENT VACUUM PUMPS(3)	GASEOUS WASTE SYSTEM
	Short Term	Long Term	Long Term	Long Term	Short Term
Kr-83m	2.2E-02	4.2E-01	2.7E-01	5.2E-03	0.0
Kr-85m	1.5E-01	1.9E+00	1.2E+00	5.5E-02	7.3E-02
Kr-85	6.1E+01	2.5E+00	1.6E+00	1.0E+01	2.3E+02
Kr-87	5.4E-02	1.3E+00	8.2E-01	1.1E-02	0.0
Kr-88	2.4E-01	3.8E+00	2.4E+00	7.0E-02	0.0
Kr-89	4.7E-04	1.2E-01	7.7E-02	4.3E-05	0.0
Xe-131m	7.4E-01	1.3E-01	8.0E-02	1.8E-01	1.3E+00
Xe-133m	8.9E-01	8.9E-01	5.6E-01	3.1E-01	0.0
Xe-133	8.9E+01	3.6E+01	2.3E+01	2.7E+01	2.3E+01
Xe-135m	4.5E-03	3.2E-01	2.0E-01	6.2E-04	0.0
Xe-135	7.0E-01	4.5E+00	2.8E+00	2.7E-01	0.0
Xe-137	1.0E-03	2.1E-01	1.3E-01	8.8E-05	0.0
Xe-138	1.5E-02	1.1E+00	6.6E-01	1.7E-03	0.0
Ar-41	2.5E+01	0.0	0.0	0.0	0.0

(1) Containment can be purged via VV-1 (Auxiliary Building Vent), CV-1 (Rx Containment/SLCRS Vent), or PV-1/2 (Gaseous Waste/Process Vent)

(2) Source Term from BVPS-2 UFSAR Table 11.3.1[3.1.1.2]

(3) Original Source Term from Calculation No. UR(B)-262 was adjusted for a factor of 14 increase in pump flowrate due to installation of high capacity pumps during 1R15. This change in Source Term is documented in Condition Report CR03-04830 and Calculation No. ERS-HHM-87-014.[3.1.1.5] [3.1.1.8] [3.1.3.10]

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ATTACHMENT A
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GASEOUS SOURCE TERM

TABLE 2.1-1b
BV-2 RADIONUCLIDE MIX FOR GASEOUS EFFLUENTS
(Ci/yr)

	SLCRS UNFILTERED PATHWAY Long Term, And	SLCRS FILTERED PATHWAY	TURBINE BUILDING VENT	GASEOUS WASTE/PROCESS VENT		
NUCLIDE(2)	CONTAINMENT BUILDING(1) Short Term	AUXILIARY BUILDING VENTILATION Long Term	TURBINE BUILDING VENTILATION Long Term	MAIN CONDENSER/ AIR EJECTOR Long Term	CONTAINMENT VACUUM PUMPS(3) Long Term	GASEOUS WASTE SYSTEM Short Term
Kr-83m	4.0E-05	4.2E-01	3.9E-05	2.7E-01	3.7E-04	0.0
Kr-85m	1.4E-02	1.9E+00	1.7E-04	1.2E+00	3.9E-03	1.2E-02
Kr-85	6.1E+01	2.5E+00	2.3E-04	1.6E+00	7.2E-01	2.3E+02
Kr-87	5.3E-06	1.3E+00	1.1E-04	8.2E-01	7.8E-04	0.0
Kr-88	4.1E-03	3.8E+00	3.5E-04	2.4E+00	5.0E-03	0.0
Kr-89	0.0	1.2E-01	1.1E-05	7.7E-02	3.1E-06	0.0
Xe-131m	7.2E-01	1.3E-01	1.2E-05	8.0E-02	1.3E-02	8.3E-01
Xe-133m	7.6E-01	8.9E-01	8.1E-05	5.6E-01	2.2E-02	0.0
Xe-133	8.4E+01	3.6E+01	3.4E-03	2.3E+01	1.9E-00	8.2E+00
Xe-135m	0.0	3.2E-01	2.9E-05	2.0E-01	4.4E-05	0.0
Xe-135	2.4E-01	4.5E+00	4.2E-04	2.8E+00	1.9E-02	0.0
Xe-137	0.0	2.1E-01	2.1E-05	1.3E-01	6.3E-06	0.0
Xe-138	0.0	1.1E+00	9.7E-05	6.6E-01	1.2E-04	0.0
Ar-41	2.5E+01	0.0	0.0	0.0	0.0	0.0

(1) Containment can be purged via VV-2 (SLCRS Unfiltered Pathway), CV-2 (SLCRS Filtered Pathway), or PV-1/2 (Gaseous Waste/Process Vent)

(2) Source Term from BVPS-2 UFSAR Table 11.3.2[3.1.2.3]

(3) Source Term from Calculation No. UR(B)-262[3.1.2.5]

ATTACHMENT B
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GASEOUS EFFLUENT MONITOR DETECTION EFFICIENCIES

TABLE 2.1-2a

BV-1 MONITOR DETECTOR EFFICIENCIES
(cpm/uCi/cc)

NUCLIDE	AUXILIARY BUILDING VENT		GASEOUS WASTE/ PROCESS VENT		Rx CONTAINMENT/ SLCRS VENT	
	PRIMARY MONITOR(1)	ALTERNATE MONITOR(2)	PRIMARY MONITOR(1)	ALTERNATE MONITOR(2)	PRIMARY MONITOR(1)	ALTERNATE MONITOR(2)
	RM-VS-101B	RM-VS-109 Channel 5	RM-GW-108B	RM-GW-109 Channel 5	RM-VS-107B	RM-VS-110 Channel 5
Kr-83m	--	--	--	--	--	--
Kr-85m	9.80 E7	2.39 E7	9.00 E7	2.43 E7	5.16 E7	2.57 E7
Kr-85	3.88 E5	2.47 E7	3.56 E5	2.51 E7	5.04 E7	2.67 E7
Kr-87	7.38 E7	2.95 E7	6.78 E7	3.00 E7	9.60 E7	3.19 E7
Kr-88	1.14 E8	2.11 E7	1.05 E8	2.14 E7	5.16 E7	2.28 E7
Kr-89	1.39 E8	2.93 E7	1.28 E8	2.98 E7	9.59 E7	3.16 E7
Kr-90	1.34 E8	3.05 E7	1.23 E8	3.10 E7	9.87 E7	3.29 E7
Xe-131m	2.25 E6	1.56 E7	2.07 E6	1.59 E7	2.94 E7	1.68 E7
Xe-133m	1.26 E7	1.94 E7	1.16 E7	1.97 E7	4.17 E7	2.09 E7
Xe-133	1.01 E7	1.24 E7	9.24 E6	1.26 E7	2.28 E7	1.33 E7
Xe-135m	7.15 E7	5.70 E6	6.58 E7	5.80 E6	1.51 E7	6.15 E6
Xe-135	1.12 E8	2.91 E7	1.03 E8	2.96 E7	6.42 E7	3.14 E7
Xe-137	3.16 E7	2.96 E7	2.91 E7	3.01 E7	1.05 E8	3.19 E7
Xe-138	1.15 E8	2.66 E7	1.06 E8	2.70 E7	7.35 E7	2.87 E7
Ar-41	7.17 E7	3.00 E7	6.59 E7	3.05 E7	7.19 E7	3.23 E7

(1) The listed detector efficiencies for the respective primary monitors (Victoreen) are corrected for the reduced pressures observed and documented during operation.

(2) The alternate monitors (Eberline SPING Channel 5) efficiencies are corrected for detector unique installation factors. (Pressure corrections are not required for the SPING Monitors.) See Calculation Package ERS-SFL-85-031 for additional information.[3.1.1.4]

ATTACHMENT B
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GASEOUS EFFLUENT MONITOR DETECTION EFFICIENCIES

TABLE 2.1-2b
BV-2 MONITOR DETECTOR EFFICIENCIES
(cpm/uCi/cc)

NUCLIDE(1)	SLCRS UNFILTERED PATHWAY 2HVS-RQ101B	SLCRS FILTERED PATHWAY 2HVS-RQ109B	WASTE GAS STORAGE VAULT VENT 2RMQ-RQ303B	DECON BUILDING VENT 2RMQ-RQ301B	CONDENSATE POLISHING BUILDING VENT 2HVL-RQ112B
Kr-83m	--	--	--	--	--
Kr-85m	3.20E7	5.83E7	3.20E7	3.20E7	3.20E7
Kr-85	3.60E7	7.19E7	3.60E7	3.60E7	3.60E7
Kr-87	3.73E7	8.85E7	3.73E7	3.73E7	3.73E7
Kr-88	3.05E7	6.80E7	3.05E7	3.05E7	3.05E7
Kr-89	3.72E7	8.73E7	3.72E7	3.72E7	3.72E7
Kr-90	3.86E7	8.80E7	3.86E7	3.86E7	3.86E7
Xe-131m	2.44E7	4.61E4	2.44E7	2.44E7	2.44E7
Xe-133m	2.86E7	6.06E4	2.86E7	2.86E7	2.86E7
Xe-133	1.80E7	2.94E7	1.80E7	1.80E7	1.80E7
Xe-135m	7.22E6	1.55E4	7.22E6	7.22E6	7.22E6
Xe-135	3.86E7	7.48E7	3.86E7	3.86E7	3.86E7
Xe-137	3.78E7	9.07E7	3.78E7	3.78E7	3.78E7
Xe-138	3.52E7	7.74E7	3.52E7	3.52E7	3.52E7
Ar-41	3.79E7	7.90E7	3.79E7	3.79E7	3.79E7

(1) Efficiencies from Calculation Package ERS-SFL-86-026.(3.1.2.1)

ATTACHMENT C
Page 1 of 1
MODES OF GASEOUS RELEASE

Table 2.2-1
MODES OF GASEOUS RELEASE FROM BEAVER VALLEY SITE VENTS FOR IIMPLEMENTATION OF 10 CFR 20 AND 10 CFR 50

RELEASE POINT	RELEASE MODE 1	RELEASE MODE 2	RELEASE MODE 3	RELEASE MODE 4
RP 1; VV-1, Auxiliary Building Vent(1)	Aux. Bldg. Ventilation	Containment Purge(3)	Same As Mode 1	Same As Mode 1
RP 2; CV-1, Rx Containment/SLCRS Vent(1)	Leakage Collection Exhaust	Same As Mode 1	Same As Mode 1 and Containment Purge(3)	Same As Mode 1
RP 3; PV-1/2, Gaseous Waste/Process Vent(2)	Main Cond. Air Ejector, Waste Gas, Containment Vacuum	Same As Mode 1	Same As Mode 1	Same As Mode 1 and Containment Purge
RP 4; VV-2 SLCRS Unfiltered Pathway(1)	Contiguous Areas	Containment Purge(3)	Same As Mode 1	Same As Mode 1
RP 5; CV-2, SLCRS Filtered Pathway Vent(1)	Aux. Bldg. Ventilation	Same As Mode 1	Same As Mode 1 and Containment Purge(3)	Same As Mode 1
RP 6; CB-2, Condensate Polishing Bldg Vent(1)	(4)	(4)	(4)	(4)
RP 7; WV-2, Waste Gas Storage Vault Vent(1)	(4)	(4)	(4)	(4)
RP 8; DV-2, Decontamination Bldg Vent(1)	(4)	(4)	(4)	(4)
RP 9; TV-2, Turbine Bldg Vent(1)	(4)	(4)	(4)	(4)

NOTE: For the purpose of implementing 10 CFR 50, batch discharges may use continuous meteorology since short term meteorology is used at the time of the annual report.

(1) Continuous ground level meteorology is applicable
(2) Continuous elevated meteorology is applicable
(3) Mode established by purge from one unit, all other release points remain same as Mode 1
(4) Not normally a radioactive release point

ATTACHMENT D
Page 1 of 2
RADIONUCLIDE MIX

TABLE 2.2-2a
BV-1 RADIONUCLIDE MIX FOR GASEOUS EFFLUENTS
(Ci/yr)

	RX CONTAINMENT/ SLCRS VENT	AUXILIARY BUILDING VENT	GASEOUS WASTE/PROCESS VENT		
	Long Term, And				
NUCLIDE[2]	CONTAINMENT BUILDING[1]	AUXILIARY BUILDING VENTILATION	MAIN CONDENSER/ AIR EJECTOR	CONTAINMENT VACUUMM PUMPS[3]	GASEOUS WASTE SYSTEM
	Short Term	Long Term	Long Term	Long Term	Short Term
Kr-83m	2.2E-02	4.2E-01	2.7E-01	5.2E-03	0.0
Kr-85m	1.5E-01	1.9E+00	1.2E+00	5.5E-02	1.2E-02
Kr-85	6.1E+01	2.5E+00	1.6E+00	1.0E+01	2.3E+02
Kr-87	5.4E-02	1.3E+00	8.2E-01	1.1E-02	0.0
Kr-88	2.4E-01	3.8E+00	2.4E+00	7.0E-02	0.0
Kr-89	4.7E-04	1.2E-01	7.7E-02	4.3E-05	0.0
Xe-131m	7.4E-01	1.3E-01	8.0E-02	1.8E-01	8.3E-01
Xe-133m	8.9E-01	8.9E-01	5.6E-01	3.1E-01	0.0
Xe-133	8.9E+01	3.6E+01	2.3E+01	2.7E+01	8.2E+00
Xe-135m	4.5E-03	3.2E-01	2.0E-01	6.2E-04	0.0
Xe-135	7.0E-01	4.5E+00	2.8E+00	2.7E-01	0.0
Xe-137	1.0E-03	2.1E-01	1.3E-01	8.8E-05	0.0
Xe-138	1.5E-02	1.1E+00	6.6E-01	1.7E-03	0.0
I-131	1.2E-03	4.6E-02	2.1E-02	6.6E-03	0.0
I-132	0.0	0.0	0.0	3.5E-05	0.0
I-133	2.0E-04	6.7E-02	3.0E-02	1.2E-03	0.0
I-134	0.0	0.0	0.0	6.6E-06	0.0
I-135	0.0	0.0	0.0	2.0E-04	0.0
Co-58	7.5E-04	6.0E-02	0.0	2.2E-04	0.0
Co-60	3.4E-04	2.7E-02	0.0	1.0E-04	0.0
Mn-54	2.2E-04	1.8E-02	0.0	6.9E-05	0.0
Fe-59	7.5E-05	6.0E-03	0.0	2.2E-05	0.0
Sr-89	1.7E-05	1.3E-03	0.0	5.2E-06	0.0
Sr-90	3.0E-06	2.0E-04	0.0	9.2E-07	0.0
Cs-134	2.2E-04	1.8E-02	0.0	6.9E-05	0.0
Cs-137	3.8E-04	3.0E-02	0.0	1.2E-04	0.0
C-14	1.0E+00	0.0	0.0	0.0	7.0E+00
Ar-41	2.5E+01	0.0	0.0	0.0	0.0

(1) Containment can be purged via VV-1 (Auxiliary Building Vent), CV-1 (Rx Containment/SLCRS Vent), or PV-1/2 (Gaseous Waste/Process Vent)

(2) Source Term from BVPS-2UFSAR Table 11.3-1[3.1.1.2]

(3) See Note (3) from ATTACHMENT A Table 2.1-1a [3.1.1.5] [3.1.1.8] [3.1.3.10]

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ATTACHMENT D
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RADIONUCLIDE MIX

TABLE 2.2-2b
BV-2 RADIONUCLIDE MIX FOR GASEOUS EFFLUENTS
(Ci/yr)

	SLCRS UNFILTERED PATHWAY	SLCRS FILTERED PATHWAY	TURBINE BUILDING VENT	GASEOUS WASTE/PROCESS VENT		
NUCLIDE[2]	Long Term, And CONTAINMENT BUILDING[1] Short Term	AUXILIARY BUILDING VENTILATION Long Term	TURBINE BUILDING VENTILATION Long Term	MAIN CONDENSER/ AIR EJECTOR Long Term	CONTAINMENT VACUUM PUMPS[3] Long Term	GASEOUS WASTE SYSTEM Short Term
Kr-83m	4.0E-05	4.2E-01	3.9E-05	2.7E-01	3.7E-04	0.0
Kr-85m	1.4E-02	1.9E+00	1.7E-04	1.2E+00	3.9E-03	1.2E-02
Kr-85	6.1E+01	2.5E+00	2.3E-04	1.6E+00	7.2E-01	2.3E+02
Kr-87	5.3E-06	1.3E+00	1.1E-04	8.2E-01	7.8E-04	0.0
Kr-88	4.1E-03	3.8E+00	3.5E-04	2.4E+00	5.0E-03	0.0
Kr-89	0.0	1.2E-01	1.1E-05	7.7E-02	3.1E-06	0.0
Xe-131m	7.2E-01	1.3E-01	1.2E-05	8.0E-02	1.3E-02	8.3E-01
Xe-133m	7.6E-01	8.9E-01	8.1E-05	5.6E-01	2.2E-02	0.0
Xe-133	8.4E+01	3.6E+01	3.4E-03	2.3E+01	1.9E-00	8.2E+00
Xe-135m	0.0	3.2E-01	2.9E-05	2.0E-01	4.4E-05	0.0
Xe-135	2.4E-01	4.5E+00	4.2E-04	2.8E+00	1.9E-02	0.0
Xe-137	0.0	2.1E-01	2.1E-05	1.3E-01	6.3E-06	0.0
Xe-138	0.0	1.1E+00	9.7E-05	6.6E-01	1.2E-04	0.0
I-131	2.7E-05	4.6E-03	6.5E-04	2.1E-02	4.7E-04	0.0
I-132	0.0	0.0	0.0	0.0	2.5E-06	0.0
I-133	2.6E-06	6.7E-03	8.7E-04	3.0E-02	8.4E-05	0.0
I-134	0.0	0.0	0.0	0.0	4.7E-07	0.0
I-135	0.0	0.0	0.0	0.0	1.4E-05	0.0
Co-58	7.5E-02	6.0E-04	0.0	0.0	1.6E-05	0.0
Co-60	3.4E-02	2.7E-04	0.0	0.0	7.4E-06	0.0
Mn-54	2.2E-02	1.8E-04	0.0	0.0	4.9E-06	0.0
Fe-59	7.5E-03	6.0E-05	0.0	0.0	1.6E-06	0.0
Sr-89	1.7E-03	1.3E-05	0.0	0.0	3.7E-07	0.0
Sr-90	3.0E-04	2.0E-06	0.0	0.0	6.6E-08	0.0
Cs-134	2.2E-02	1.8E-04	0.0	0.0	4.9E-06	0.0
Cs-137	3.8E-02	3.0E-04	0.0	0.0	8.4E-06	0.0
C-14	1.0E+00	0.0	0.0	0.0	0.0	7.0E+00
Ar-41	2.5E+01	0.0	0.0	0.0	0.0	0.0

(1) Containment can be purged via VV-2 (SLCRS Unfiltered Pathway), CV-2 (SLCRS Filtered Pathway), or PV-1/2 (Gaseous Waste/Process Vent)

(2) Source Term from BVPS-2UFSAR Table 11.3-2[3.1.1.3]

(3) See Section 8.1.1.1

ATTACHMENT E
Page 1 of 1
DISTANCES TO RELEASE POINTS

TABLE 2.2-3
DISTANCES OF LIMITING MAXIMUM INDIVIDUAL RECEPTORS TO RELEASE POINTS
FOR ANNUAL X/Q VALUES
(meters)

DOWNWIND SECTOR	SITE BOUNDARY*			VEGETABLE GARDEN		MILK COW		MILK GOAT		MEAT ANIMAL		RESIDENT	
	GROUND		ELEV	GROUND	ELEV	GROUND	ELEV	GROUND	ELEV	GROUND	ELEV	GROUND	ELEV
	(1)	(2)											
N	670	579	413	2,623	2,423	---	---	4,651	4,418	4,152	3,919	2,527	2,295
NNE	535	792	632	2,740	2,461	---	---	6,276	6,033	2,848	2,605	2,639	2,461
NE	490	442	327	724	901	7,741	7,526	20,760	20,545	7,741	7,526	708	790
ENE	490	448	394	1,674	1,658	---	---	6,824	6,671	---	---	708	1,562
E	545	546	551	1,979	1,922	7,065	6,998	4,265	4,200	4,265	4,200	756	1,922
ESE	575	607	672	1,577	1,619	---	---	2,865	2,899	1,577	1,619	1,577	1,650
SE	575	701	815	1,835	1,961	5,729	5,848	5,729	5,848	3,299	3,420	1,835	1,961
SSE	655	762	912	1,738	1,933	5,053	5,244	9,977	10,166	1,770	1,964	1,432	1,628
S	850	887	1,054	3,138	3,372	3,347	3,539	---	---	2,253	2,487	2,189	2,423
SSW	975	1,064	1,226	2,317	2,560	3,347	3,590	5,616	5,859	2,317	2,560	1,223	1,466
SW	1,435	1,439	1,574	2,221	2,439	---	---	2,993	3,210	2,414	2,632	2,221	2,439
WSW	595	561	660	2,301	2,463	5,182	5,341	---	---	2,446	2,608	2,301	2,463
W	685	640	681	3,556	3,635	5,118	5,195	---	---	4,088	4,166	3,556	3,635
WNW	810	701	676	3,605	3,590	4,538	4,521	22,529	22,507	3,605	3,590	3,605	3,590
NW	655	567	482	1,464	1,415	---	---	10,944	10,832	4,570	4,461	1,432	1,383
NNW	645	558	420	1,464	1,285	---	---	15,450	15,262	3,959	3,774	1,143	1,253

*Distances for ground releases are measured from the center point between the BV-1 and BV-2 Containment Buildings. Distances for elevated release are measured from the BV-1 Cooling Tower. Elevated release is applicable to PV-1/2. Ground release is applicable to all other release points.

(1) TV-2 and CB-2
(2) VV-1, CV-1, VV-2, CV-2, DV-2, WV-2

ATTACHMENT F
Page 1 of 7
0-5 MILE DISPERSION PARAMETERS

TABLE 2.2-4
CV-1 AND CV-2 ANNUAL AVERAGE, GROUND LEVEL,
X/Q VALUES FOR CONTINUOUS RELEASES, SPECIAL DISTANCES
(IDENTIFIED IN ATTACHMENT E, TABLE 2.2-3), AND SELECTED CONTROL LOCATIONS
(1E-7 sec/m^3)

	INDIVIDUAL RECEPTORS						DISTANCES TO THE CONTROL LOCATION, IN MILES									
DOWN-WIND SECTOR	SITE BOUND-ARY	VEGE-TABLE GARDEN	MILK COW	MILK GOAT	MEAT ANIMAL	RESI-DENCE	0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	2.0-2.5	2.5-3.0	3.0-3.5	3.5-4.0	4.0-4.5	4.5-5.0
N	125.0	12.80	--	5.360	6.27	13.50	233.0	39.5	18.70	11.80	7.68	5.82	4.240	3.480	2.660	2.280
NNE	50.2	6.92	--	2.040	6.42	7.16	148.0	26.8	10.80	6.62	4.60	3.44	2.690	2.190	1.830	1.560
NE	102.0	47.40	1.200	0.265	1.20	49.10	120.0	21.6	11.60	6.99	4.81	3.55	2.370	1.910	1.450	1.230
ENE	85.8	12.50	--	0.124	--	42.20	103.0	18.4	9.55	5.70	4.14	3.04	2.340	1.880	1.260	1.060
E	54.5	6.16	0.807	1.910	1.91	32.60	89.5	15.7	6.08	3.65	2.49	1.83	1.300	1.040	0.859	0.726
ESE	31.1	6.92	--	3.010	6.92	6.92	59.1	10.5	5.16	3.10	1.95	1.43	1.020	0.815	0.612	0.517
SE	27.8	6.70	0.994	0.994	2.74	6.70	65.9	12.0	5.89	3.54	2.41	1.77	1.160	0.931	0.768	0.649
SSE	24.1	6.68	1.030	0.372	6.50	9.01	67.2	12.0	5.46	3.30	1.91	1.41	0.997	0.803	0.665	0.563
S	27.5	3.40	3.090	--	5.57	5.81	99.9	17.5	6.77	4.11	2.84	2.10	1.490	1.200	0.999	0.848
SSW	23.8	6.31	3.700	1.740	6.31	19.30	110.0	19.9	7.83	4.80	3.33	2.48	1.940	1.580	1.190	1.020
SW	22.3	13.90	--	9.050	12.30	13.90	160.0	29.2	16.10	9.94	5.85	4.37	3.430	2.790	2.110	1.800
WSW	163.0	19.30	5.720	--	17.70	19.30	283.0	49.8	23.50	14.60	10.30	7.72	5.690	4.650	3.620	3.090
W	278.0	15.70	9.540	--	13.00	15.70	615.0	103.0	49.00	31.00	15.40	11.70	9.320	7.660	6.460	5.550
WNW	487.0	40.70	30.100	1.810	40.70	40.70	1290.0	203.0	92.10	59.20	40.60	31.20	25.000	20.700	14.200	12.200
NW	924.0	194.00	--	8.660	40.50	200.00	1710.0	262.0	123.00	79.80	55.00	42.30	34.000	28.200	19.400	16.700
NNW	302.0	63.00	--	1.720	15.40	92.30	547.0	86.4	40.80	26.20	17.60	13.50	10.100	8.350	6.560	5.660

ATTACHMENT F
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0-5 MILE DISPERSION PARAMETERS

TABLE 2.2-5
VV-1 AND VV-2 ANNUAL AVERAGE, GROUND LEVEL,
X/Q VALUES FOR CONTINUOUS RELEASES, SPECIAL DISTANCES
(IDENTIFIED IN ATTACHMENT E, TABLE 2.2-3), AND SELECTED CONTROL LOCATIONS
($1E-7$ sec/m^3)

	INDIVIDUAL RECEPTORS						DISTANCES TO THE CONTROL LOCATION, IN MILES									
DOWN-WIND SECTOR	SITE BOUND-ARY	VEGE-TABLE GARDEN	MILK COW	MILK GOAT	MEAT ANIMAL	RESI-DENCE	0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	2.0-2.5	2.5-3.0	3.0-3.5	3.5-4.0	4.0-4.5	4.5-5.0
N	152.0	15.00	--	5.980	7.06	15.90	276.0	49.9	22.70	13.70	8.75	6.52	4.69	3.810	2.900	2.470
NNE	62.3	7.66	--	2.150	7.08	7.95	189.0	32.0	12.20	7.31	4.99	3.69	2.87	2.320	1.920	1.630
NE	132.0	57.90	1.240	0.269	1.24	60.20	156.0	24.8	12.70	7.51	5.09	3.73	2.47	1.980	1.500	1.270
ENE	110.0	13.60	--	1.270	--	50.40	135.0	20.6	10.20	6.01	4.31	3.14	2.41	1.930	1.290	1.080
E	67.8	6.66	0.828	1.990	1.99	38.80	116.0	17.7	6.57	3.86	2.61	1.90	1.34	1.070	0.883	0.774
ESE	38.0	7.64	--	3.200	7.64	7.64	76.7	11.9	5.59	3.29	2.05	1.49	1.05	0.842	0.630	0.531
SE	33.3	7.27	1.030	1.030	2.88	7.27	86.2	13.5	6.37	3.75	2.53	1.84	1.20	0.960	0.790	0.666
SSE	29.1	7.41	1.080	0.382	7.19	10.10	87.0	13.7	5.98	3.53	2.02	1.48	1.04	0.833	0.688	0.531
S	32.8	3.65	3.300	--	6.10	6.38	127.0	20.3	7.56	4.48	3.04	2.23	1.57	1.260	1.050	0.885
SSW	28.7	7.08	4.040	1.850	7.08	22.90	140.0	23.6	8.87	5.28	3.60	2.66	2.07	1.670	1.260	1.070
SW	26.2	15.70	--	9.980	13.80	15.70	204.0	34.8	18.40	11.40	6.38	4.71	3.66	2.960	2.230	1.900
WSW	201.0	22.40	6.230	--	20.40	22.40	347.0	61.3	27.70	16.60	11.40	8.49	6.19	5.020	3.880	3.300
W	345.0	18.00	10.600	--	14.70	18.00	715.0	132.0	60.30	36.50	17.70	13.20	10.40	8.440	7.060	6.040
WNW	598.0	48.60	35.000	1.920	48.60	48.60	1410.0	269.0	120.00	73.00	48.50	36.40	28.70	23.400	15.900	13.600
NW	1030.0	262.00	---	9.520	47.80	271.00	1820.0	350.0	164.00	100.00	66.60	50.10	39.50	32.300	21.900	18.800
NNW	345.0	83.40	--	1.840	18.10	121.00	601.0	114.0	52.80	32.20	21.00	15.80	11.60	9.460	7.360	6.310

TABLE 2.2-6
PV-1/2 ANNUAL AVERAGE, ELEVATED LEVEL, X/Q VALUES
FOR CONTINUOUS RELEASES, SPECIAL DISTANCES
(IDENTIFIED IN ATTACHMENT E, TABLE 2.2-3), AND SELECTED CONTROL LOCATIONS
(1E-7 sec/m^3)

	INDIVIDUAL RECEPTORS						DISTANCES TO THE CONTROL LOCATION, IN MILES									
DOWN-WIND SECTOR	SITE BOUND-ARY	VEGE-TABLE GARDEN	MILK COW	MILK GOAT	MEAT ANIMAL	RESI-DENCE	0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	2.0-2.5	2.5-3.0	3.0-3.5	3.5-4.0	4.0-4.5	4.5-5.0
N	0.0082	6.720	--	1.910	2.27	6.790	0.0289	23.1000	8.2700	5.32	2.56	1.91	1.480	1.200	0.996	0.846
NNE	0.0280	6.690	--	1.430	6.14	6.890	0.0175	14.5000	6.9800	5.47	3.27	2.69	1.770	1.430	1.290	1.100
NE	0.0110	.074	1.610	0.350	1.61	0.055	0.0069	0.1160	.2300	7.10	5.38	3.68	2.880	2.090	1.880	1.570
ENE	0.0110	9.090	--	1.770	--	0.525	0.0135	0.3310	7.2800	6.02	4.75	3.22	2.620	2.030	1.710	1.100
E	0.0360	8.300	1.240	2.870	2.87	8.300	0.0124	17.1000	7.8600	6.20	3.67	2.83	2.190	1.730	1.280	1.200
ESE	0.0420	11.600	--	4.570	11.60	11.200	0.0208	12.7000	8.1400	4.78	3.00	2.20	1.360	1.160	0.830	0.737
SE	0.0750	7.890	1.230	1.230	3.05	7.890	0.4770	7.4000	7.5700	4.45	2.79	2.05	1.460	1.180	0.811	0.686
SSE	0.2060	7.390	1.160	0.357	7.20	9.770	0.3030	9.4400	6.9300	4.06	2.58	1.89	1.170	0.937	0.646	0.546
S	5.740	3.760	3.490	--	6.06	6.310	0.7960	8.5100	8.4900	4.98	3.37	2.47	1.380	1.110	0.774	0.655
SSW	7.640	3.610	2.140	0.872	3.61	5.820	26.1000	9.1000	4.0300	3.11	2.11	1.56	1.030	0.834	0.807	0.684
SW	6.500	3.900	--	2.560	3.47	3.900	36.1000	15.9000	4.9300	3.12	1.77	1.57	1.201	1.060	1.150	0.977
WSW	0.126	4.350	1.420	--	3.98	4.350	0.3870	17.8000	4.9000	3.53	2.36	1.64	1.460	1.210	0.920	0.781
W	0.029	2.490	0.764	--	2.02	2.490	0.0147	8.7200	6.2300	3.68	2.50	1.84	0.741	1.120	0.851	0.795
WNW	0.033	2.530	1.780	0.163	2.53	2.530	0.0202	0.0549	0.0809	3.07	2.50	1.84	1.110	0.686	0.791	0.731
NW	0.007	0.074	--	0.305	1.67	0.073	0.0084	0.0650	0.1170	3.66	2.30	1.69	1.210	0.903	0.804	0.683
NNW	0.008	6.460	--	0.224	1.81	6.590	0.0135	6.7800	5.0200	2.96	1.93	1.49	1.050	0.849	0.705	0.599

*Elevated release X/Q value at site boundary location where ground level release X/Qs maximize.

TABLE 2.2-7
TV-2 ANNUAL AVERAGE, GROUND LEVEL, X/Q VALUES
FOR CONTINUOUS RELEASES, SPECIAL DISTANCES
(IDENTIFIED IN ATTACHMENT E, TABLE 2.2-3), AND SELECTED CONTROL LOCATIONS
(1E-7 sec/m^3)

	INDIVIDUAL RECEPTORS						DISTANCES TO THE CONTROL LOCATION, IN MILES										
DOWN-WIND SECTOR	SITE BOUND-ARY	VEGE-TABLE GARDEN	MILK COW	MILK GOAT	MEAT ANIMAL	RESI-DENCE	0-0.5	0.5-1.0	1.0-1.5	1.5-2.0	2.0-2.5	2.5-3.0	3.0-3.5	3.5-4.0	4.0-4.5	4.5-5.0
N	105.0	14.00	--	5.740	6.74	14.80	244.0	42.6	20.50	12.70	8.18	6.15	4.45	3.640	2.770	2.380
NNE	102.0	7.37	--	2.130	6.83	7.64	161.0	28.8	11.40	6.94	4.79	3.56	2.78	2.250	1.870	1.590
NE	96.6	51.90	1.230	0.268	1.23	53.80	132.0	23.0	12.10	7.24	4.95	3.64	2.42	1.950	1.480	1.250
ENE	84.1	13.20	--	1.280	--	46.30	115.0	19.4	9.89	5.85	4.23	3.09	2.38	1.900	1.270	1.070
E	60.7	6.49	.829	1.980	1.98	35.70	99.2	16.6	6.32	3.75	2.55	1.87	1.32	1.060	0.871	0.735
ESE	37.1	7.25	--	3.100	7.25	7.25	65.8	11.1	5.36	3.19	2.00	1.46	1.03	0.829	0.621	0.524
SE	41.8	7.06	1.020	1.020	2.85	7.06	73.5	12.6	6.12	3.64	2.47	1.81	1.18	0.945	0.779	0.658
SSE	34.0	7.16	1.070	0.384	6.96	9.69	74.2	12.7	5.71	3.41	1.97	1.45	1.02	0.818	0.676	0.572
S	32.7	3.64	3.310	--	6.00	6.27	109.0	18.6	7.13	4.29	2.94	2.17	1.53	1.230	1.020	0.866
SSW	29.7	6.73	3.890	1.800	6.73	20.90	120.0	21.3	8.31	5.03	3.46	2.57	2.00	1.620	1.230	1.040
SW	24.1	14.80	--	9.550	13.10	14.80	174.0	31.2	17.20	10.40	6.10	4.54	3.54	2.870	2.170	1.850
WSW	159.0	20.80	6.010	--	19.10	20.80	301.0	53.6	25.30	15.60	10.80	8.09	5.93	4.830	3.750	3.200
W	264.0	16.90	10.100	--	13.90	16.90	636.0	111.0	53.90	33.50	16.50	12.40	9.82	8.040	6.760	5.790
WNW	404.0	44.50	32.500	1.870	44.50	44.50	1310.0	218.0	104.00	65.40	44.20	33.60	26.70	22.000	15.000	12.900
NW	735.0	216.00	--	9.100	43.90	222.00	1720.0	279.0	140.00	88.80	60.30	45.90	36.60	30.100	20.600	17.700
NNW	247.0	71.00	--	1.820	17.00	99.40	557.0	924.0	45.90	28.90	19.20	14.60	10.80	8.880	6.950	5.980

ATTACHMENT F
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0-5 MILE DISPERSION PARAMETERS

TABLE 2.2-8

DV-2 ANNUAL AVERAGE, GROUND LEVEL, X/Q VALUES
FOR CONTINUOUS RELEASES, SPECIAL DISTANCES
(IDENTIFIED IN ATTACHMENT E, TABLE 2.2-3), AND SELECTED CONTROL LOCATIONS
(1E-7 sec/m^3)

Same as Table 2.2-4

ATTACHMENT F
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0-5 MILE DISPERSION PARAMETERS

TABLE 2.2-9

WV-2 ANNUAL AVERAGE, GROUND LEVEL, X/Q VALUES
FOR CONTINUOUS RELEASES, SPECIAL DISTANCES
(IDENTIFIED IN ATTACHMENT E, TABLE 2.2-3), AND SELECTED CONTROL LOCATIONS
(1E-7 sec/m^3)

Same as Table 2.2-4

ATTACHMENT F
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0-5 MILE DISPERSION PARAMETERS

TABLE 2.2-10

CB-2 ANNUAL AVERAGE, GROUND LEVEL, X/Q VALUES
FOR CONTINUOUS RELEASES, SPECIAL DISTANCES
(IDENTIFIED IN ATTACHMENT E, TABLE 2.2-3), AND SELECTED CONTROL LOCATIONS

Same as Table 2.2-7

ATTACHMENT G
Page 1 of 2
NOBLE GAS DOSE FACTORS AND DOSE PARAMETERS

TABLE 2.2-11

DOSE FACTORS FOR NOBLE GASES AND DAUGHTERS

NUCLIDE[(1)]	K_i TOTAL BODY DOSE FACTOR mrem/yr Per uCi/m^3	L_i SKIN DOSE FACTOR mrem/yr Per uCi/m^3	M_i GAMMA AIR DOSE FACTOR mrad/yr Per uCi/m^3	N_i BETA AIR DOSE FACTOR mrad/yr Per uCi/m^3
Kr-83m	7.56E-02	--	1.93E+01	2.88E+02
Kr-85m	1.17E+03	1.46E+03	1.23E+03	1.97E+03
Kr-85	1.61E+01	1.34E+03	1.72E+01	1.95E+03
Kr-87	5.92E+03	9.73E+03	6.17E+03	1.03E+04
Kr-88	1.47E+04	2.37E+03	1.52E+04	2.93E+03
Kr-89	1.66E+04	1.01E+04	1.73E+04	1.06E+04
Kr-90	1.56E+04	7.29E+03	1.63E+04	7.83E+03
Xe-131m	9.15E+01	4.76E+02	1.56E+02	1.11E+03
Xe-133m	2.51E+02	9.94E+02	3.27E+02	1.48E+03
Xe-133	2.94E+02	3.06E+02	3.53E+02	1.05E+03
Xe-135m	3.12E+03	7.11E+02	3.36E+03	7.39E+02
Xe-135	1.81E+03	1.86E+03	1.92E+03	2.46E+03
Xe-137	1.42E+03	1.22E+04	1.51E+03	1.27E+04
Xe-138	8.83E+03	4.13E+03	9.21E+03	4.75E+03
Ar-41	8.84E+03	2.69E+03	9.30E+03	3.28E+03

(1) The listed dose factors are for radionuclides that may be detected in gaseous effluents.

ATTACHMENT G
Page 2 of 2
NOBLE GAS DOSE FACTORS AND DOSE PARAMETERS

TABLE 2.2-12

DOSE PARAMETERS FOR FINITE ELEVATED PLUMES

NUCLIDE[4]	V_i[1] TOTAL BODY DOSE FACTOR mrem/yr Per uCi/sec	B_i[1],[2] GAMMA AIR DOSE FACTOR mrad/yr Per uCi/sec	M_i[3] TOTAL BODY DOSE FACTOR mrem/yr Per uCi/sec	B_i[3] GAMMA AIR DOSE FACTOR mrad/yr Per uCi/sec
Kr-83m	3.19E-10	1.75E-8	4.58E-8	3.96E-5
Kr-85m	7.81E-5	1.16E-4	4.70E-4	7.06E-4
Kr-85	1.55E-6	2.35E-6	5.54E-6	8.40E-6
Kr-87	5.13E-4	7.74E-4	1.45E-3	2.19E-3
Kr-88	1.39E-3	2.09E-3	4.09E-3	6.16E-3
Kr-89	7.99E-4	1.20E-3	1.25E-3	1.88E-3
Xe-131m	1.64E-5	2.47E-5	1.67E-4	3.09E-4
Xe-133m	1.38E-5	2.11E-5	1.32E-4	2.61E-4
Xe-133	1.05E-5	1.56E-4	1.54E-4	2.76E-4
Xe-135m	2.41E-4	3.66E-4	6.21E-4	9.50E-4
Xe-135	1.41E-4	2.12E-4	6.96E-4	1.05E-3
Xe-137	6.00E-5	9.05E-5	9.66E-5	1.46E-4
Xe-138	8.11E-4	1.22E-3	2.22E-3	3.34E-3
Ar-41	1.02E-3	1.53E-3	2.68E-3	4.02E-3

(1) V_i and B_i values used to implement Modes 1, 2, and 3 of Section 2.2.1 (10CFR20)

(2) B_i values used to implement Modes 1, 2, 3, and 4 of Section 2.3.1 (10CFR50)

(3) V_i and B_i values to implement Mode 4 of Section 2.2.1 (10CFR20) and to implement monitor setpoint determinations of Section 2.1.2 and 2.1.4

(4) The listed dose parameters are for radionuclides that may be detected in gaseous effluents.

ATTACHMENT H
Page 1 of 1
ORGAN DOSE PARAMETERS

Table 2.2-13

P_{IT} VALUES FOR A CHILD FOR THE BEAVER VALLEY SITE

(mrem/yr per uCi/cu meter)

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	1.12E+03	1.12E+03	1.12E+03	1.12E+03	1.12E+03	1.12E+03
2 P-32	2.60E+06	1.14E+05	9.88E+04	0.00E+00	0.00E+00	0.00E+00	4.22E+04
3 Cr-51	0.00E+00	0.00E+00	1.54E+02	8.55E+01	2.43E+01	1.70E+04	1.08E+03
4 Mn-54	0.00E+00	4.29E+04	9.51E+03	0.00E+00	1.00E+04	1.58E+06	2.29E+04
5 Fe-59	2.07E+04	3.34E+04	1.67E+04	0.00E+00	0.00E+00	1.27E+06	7.07E+04
6 Co-57	0.00E+00	9.03E+02	1.07E+03	0.00E+00	0.00E+00	5.07E+05	1.32E+04
7 Co-58	0.00E+00	1.77E+03	3.16E+03	0.00E+00	0.00E+00	1.11E+06	3.44E+04
8 Co-60	0.00E+00	1.31E+04	2.26E+04	0.00E+00	0.00E+00	7.07E+06	9.82E+04
9 Zn-65	4.25E+04	1.13E+05	7.03E+04	0.00E+00	7.14E+04	9.95E+05	1.63E+04
10 Rb-86	0.00E+00	1.98E+05	1.14E+05	0.00E+00	0.00E+00	0.00E+00	7.99E+03
11 Sr-89	5.99E+05	0.00E+00	1.72E+04	0.00E+00	0.00E+00	2.16E+06	1.67E+05
12 Sr-90	1.01E+08	0.00E+00	6.44E+06	0.00E+00	0.00E+00	1.48E+07	3.43E+05
13 Y-91	9.14E+05	0.00E+00	2.44E+04	0.00E+00	0.00E+00	2.63E+06	1.84E+05
14 Zr-95	1.90E+05	4.18E+04	3.70E+04	0.00E+00	5.96E+04	2.23E+06	6.11E+04
15 Nb-95	2.35E+04	9.18E+03	6.55E+03	0.00E+00	8.62E+03	6.14E+05	3.70E+04
16 Nb-97	4.29E-01	7.70E-02	3.60E-02	0.00E+00	8.55E-02	3.42E+03	2.78E+04
17 Mo-99	0.00E+00	1.72E+02	4.26E+01	0.00E+00	3.92E+02	1.35E+05	1.27E+05
18 Tc-99m	1.76E-03	3.48E-03	5.77E-02	0.00E+00	5.07E-02	9.51E+02	4.81E+03
19 Ru-103	2.79E+03	0.00E+00	1.07E+03	0.00E+00	7.03E+03	6.62E+05	4.48E+04
20 Ru-106	1.36E+05	0.00E+00	1.69E+04	0.00E+00	1.84E+05	1.43E+07	4.29E+05
21 Ag-110m	1.69E+04	1.14E+04	9.14E+03	0.00E+00	2.12E+04	5.48E+06	1.00E+05
22 Sb-124	5.74E+04	7.40E+02	2.00E+04	1.26E+02	0.00E+00	3.24E+06	1.64E+05
23 Sb-125	9.84E+04	7.59E+02	2.07E+04	9.10E+01	0.00E+00	2.32E+06	4.03E+04
24 Te-127m	2.49E+04	8.55E+03	3.02E+03	6.07E+03	6.36E+04	1.48E+06	7.14E+04
25 Te-129m	1.92E+04	6.85E+03	3.04E+03	6.33E+03	5.03E+04	1.76E+06	1.82E+05
26 I-131	4.81E+04	4.81E+04	2.73E+04	1.62E+07	7.88E+04	0.00E+00	2.84E+03
27 I-133	1.66E+04	2.03E+04	7.70E+03	3.85E+06	3.38E+04	0.00E+00	5.48E+03
28 Cs-134	6.51E+05	1.01E+06	2.25E+05	0.00E+00	3.30E+05	1.21E+05	3.85E+03
29 Cs-136	6.51E+04	1.71E+05	1.16E+05	0.00E+00	9.55E+04	1.45E+04	4.18E+03
30 Cs-137	9.07E+05	8.25E+05	1.28E+05	0.00E+00	2.82E+05	1.04E+05	3.62E+03
31 Ba-140	7.40E+04	6.48E+01	4.33E+03	0.00E+00	2.11E+01	1.74E+06	1.02E+05
32 La-140	6.44E+02	2.25E+02	7.55E+01	0.00E+00	0.00E+00	1.83E+05	2.26E+05
33 Ce-141	3.92E+04	1.95E+04	2.90E+03	0.00E+00	8.55E+03	5.44E+05	5.66E+04
34 Ce-144	6.77E+06	2.12E+06	3.61E+05	0.00E+00	1.17E+06	1.20E+07	3.89E+05

Calculated per ODCM equation 2.2-13

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MODES OF GASEOUS RELEASE

TABLE 2.3-1

MODES OF GASEOUS RELEASE FROM BEAVER VALLEY SITE VENTS FOR IMPLEMENTATION OF 10 CFR 20 AND 10 CFR 50

RELEASE POINT	RELEASE MODE 1	RELEASE MODE 2	RELEASE MODE 3	RELEASE MODE 4
RP 1; VV-1, Auxiliary Building Vent[(1)]	Aux. Bldg. Ventilation	Containment Purge[(3)]	Same As Mode 1	Same As Mode 1
RP 2; CV-1, Rx Containment/SLCRS Vent[(1)]	Leakage Collection Exhaust	Same As Mode 1	Same As Mode 1 and Containment Purge[(3)]	Same As Mode 1
RP 3; PV-1/2, Gaseous Waste/Process Vent[(2)]	Main Cond. Air Ejector, Waste Gas, Containment Vacuum	Same As Mode 1	Same As Mode 1	Same As Mode 1 and Containment Purge
RP 4; VV-2 SLCRS Unfiltered Pathway[(1)]	Contiguous Areas	Containment Purge[(3)]	Same As Mode 1	Same As Mode 1
RP 5; CV-2, SLCRS Filtered Pathway[(1)]	Aux. Bldg. Ventilation	Same As Mode 1	Same As Mode 1 and Containment Purge[(3)]	Same As Mode 1
RP 6; CB-2, Condensate Polishing Bldg Vent[(1)]	[(4)]	[(4)]	[(4)]	[(4)]
RP 7; WV-2, Waste Gas Storage Vault Vent[(1)]	[(4)]	[(4)]	[(4)]	[(4)]
RP 8; DV-2, Decontamination Bldg Vent[(1)]	[(4)]	[(4)]	[(4)]	[(4)]
RP 9; TV-2, Turbine Bldg Vent[(1)]	[(4)]	[(4)]	[(4)]	[(4)]

NOTE: For the purpose of implementing 10 CFR 50, batch discharges may use continuous meteorology since short term meteorology is used at the time of the annual report.

(1) Continuous ground level meteorology is applicable
(2) Continuous elevated meteorology is applicable
(3) Mode established by purge from one unit, all other release points remain same as Mode 1
(4) Not normally a radioactive release point

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P&I ORGAN DOSE FACTORS

Table 2.3-2

R VALUES FOR BEAVER VALLEY SITE

(mrem/yr per uCi/cu meter)

Pathway = Inhalation
Age Group = Adult

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	1.26E+03	1.26E+03	1.26E+03	1.26E+03	1.26E+03	1.26E+03
2 P-32	1.32E+06	7.71E+04	5.01E+04	0.00E+00	0.00E+00	0.00E+00	8.64E+04
3 Cr-51	0.00E+00	0.00E+00	1.00E+02	5.95E+01	2.28E+01	1.44E+04	3.32E+03
4 Mn-54	0.00E+00	3.96E+04	6.30E+03	0.00E+00	9.84E+03	1.40E+06	7.74E+04
5 Fe-59	1.18E+04	2.78E+04	1.06E+04	0.00E+00	0.00E+00	1.02E+06	1.88E+05
6 Co-57	0.00E+00	6.92E+02	6.71E+02	0.00E+00	0.00E+00	3.70E+05	3.14E+04
7 Co-58	0.00E+00	1.58E+03	2.07E+03	0.00E+00	0.00E+00	9.28E+05	1.06E+05
8 Co-60	0.00E+00	1.15E+04	1.48E+04	0.00E+00	0.00E+00	5.97E+06	2.85E+05
9 Zn-65	3.24E+04	1.03E+05	4.66E+04	0.00E+00	6.90E+04	8.64E+05	5.34E+04
10 Rb-86	0.00E+00	1.35E+05	5.90E+04	0.00E+00	0.00E+00	0.00E+00	1.66E+04
11 Sr-89	3.04E+05	0.00E+00	8.72E+03	0.00E+00	0.00E+00	1.40E+06	3.50E+05
12 Sr-90	9.92E+07	0.00E+00	6.10E+06	0.00E+00	0.00E+00	9.60E+06	7.22E+05
13 Y-91	4.62E+05	0.00E+00	1.24E+04	0.00E+00	0.00E+00	1.70E+06	3.85E+05
14 Zr-95	1.07E+05	3.44E+04	2.33E+04	0.00E+00	5.42E+04	1.77E+06	1.50E+05
15 Nb-95	1.41E+04	7.82E+03	4.21E+03	0.00E+00	7.74E+03	5.05E+05	1.04E+05
16 Nb-97	2.22E-01	5.62E-02	2.05E-02	0.00E+00	6.54E-02	2.40E+03	2.42E+02
17 Mo-99	0.00E+00	1.21E+02	2.30E+01	0.00E+00	2.91E+02	9.12E+04	2.48E+05
18 Tc-99m	1.03E-03	2.91E-03	3.70E-02	0.00E+00	4.42E-02	7.64E+02	4.16E+03
19 Ru-103	1.53E+03	0.00E+00	6.58E+02	0.00E+00	5.83E+03	5.05E+05	1.10E+05
20 Ru-106	6.91E+04	0.00E+00	8.72E+03	0.00E+00	1.34E+05	9.36E+06	9.12E+05
21 Ag-110m	1.08E+04	1.00E+04	5.94E+03	0.00E+00	1.97E+04	4.63E+06	3.02E+05
22 Sb-124	3.12E+04	5.89E+02	1.24E+04	7.55E+01	0.00E+00	2.48E+06	4.06E+05
23 Sb-125	5.34E+04	5.95E+02	1.26E+04	5.40E+01	0.00E+00	1.74E+06	1.01E+05
24 Te-127m	1.26E+04	5.77E+03	1.57E+03	3.29E+03	4.58E+04	9.60E+05	1.50E+05
25 Te-129m	9.76E+03	4.67E+03	1.58E+03	3.44E+03	3.66E+04	1.16E+06	3.83E+05
26 I-131	2.52E+04	3.58E+04	2.05E+04	1.19E+07	6.13E+04	0.00E+00	6.28E+03
27 I-133	8.64E+03	1.48E+04	4.52E+03	2.15E+06	2.58E+04	0.00E+00	8.88E+03
28 Cs-134	3.73E+05	8.48E+05	7.28E+05	0.00E+00	2.87E+05	9.76E+04	1.04E+04
29 Cs-136	3.90E+04	1.46E+05	1.10E+05	0.00E+00	8.56E+04	1.20E+04	1.17E+04
30 Cs-137	4.78E+05	6.21E+05	4.28E+05	0.00E+00	2.22E+05	7.52E+04	8.40E+03
31 Ba-140	3.90E+04	4.90E+01	2.57E+03	0.00E+00	1.67E+01	1.27E+06	2.18E+05
32 La-140	3.44E+02	1.74E+02	4.58E+01	0.00E+00	0.00E+00	1.36E+05	4.58E+05
33 Ce-141	1.99E+04	1.35E+04	1.53E+03	0.00E+00	6.26E+03	3.62E+05	1.20E+05
34 Ce-144	3.43E+06	1.43E+06	1.84E+05	0.00E+00	8.48E+05	7.78E+06	8.16E+05

Calculated per ODCM equation 2.3-22

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P&I ORGAN DOSE FACTORS

Table 2.3-3

R VALUES FOR BEAVER VALLEY SITE

(mrem/yr per uCi/cu meter)

Pathway = Inhalation
Age Group = Teen

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	1.27E+03	1.27E+03	1.27E+03	1.27E+03	1.27E+03	1.27E+03
2 P-32	1.89E+06	1.10E+05	7.16E+04	0.00E+00	0.00E+00	0.00E+00	9.28E+04
3 Cr-51	0.00E+00	0.00E+00	1.35E+02	7.50E+01	3.07E+01	2.10E+04	3.00E+03
4 Mn-54	0.00E+00	5.11E+04	8.40E+03	0.00E+00	1.27E+04	1.98E+06	6.68E+04
5 Fe-59	1.59E+04	3.70E+04	1.43E+04	0.00E+00	0.00E+00	1.53E+06	1.78E+05
6 Co-57	0.00E+00	9.44E+02	9.20E+02	0.00E+00	0.00E+00	5.86E+05	3.14E+04
7 Co-58	0.00E+00	2.07E+03	2.78E+03	0.00E+00	0.00E+00	1.34E+06	9.52E+04
8 Co-60	0.00E+00	1.51E+04	1.98E+04	0.00E+00	0.00E+00	8.72E+06	2.59E+05
9 Zn-65	3.86E+04	1.34E+05	6.24E+04	0.00E+00	8.64E+04	1.24E+06	4.66E+04
10 Rb-86	0.00E+00	1.90E+05	8.40E+04	0.00E+00	0.00E+00	0.00E+00	1.77E+04
11 Sr-89	4.34E+05	0.00E+00	1.25E+04	0.00E+00	0.00E+00	2.42E+06	3.71E+05
12 Sr-90	1.08E+08	0.00E+00	6.68E+06	0.00E+00	0.00E+00	1.65E+07	7.65E+05
13 Y-91	6.61E+05	0.00E+00	1.77E+04	0.00E+00	0.00E+00	2.94E+06	4.09E+05
14 Zr-95	1.46E+05	4.58E+04	3.15E+04	0.00E+00	6.74E+04	2.69E+06	1.49E+05
15 Nb-95	1.86E+04	1.03E+04	5.66E+03	0.00E+00	1.00E+04	7.51E+05	9.68E+04
16 Nb-97	3.14E-01	7.78E-02	2.84E-02	0.00E+00	9.12E-02	3.93E+03	2.17E+03
17 Mo-99	0.00E+00	1.69E+02	3.22E+01	0.00E+00	4.11E+02	1.54E+05	2.69E+05
18 Tc-99m	1.38E-03	3.86E-03	4.99E-02	0.00E+00	5.76E-02	1.15E+03	6.13E+03
19 Ru-103	2.10E+03	0.00E+00	8.96E+02	0.00E+00	7.43E+03	7.83E+05	1.09E+05
20 Ru-106	9.84E+04	0.00E+00	1.24E+04	0.00E+00	1.90E+05	1.61E+07	9.60E+05
21 Ag-110m	1.38E+04	1.31E+04	7.99E+03	0.00E+00	2.50E+04	6.75E+06	2.73E+05
22 Sb-124	4.30E+04	7.94E+02	1.68E+04	9.76E+01	0.00E+00	3.34E+06	3.98E+05
23 Sb-125	7.38E+04	8.08E+02	1.72E+04	7.04E+01	0.00E+00	2.74E+06	9.92E+04
24 Te-127m	1.60E+04	8.16E+03	2.18E+03	4.38E+03	6.54E+04	1.66E+06	1.59E+05
25 Te-129m	1.39E+04	6.58E+03	2.25E+03	4.58E+03	5.19E+04	1.98E+06	4.05E+05
26 I-131	3.54E+04	4.91E+04	2.64E+04	1.46E+07	8.40E+04	0.00E+00	6.49E+03
27 I-133	1.22E+04	2.05E+04	6.22E+03	2.92E+06	3.59E+04	0.00E+00	1.03E+04
28 Cs-134	5.02E+05	1.13E+06	5.49E+05	0.00E+00	3.75E+05	1.46E+05	9.76E+03
29 Cs-136	5.15E+04	1.94E+05	1.37E+05	0.00E+00	1.10E+05	1.78E+04	1.09E+04
30 Cs-137	6.70E+05	8.48E+05	3.11E+05	0.00E+00	3.04E+05	1.21E+05	8.46E+03
31 Ba-140	5.47E+04	6.70E+01	3.52E+03	0.00E+00	2.28E+01	2.03E+06	2.29E+05
32 La-140	4.79E+02	2.36E+02	6.26E+01	0.00E+00	0.00E+00	2.14E+05	4.87E+05
33 Ce-141	2.84E+04	1.90E+04	2.17E+03	0.00E+00	8.86E+03	6.14E+05	1.26E+05
34 Ce-144	4.89E+06	2.02E+06	2.62E+05	0.00E+00	1.21E+06	1.34E+07	8.64E+05

Calculated per ODCM equation 2.3-22

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P&I ORGAN DOSE FACTORS

Table 2.3-4

R VALUES FOR BEAVER VALLEY SITE

(mrem/yr per uCi/cu meter)

Pathway = Inhalation
Age Group = Child

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	1.12E+03	1.12E+03	1.12E+03	1.12E+03	1.12E+03	1.12E+03
2 P-32	2.60E+06	1.14E+05	9.88E+04	0.00E+00	0.00E+00	0.00E+00	4.22E+04
3 Cr-51	0.00E+00	0.00E+00	1.54E+02	8.55E+01	2.43E+01	1.70E+04	1.08E+03
4 Mn-54	0.00E+00	4.29E+04	9.51E+03	0.00E+00	1.00E+04	1.58E+06	2.29E+04
5 Fe-59	2.07E+04	3.34E+04	1.67E+04	0.00E+00	0.00E+00	1.27E+06	7.07E+04
6 Co-57	0.00E+00	9.03E+02	1.07E+03	0.00E+00	0.00E+00	5.07E+05	1.32E+04
7 Co-58	0.00E+00	1.77E+03	3.16E+03	0.00E+00	0.00E+00	1.11E+06	3.44E+04
8 Co-60	0.00E+00	1.31E+04	2.26E+04	0.00E+00	0.00E+00	7.07E+06	9.62E+04
9 Zn-65	4.25E+04	1.13E+05	7.03E+04	0.00E+00	7.14E+04	9.95E+05	1.63E+04
10 Rb-86	0.00E+00	1.98E+05	1.14E+05	0.00E+00	0.00E+00	0.00E+00	7.99E+03
11 Sr-89	5.99E+05	0.00E+00	1.72E+04	0.00E+00	0.00E+00	2.16E+06	1.67E+05
12 Sr-90	1.01E+08	0.00E+00	6.44E+06	0.00E+00	0.00E+00	1.48E+07	3.43E+05
13 Y-91	9.14E+05	0.00E+00	2.44E+04	0.00E+00	0.00E+00	2.63E+06	1.84E+05
14 Zr-95	1.90E+05	4.18E+04	3.70E+04	0.00E+00	5.96E+04	2.23E+06	6.11E+04
15 Nb-95	2.35E+04	9.18E+03	6.55E+03	0.00E+00	8.62E+03	6.14E+05	3.70E+04
16 Nb-97	4.29E-01	7.70E-02	3.60E-02	0.00E+00	8.55E-02	3.42E+03	2.78E+04
17 Mo-99	0.00E+00	1.72E+02	4.26E+01	0.00E+00	3.92E+02	1.35E+05	1.27E+05
18 Tc-99m	1.78E-03	3.48E-03	5.77E-02	0.00E+00	5.07E-02	9.51E+02	4.81E+03
19 Ru-103	2.79E+03	0.00E+00	1.07E+03	0.00E+00	7.03E+03	6.62E+05	4.48E+04
20 Ru-106	1.36E+05	0.00E+00	1.69E+04	0.00E+00	1.64E+05	1.43E+07	4.29E+05
21 Ag-110m	1.69E+04	1.14E+04	9.14E+03	0.00E+00	2.12E+04	5.48E+06	1.00E+05
22 Sb-124	5.74E+04	7.40E+02	2.00E+04	1.26E+02	0.00E+00	3.24E+06	1.64E+05
23 Sb-125	9.84E+04	7.59E+02	2.07E+04	9.10E+01	0.00E+00	2.32E+06	4.03E+04
24 Te-127m	2.49E+04	8.55E+03	3.02E+03	6.07E+03	6.36E+04	1.48E+06	7.14E+04
25 Te-129m	1.92E+04	6.85E+03	3.04E+03	6.33E+03	5.03E+04	1.76E+06	1.82E+05
26 I-131	4.81E+04	4.81E+04	2.73E+04	1.62E+07	7.88E+04	0.00E+00	2.84E+03
27 I-133	1.66E+04	2.03E+04	7.70E+03	3.85E+06	3.38E+04	0.00E+00	5.48E+03
28 Cs-134	6.51E+05	1.01E+06	2.25E+05	0.00E+00	3.30E+05	1.21E+05	3.85E+03
29 Cs-136	6.51E+04	1.71E+05	1.16E+05	0.00E+00	9.55E+04	1.45E+04	4.16E+03
30 Cs-137	9.07E+05	8.25E+05	1.28E+05	0.00E+00	2.82E+05	1.04E+05	3.62E+03
31 Ba-140	7.40E+04	6.48E+01	4.33E+03	0.00E+00	2.11E+01	1.74E+06	1.02E+05
32 La-140	6.44E+02	2.25E+02	7.55E+01	0.00E+00	0.00E+00	1:83E+05	2.26E+05
33 Ce-141	3.92E+04	1.95E+04	2.90E+03	0.00E+00	8.55E+03	5.44E+05	5.66E+04
34 Ce-144	6.77E+06	2.12E+06	3.61E+05	0.00E+00	1.17E+06	1.20E+07	3.89E+05

Calculated per ODCM equation 2.3-22

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P&I ORGAN DOSE FACTORS

Table 2.3-5

R VALUES FOR BEAVER VALLEY SITE

(mrem/yr per uCi/cu meter)

Pathway = Inhalation
Age Group = Infant

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	6.47E+02	6.47E+02	6.47E+02	6.47E+02	6.47E+02	6.47E+02
2 P-32	2.03E+06	1.12E+05	7.74E+04	0.00E+00	0.00E+00	0.00E+00	1.61E+04
3 Cr-51	0.00E+00	0.00E+00	8.95E+01	5.75E+01	1.32E+01	1.28E+04	3.57E+02
4 Mn-54	0.00E+00	2.53E+04	4.98E+03	0.00E+00	4.98E+03	1.00E+06	7.06E+03
5 Fe-59	1.36E+04	2.35E+04	9.48E+03	0.00E+00	0.00E+00	1.01E+06	2.48E+04
6 Co-57	0.00E+00	6.51E+02	6.41E+02	0.00E+00	0.00E+00	3.79E+05	4.86E+03
7 Co-58	0.00E+00	1.22E+03	1.82E+03	0.00E+00	0.00E+00	7.77E+05	1.11E+04
8 Co-60	0.00E+00	8.02E+03	1.18E+04	0.00E+00	0.00E+00	4.51E+06	3.19E+04
9 Zn-65	1.93E+04	6.26E+04	3.11E+04	0.00E+00	3.25E+04	6.47E+05	5.14E+04
10 Rb-86	0.00E+00	1.90E+05	8.82E+04	0.00E+00	0.00E+00	0.00E+00	3.04E+03
11 Sr-89	3.98E+05	0.00E+00	1.14E+04	0.00E+00	0.00E+00	2.03E+06	6.40E+04
12 Sr-90	4.09E+07	0.00E+00	2.59E+06	0.00E+00	0.00E+00	1.12E+07	1.31E+05
13 Y-91	5.88E+05	0.00E+00	1.57E+04	0.00E+00	0.00E+00	2.45E+06	7.03E+04
14 Zr-95	1.15E+05	2.79E+04	2.03E+04	0.00E+00	3.11E+04	1.75E+06	2.17E+04
15 Nb-95	1.57E+04	6.43E+03	3.78E+03	0.00E+00	4.72E+03	4.79E+05	1.27E+04
16 Nb-97	3.42E-01	7.29E-02	2.63E-02	0.00E+00	5.70E-02	3.32E+03	2.69E+04
17 Mo-99	0.00E+00	1.65E+02	3.23E+01	0.00E+00	2.65E+02	1.35E+05	4.87E+04
18 Tc-99m	1.40E-03	2.88E-03	3.72E-02	0.00E+00	3.11E-02	8.11E+02	2.03E+03
19 Ru-103	2.02E+03	0.00E+00	6.79E+02	0.00E+00	4.24E+03	5.52E+05	1.61E+04
20 Ru-106	8.68E+04	0.00E+00	1.09E+04	0.00E+00	1.07E+05	1.16E+07	1.64E+05
21 Ag-110m	9.98E+03	7.22E+03	5.00E+03	0.00E+00	1.09E+04	3.67E+06	3.30E+04
22 Sb-124	3.79E+04	5.56E+02	1.20E+04	1.01E+02	0.00E+00	2.65E+06	5.91E+04
23 Sb-125	5.17E+04	4.77E+02	1.09E+04	6.23E+01	0.00E+00	1.64E+06	1.47E+04
24 Te-127m	1.67E+04	6.90E+03	2.07E+03	4.87E+03	3.75E+04	1.31E+06	2.73E+04
25 Te-129m	1.41E+04	6.09E+03	2.23E+03	4.21E+03	3.18E+04	1.68E+06	6.90E+04
26 I-131	3.79E+04	4.44E+04	1.96E+04	1.48E+07	5.18E+04	0.00E+00	1.06E+03
27 I-133	1.32E+04	1.92E+04	5.60E+03	3.56E+06	2.24E+04	0.00E+00	2.16E+03
28 Cs-134	3.96E+05	7.03E+05	7.45E+04	0.00E+00	1.90E+05	7.97E+04	1.33E+03
29 Cs-136	4.83E+04	1.35E+05	5.29E+04	0.00E+00	5.64E+04	1.18E+04	1.43E+03
30 Cs-137	5.49E+05	6.12E+05	4.55E+04	0.00E+00	1.72E+05	7.13E+04	1.33E+03
31 Ba-140	5.60E+04	5.60E+01	2.90E+03	0.00E+00	1.34E+01	1.60E+06	3.84E+04
32 La-140	5.05E+02	2.00E+02	5.15E+01	0.00E+00	0.00E+00	1.68E+05	8.48E+04
33 Ce-141	2.77E+04	1.67E+04	1.99E+03	0.00E+00	5.25E+03	5.17E+05	2.16E+04
34 Ce-144	3.19E+06	1.21E+06	1.76E+05	0.00E+00	5.38E+05	9.84E+06	1.48E+05

Calculated per ODCM equation 2.3-22

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P&I ORGAN DOSE FACTORS

Table 2.3-6

R VALUES FOR BEAVER VALLEY SITE

(sq meter-mrem/yr per uCi/sec)

Pathway = Ground

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2 P-32	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3 Cr-51	4.66E+06	4.66E+06	4.66E+06	4.66E+06	4.66E+06	4.66E+06	4.66E+06
4 Mn-54	1.39E+09	1.39E+09	1.39E+09	1.39E+09	1.39E+09	1.39E+09	1.39E+09
5 Fe-59	2.73E+08	2.73E+08	2.73E+08	2.73E+08	2.73E+08	2.73E+08	2.73E+08
6 Co-57	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
7 Co-58	3.79E+08	3.79E+08	3.79E+08	3.79E+08	3.79E+08	3.79E+08	3.79E+08
8 Co-60	2.15E+10	2.15E+10	2.15E+10	2.15E+10	2.15E+10	2.15E+10	2.15E+10
9 Zn-65	7.47E+08	7.47E+08	7.47E+08	7.47E+08	7.47E+08	7.47E+08	7.47E+08
10 Rb-86	8.99E+06	8.99E+06	8.99E+06	8.99E+06	8.99E+06	8.99E+06	8.99E+06
11 Sr-89	2.16E+04	2.16E+04	2.16E+04	2.16E+04	2.16E+04	2.16E+04	2.16E+04
12 Sr-90	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
13 Y-91	1.07E+06	1.07E+06	1.07E+06	1.07E+06	1.07E+06	1.07E+06	1.07E+06
14 Zr-95	2.45E+08	2.45E+08	2.45E+08	2.45E+08	2.45E+08	2.45E+08	2.45E+08
15 Nb-95	1.37E+08	1.37E+08	1.37E+08	1.37E+08	1.37E+08	1.37E+08	1.37E+08
16 Nb-97	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
17 Mo-99	4.00E+06	4.00E+06	4.00E+06	4.00E+06	4.00E+06	4.00E+06	4.00E+06
18 Tc-99m	1.84E+05	1.84E+05	1.84E+05	1.84E+05	1.84E+05	1.84E+05	1.84E+05
19 Ru-103	1.08E+08	1.08E+08	1.08E+08	1.08E+08	1.08E+08	1.08E+08	1.08E+08
20 Ru-106	4.22E+08	4.22E+08	4.22E+08	4.22E+08	4.22E+08	4.22E+08	4.22E+08
21 Ag-110m	3.44E+09	3.44E+09	3.44E+09	3.44E+09	3.44E+09	3.44E+09	3.44E+09
22 Sb-124	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23 Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24 Te-127m	9.17E+04	9.17E+04	9.17E+04	9.17E+04	9.17E+04	9.17E+04	9.17E+04
25 Te-129m	1.98E+07	1.98E+07	1.98E+07	1.98E+07	1.98E+07	1.98E+07	1.98E+07
26 I-131	1.72E+07	1.72E+07	1.72E+07	1.72E+07	1.72E+07	1.72E+07	1.72E+07
27 I-133	2.45E+06	2.45E+06	2.45E+06	2.45E+06	2.45E+06	2.45E+06	2.45E+06
28 Cs-134	6.86E+09	6.86E+09	6.86E+09	6.86E+09	6.86E+09	6.86E+09	6.86E+09
29 Cs-136	1.51E+08	1.51E+08	1.51E+08	1.51E+08	1.51E+08	1.51E+08	1.51E+08
30 Cs-137	1.03E+10	1.03E+10	1.03E+10	1.03E+10	1.03E+10	1.03E+10	1.03E+10
31 Ba-140	2.05E+07	2.05E+07	2.05E+07	2.05E+07	2.05E+07	2.05E+07	2.05E+07
32 La-140	1.92E+07	1.92E+07	1.92E+07	1.92E+07	1.92E+07	1.92E+07	1.92E+07
33 Ce-141	1.37E+07	1.37E+07	1.37E+07	1.37E+07	1.37E+07	1.37E+07	1.37E+07
34 Ce-144	6.96E+07	6.96E+07	6.96E+07	6.96E+07	6.96E+07	6.96E+07	6.96E+07

Calculated per ODCM equation 2.3-23

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P&I ORGAN DOSE FACTORS

Table 2.3-7

R VALUES FOR BEAVER VALLEY SITE

(sq meter-mrem/yr per uCi/sec)

Pathway = Vegetation
Age Group = Adult

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	2.26E+03	2.26E+03	2.26E+03	2.26E+03	2.26E+03	2.26E+03
2 P-32	1.40E+09	8.74E+07	5.43E+07	0.00E+00	0.00E+00	0.00E+00	1.58E+08
3 Cr-51	0.00E+00	0.00E+00	4.64E+04	2.78E+04	1.02E+04	6.16E+04	1.17E+07
4 Mn-54	0.00E+00	3.13E+08	5.97E+07	0.00E+00	9.31E+07	0.00E+00	9.59E+08
5 Fe-59	1.26E+08	2.96E+08	1.14E+08	0.00E+00	0.00E+00	8.28E+07	9.88E+08
6 Co-57	0.00E+00	1.17E+07	1.95E+07	0.00E+00	0.00E+00	0.00E+00	2.97E+08
7 Co-58	0.00E+00	3.07E+07	6.89E+07	0.00E+00	0.00E+00	0.00E+00	6.23E+08
8 Co-60	0.00E+00	1.67E+08	3.69E+08	0.00E+00	0.00E+00	0.00E+00	3.14E+09
9 Zn-65	3.17E+08	1.01E+09	4.56E+08	0.00E+00	6.75E+08	0.00E+00	6.36E+08
10 Rb-86	0.00E+00	2.19E+08	1.02E+08	0.00E+00	0.00E+00	0.00E+00	4.33E+07
11 Sr-89	9.97E+09	0.00E+00	2.86E+08	0.00E+00	0.00E+00	0.00E+00	1.60E+09
12 Sr-90	6.05E+11	0.00E+00	1.48E+11	0.00E+00	0.00E+00	0.00E+00	1.75E+10
13 Y-91	5.11E+06	0.00E+00	1.37E+05	0.00E+00	0.00E+00	0.00E+00	2.81E+09
14 Zr-95	1.17E+06	3.77E+05	2.55E+05	0.00E+00	5.91E+05	0.00E+00	1.19E+09
15 Nb-95	1.42E+05	7.92E+04	4.26E+04	0.00E+00	7.83E+04	0.00E+00	4.81E+08
16 Nb-97	2.16E-06	5.46E-07	1.99E-07	0.00E+00	6.37E-07	0.00E+00	2.02E-03
17 Mo-99	0.00E+00	6.15E+06	1.17E+06	0.00E+00	1.39E+07	0.00E+00	1.43E+07
18 Tc-99m	3.10E+00	8.77E+00	1.12E+02	0.00E+00	1.33E+02	4.30E+00	5.19E+03
19 Ru-103	4.77E+06	0.00E+00	2.06E+06	0.00E+00	1.62E+07	0.00E+00	5.57E+08
20 Ru-106	1.93E+08	0.00E+00	2.44E+07	0.00E+00	3.72E+08	0.00E+00	1.25E+10
21 Ag-110m	1.05E+07	9.75E+06	5.79E+06	0.00E+00	1.92E+07	0.00E+00	3.98E+09
22 Sb-124	1.04E+08	1.96E+06	4.11E+07	2.51E+05	0.00E+00	8.07E+07	2.94E+09
23 Sb-125	1.37E+08	1.53E+06	3.25E+07	1.39E+05	0.00E+00	1.05E+08	1.50E+09
24 Te-127m	3.49E+08	1.25E+08	4.26E+07	8.92E+07	1.42E+09	0.00E+00	1.17E+09
25 Te-129m	2.51E+08	9.38E+07	3.98E+07	8.64E+07	1.05E+09	0.00E+00	1.27E+09
26 I-131	8.08E+07	1.16E+08	6.62E+07	3.79E+10	1.98E+08	0.00E+00	3.05E+07
27 I-133	2.09E+06	3.63E+06	1.11E+06	5.33E+08	6.33E+06	0.00E+00	3.26E+06
28 Cs-134	4.67E+09	1.11E+10	9.08E+09	0.00E+00	3.59E+09	1.18E+09	1.94E+08
29 Cs-136	4.27E+07	1.69E+08	1.21E+08	0.00E+00	9.36E+07	1.29E+07	1.91E+07
30 Cs-137	6.36E+09	8.70E+09	5.70E+09	0.00E+00	2.95E+09	9.81E+08	1.68E+08
31 Ba-140	1.29E+08	1.61E+05	8.42E+06	0.00E+00	5.49E+04	9.24E+04	2.65E+08
32 La-140	1.98E+03	9.97E+02	2.63E+02	0.00E+00	0.00E+00	0.00E+00	7.32E+07
33 Ce-141	1.97E+05	1.33E+05	1.51E+04	0.00E+00	6.19E+04	0.00E+00	5.10E+08
34 Ce-144	3.29E+07	1.38E+07	1.77E+06	0.00E+00	8.16E+06	0.00E+00	1.11E+10

All nuclides (except H-3) calculated per ODCM equation 2.3-26
H-3 calculated per ODCM equation 2.3-29

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P&I ORGAN DOSE FACTORS

Table 2.3-8

R VALUES FOR BEAVER VALLEY SITE

(sq meter-mrem/yr per uCi/sec)

Pathway = Vegetation
Age Group = Teen

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	2.59E+03	2.59E+03	2.59E+03	2.59E+03	2.59E+03	2.59E+03
2 P-32	1.61E+09	9.86E+07	6.24E+07	0.00E+00	0.00E+00	0.00E+00	1.35E+08
3 Cr-51	0.00E+00	0.00E+00	6.17E+04	3.43E+04	1.35E+04	8.81E+04	1.04E+07
4 Mn-54	0.00E+00	4.54E+08	9.01E+07	0.00E+00	1.36E+08	0.00E+00	9.32E+08
5 Fe-59	1.79E+08	4.19E+08	1.62E+08	0.00E+00	0.00E+00	1.32E+08	9.90E+08
6 Co-57	0.00E+00	1.79E+07	3.00E+07	0.00E+00	0.00E+00	0.00E+00	3.33E+08
7 Co-58	0.00E+00	4.36E+07	1.00E+08	0.00E+00	0.00E+00	0.00E+00	6.01E+08
8 Co-60	0.00E+00	2.49E+08	5.60E+08	0.00E+00	0.00E+00	0.00E+00	3.24E+09
9 Zn-65	4.24E+08	1.47E+09	6.87E+08	0.00E+00	9.42E+08	0.00E+00	6.23E+08
10 Rb-86	0.00E+00	2.74E+08	1.29E+08	0.00E+00	0.00E+00	0.00E+00	4.05E+07
11 Sr-89	1.51E+10	0.00E+00	4.34E+08	0.00E+00	0.00E+00	0.00E+00	1.80E+09
12 Sr-90	7.51E+11	0.00E+00	1.85E+11	0.00E+00	0.00E+00	0.00E+00	2.11E+10
13 Y-91	7.84E+06	0.00E+00	2.10E+05	0.00E+00	0.00E+00	0.00E+00	3.21E+09
14 Zr-95	1.72E+06	5.43E+05	3.74E+05	0.00E+00	7.98E+05	0.00E+00	1.25E+09
15 Nb-95	1.92E+05	1.07E+05	5.87E+04	0.00E+00	1.03E+05	0.00E+00	4.56E+08
16 Nb-97	2.00E-06	4.97E-07	1.81E-07	0.00E+00	5.81E-07	0.00E+00	1.19E-02
17 Mo-99	0.00E+00	5.65E+06	1.08E+06	0.00E+00	1.29E+07	0.00E+00	1.01E+07
18 Tc-99m	2.74E+00	7.64E+00	9.90E+01	0.00E+00	1.14E+02	4.24E+00	5.02E+03
19 Ru-103	6.82E+06	0.00E+00	2.92E+06	0.00E+00	2.41E+07	0.00E+00	5.70E+08
20 Ru-106	2.38E+08	0.00E+00	3.90E+07	0.00E+00	5.97E+08	0.00E+00	1.48E+10
21 Ag-110m	1.52E+07	1.43E+07	8.72E+06	0.00E+00	2.74E+07	0.00E+00	4.03E+09
22 Sb-124	1.54E+08	2.84E+06	6.02E+07	3.50E+05	0.00E+00	1.35E+08	3.11E+09
23 Sb-125	2.14E+08	2.34E+06	5.01E+07	2.05E+05	0.00E+00	1.88E+08	1.67E+09
24 Te-127m	5.52E+08	1.96E+08	6.58E+07	1.31E+08	2.24E+09	0.00E+00	1.37E+09
25 Te-129m	3.62E+08	1.34E+08	5.73E+07	1.17E+08	1.51E+09	0.00E+00	1.36E+09
26 I-131	7.69E+07	1.08E+08	5.78E+07	3.14E+10	1.85E+08	0.00E+00	2.13E+07
27 I-133	1.94E+06	3.29E+06	1.00E+06	4.59E+08	5.77E+06	0.00E+00	2.49E+06
28 Cs-134	7.10E+09	1.67E+10	7.75E+09	0.00E+00	5.31E+09	2.03E+09	2.08E+08
29 Cs-136	4.38E+07	1.72E+08	1.16E+08	0.00E+00	9.37E+07	1.48E+07	1.39E+07
30 Cs-137	1.01E+10	1.35E+10	4.69E+09	0.00E+00	4.59E+09	1.78E+09	1.92E+08
31 Ba-140	1.38E+08	1.69E+05	8.90E+06	0.00E+00	5.74E+04	1.14E+05	2.13E+08
32 La-140	1.81E+03	8.88E+02	2.36E+02	0.00E+00	0.00E+00	0.00E+00	5.10E+07
33 Ce-141	2.83E+05	1.89E+05	2.17E+04	0.00E+00	8.90E+04	0.00E+00	5.41E+08
34 Ce-144	5.27E+07	2.18E+07	2.83E+06	0.00E+00	1.30E+07	0.00E+00	1.33E+10

All nuclides (except H-3) calculated per ODCM equation 2.3-28
H-3 calculated per ODCM equation 2.3-29

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P&I ORGAN DOSE FACTORS

Table 2.3-9

R VALUES FOR BEAVER VALLEY SITE

(sq meter-mrem/yr per uCi/sec)

Pathway = Vegetation
Age Group = Child

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	4.01E+03	4.01E+03	4.01E+03	4.01E+03	4.01E+03	4.01E+03
2 P-32	3.37E+09	1.58E+08	1.30E+08	0.00E+00	0.00E+00	0.00E+00	9.32E+07
3 Cr-51	0.00E+00	0.00E+00	1.17E+05	6.50E+04	1.78E+04	1.19E+05	6.21E+06
4 Mn-54	0.00E+00	6.65E+08	1.77E+08	0.00E+00	1.86E+08	0.00E+00	5.58E+08
5 Fe-59	3.98E+08	6.43E+08	3.20E+08	0.00E+00	0.00E+00	1.87E+08	6.70E+08
6 Co-57	0.00E+00	2.99E+07	6.04E+07	0.00E+00	0.00E+00	0.00E+00	2.45E+08
7 Co-58	0.00E+00	6.44E+07	1.97E+08	0.00E+00	0.00E+00	0.00E+00	3.76E+08
8 Co-60	0.00E+00	3.78E+08	1.12E+09	0.00E+00	0.00E+00	0.00E+00	2.10E+09
9 Zn-65	8.13E+08	2.17E+09	1.35E+09	0.00E+00	1.36E+09	0.00E+00	3.80E+08
10 Rb-86	0.00E+00	4.52E+08	2.78E+08	0.00E+00	0.00E+00	0.00E+00	2.91E+07
11 Sr-89	3.60E+10	0.00E+00	1.03E+09	0.00E+00	0.00E+00	0.00E+00	1.39E+09
12 Sr-90	1.24E+12	0.00E+00	3.15E+11	0.00E+00	0.00E+00	0.00E+00	1.67E+10
13 Y-91	1.86E+07	0.00E+00	4.99E+05	0.00E+00	0.00E+00	0.00E+00	2.48E+09
14 Zr-95	3.86E+06	8.48E+05	7.55E+05	0.00E+00	1.21E+06	0.00E+00	8.85E+08
15 Nb-95	4.11E+05	1.60E+05	1.14E+05	0.00E+00	1.50E+05	0.00E+00	2.96E+08
16 Nb-97	3.65E-06	6.59E-07	3.08E-07	0.00E+00	7.31E-07	0.00E+00	2.03E-01
17 Mo-99	0.00E+00	7.71E+06	1.91E+06	0.00E+00	1.65E+07	0.00E+00	6.38E+06
18 Tc-99m	4.71E+00	9.24E+00	1.53E+02	0.00E+00	1.34E+02	4.69E+00	5.26E+03
19 Ru-103	1.53E+07	0.00E+00	5.90E+06	0.00E+00	3.86E+07	0.00E+00	3.97E+08
20 Ru-106	7.45E+08	0.00E+00	9.30E+07	0.00E+00	1.01E+09	0.00E+00	1.16E+10
21 Ag-110m	3.21E+07	2.17E+07	1.73E+07	0.00E+00	4.04E+07	0.00E+00	2.58E+09
22 Sb-124	3.52E+08	4.57E+06	1.23E+08	7.77E+05	0.00E+00	1.95E+08	2.20E+09
23 Sb-125	4.99E+08	3.85E+06	1.05E+08	4.63E+05	0.00E+00	2.78E+08	1.19E+09
24 Te-127m	1.32E+09	3.56E+08	1.57E+08	3.16E+08	3.77E+09	0.00E+00	1.07E+09
25 Te-129m	8.41E+08	2.35E+08	1.31E+08	2.71E+08	2.47E+09	0.00E+00	1.03E+09
26 I-131	1.43E+08	1.44E+08	8.17E+07	4.76E+10	2.36E+08	0.00E+00	1.28E+07
27 I-133	3.53E+06	4.37E+06	1.65E+06	8.12E+08	7.28E+06	0.00E+00	1.76E+06
28 Cs-134	1.60E+10	2.63E+10	5.55E+09	0.00E+00	8.15E+09	2.93E+09	1.42E+08
29 Cs-136	8.24E+07	2.27E+08	1.47E+08	0.00E+00	1.21E+08	1.80E+07	7.96E+06
30 Cs-137	2.39E+10	2.29E+10	3.38E+09	0.00E+00	7.46E+09	2.68E+09	1.43E+08
31 Ba-140	2.77E+08	2.42E+07	1.62E+07	0.00E+00	7.89E+04	1.45E+05	1.40E+08
32 La-140	3.25E+03	1.13E+03	3.83E+02	0.00E+00	0.00E+00	0.00E+00	3.16E+07
33 Ce-141	6.56E+05	3.27E+05	4.86E+05	0.00E+00	1.43E+05	0.00E+00	4.08E+08
34 Ce-144	1.27E+08	3.98E+07	6.78E+06	0.00E+00	2.21E+07	0.00E+00	1.04E+10

All nuclides (except H-3) calculated per ODCM equation 2.3-28
H-3 calculated per ODCM equation 2.3-29

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P&I ORGAN DOSE FACTORS

Table 2.3-10

R VALUES FOR BEAVER VALLEY SITE

(sq meter-mrem/yr per uCi/sec)

Pathway = Meat
Age Group = Adult

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	3.25E+02	3.25E+02	3.25E+02	3.25E+02	3.25E+02	3.25E+02
2 P-32	3.95E+09	2.46E+08	1.53E+08	0.00E+00	0.00E+00	0.00E+00	4.44E+08
3 Cr-51	0.00E+00	0.00E+00	5.68E+03	3.50E+03	1.29E+03	7.78E+03	1.47E+06
4 Mn-54	0.00E+00	6.49E+06	1.24E+06	0.00E+00	1.93E+06	0.00E+00	1.99E+07
5 Fe-59	2.14E+08	5.04E+08	1.93E+08	0.00E+00	0.00E+00	1.41E+08	1.68E+09
6 Co-57	0.00E+00	4.01E+06	6.66E+06	0.00E+00	0.00E+00	0.00E+00	1.02E+08
7 Co-58	0.00E+00	1.42E+07	3.18E+07	0.00E+00	0.00E+00	0.00E+00	2.87E+08
8 Co-60	0.00E+00	5.12E+07	1.13E+08	0.00E+00	0.00E+00	0.00E+00	9.61E+08
9 Zn-65	2.54E+08	8.09E+08	3.66E+08	0.00E+00	5.41E+08	0.00E+00	5.10E+08
10 Rb-86	0.00E+00	4.11E+08	1.92E+08	0.00E+00	0.00E+00	0.00E+00	8.11E+07
11 Sr-89	2.41E+08	0.00E+00	6.92E+06	0.00E+00	0.00E+00	0.00E+00	3.87E+07
12 Sr-90	8.41E+09	0.00E+00	2.06E+09	0.00E+00	0.00E+00	0.00E+00	2.43E+08
13 Y-91	8.94E+05	0.00E+00	2.39E+04	0.00E+00	0.00E+00	0.00E+00	4.92E+08
14 Zr-95	1.47E+06	4.71E+05	3.19E+05	0.00E+00	7.39E+05	0.00E+00	1.49E+09
15 Nb-95	1.89E+06	1.05E+06	5.64E+05	0.00E+00	1.04E+06	0.00E+00	6.37E+09
16 Nb-97	******************************			0.00E+00	***********	0.00E+00	***********
17 Mo-99	0.00E+00	8.51E+04	1.62E+04	0.00E+00	1.93E+05	0.00E+00	1.97E+05
18 Tc-99m	3.63E-21	1.06E-20	1.36E-19	0.00E+00	1.64E-19	5.30E-21	6.40E-18
19 Ru-103	8.57E+07	0.00E+00	3.69E+07	0.00E+00	3.27E+08	0.00E+00	1.00E+10
20 Ru-106	1.97E+09	0.00E+00	2.49E+08	0.00E+00	3.80E+09	0.00E+00	1.27E+11
21 Ag-110m	4.77E+06	4.41E+06	2.62E+06	0.00E+00	8.67E+06	0.00E+00	1.80E+09
22 Sb-124	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23 Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24 Te-127m	8.38E+08	3.00E+08	1.02E+08	2.14E+08	3.40E+09	0.00E+00	2.81E+09
25 Te-129m	9.33E+08	3.48E+08	1.48E+08	3.21E+08	3.89E+09	0.00E+00	4.70E+09
26 I-131	9.13E+06	1.31E+07	7.48E+06	4.28E+09	2.24E+07	0.00E+00	3.45E+06
27 I-133	3.12E-01	5.42E-01	1.65E-01	7.96E+01	9.46E-01	0.00E+00	4.87E-01
28 Cs-134	4.53E+08	1.08E+09	8.81E+08	0.00E+00	3.49E+08	1.16E+08	1.89E+07
29 Cs-136	1.02E+07	4.04E+07	2.91E+07	0.00E+00	2.25E+07	3.08E+06	4.59E+06
30 Cs-137	5.90E+08	8.06E+08	5.28E+08	0.00E+00	2.74E+08	9.10E+07	1.56E+07
31 Ba-140	2.44E+07	3.06E+04	1.60E+06	0.00E+00	1.04E+04	1.75E+04	5.02E+07
32 La-140	3.16E-02	1.59E-02	4.21E-03	0.00E+00	0.00E+00	0.00E+00	1.17E+03
33 Ce-141	1.16E+04	7.83E+03	8.88E+02	0.00E+00	3.64E+03	0.00E+00	2.99E+07
34 Ce-144	1.03E+06	4.32E+05	5.55E+04	0.00E+00	2.56E+05	0.00E+00	3.50E+08

All nuclides (except H-3) calculated per ODCM equation 2.3-25
H-3 calculated per ODCM equation 2.3-30

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P&I ORGAN DOSE FACTORS

Table 2.3-11

R VALUES FOR BEAVER VALLEY SITE

(sq meter-mrem/yr per uCi/sec)

Pathway = Meat
Age Group = Teen

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	1.94E+02	1.94E+02	1.94E+02	1.94E+02	1.94E+02	1.94E+02
2 P-32	3.34E+09	2.07E+08	1.29E+08	0.00E+00	0.00E+00	0.00E+00	2.80E+08
3 Cr-51	0.00E+00	0.00E+00	4.69E+03	2.60E+03	1.03E+03	6.69E+03	7.88E+05
4 Mn-54	0.00E+00	4.95E+06	9.81E+05	0.00E+00	1.48E+06	0.00E+00	1.01E+07
5 Fe-59	1.71E+08	4.00E+08	1.54E+08	0.00E+00	0.00E+00	1.26E+08	9.45E+08
6 Co-57	0.00E+00	3.22E+06	5.40E+06	0.00E+00	0.00E+00	0.00E+00	6.01E+07
7 Co-58	0.00E+00	1.09E+07	2.52E+07	0.00E+00	0.00E+00	0.00E+00	1.51E+08
8 Co-60	0.00E+00	3.97E+07	8.95E+07	0.00E+00	0.00E+00	0.00E+00	5.17E+08
9 Zn-65	1.79E+08	6.21E+08	2.90E+08	0.00E+00	3.97E+08	0.00E+00	2.63E+08
10 Rb-86	0.00E+00	3.43E+08	1.61E+08	0.00E+00	0.00E+00	0.00E+00	5.08E+07
11 Sr-89	2.03E+08	0.00E+00	5.83E+06	0.00E+00	0.00E+00	0.00E+00	2.42E+07
12 Sr-90	5.44E+09	0.00E+00	1.34E+09	0.00E+00	0.00E+00	0.00E+00	1.53E+08
13 Y-91	7.53E+05	0.00E+00	2.02E+04	0.00E+00	0.00E+00	0.00E+00	3.09E+08
14 Zr-95	1.18E+06	3.71E+05	2.55E+05	0.00E+00	5.45E+05	0.00E+00	8.56E+08
15 Nb-95	1.47E+06	8.17E+05	4.50E+05	0.00E+00	7.92E+05	0.00E+00	3.49E+09
16 Nb-97	***********	***********	***********	0.00E+00	***********	0.00E+00	***********
17 Mo-99	0.00E+00	7.03E+04	1.34E+04	0.00E+00	1.61E+05	0.00E+00	1.26E+05
18 Tc-99m	3.04E-21	8.48E-21	1.10E-19	0.00E+00	1.26E-19	4.71E-21	5.57E-18
19 Ru-103	6.96E+07	0.00E+00	2.98E+07	0.00E+00	2.46E+08	0.00E+00	5.83E+09
20 Ru-106	1.28E+09	0.00E+00	2.09E+08	0.00E+00	3.19E+09	0.00E+00	7.94E+10
21 Ag-110m	3.61E+06	3.42E+06	2.08E+06	0.00E+00	6.52E+06	0.00E+00	9.60E+08
22 Sb-124	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23 Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24 Te-127m	7.07E+08	2.51E+08	8.41E+07	1.68E+08	2.87E+09	0.00E+00	1.76E+09
25 Te-129m	7.82E+08	2.90E+08	1.24E+08	2.52E+08	3.27E+09	0.00E+00	2.93E+09
26 I-131	7.59E+06	1.06E+07	5.71E+06	3.10E+09	1.83E+07	0.00E+00	2.10E+06
27 I-133	2.61E-01	4.42E-01	1.35E-01	6.17E+01	7.75E-01	0.00E+00	3.34E-01
28 Cs-134	3.60E+08	8.48E+08	3.93E+08	0.00E+00	2.69E+08	1.03E+08	1.05E+07
29 Cs-136	7.98E+06	3.14E+07	2.11E+07	0.00E+00	1.71E+07	2.69E+06	2.53E+06
30 Cs-137	4.90E+08	6.51E+08	2.27E+08	0.00E+00	2.22E+08	8.61E+07	9.27E+06
31 Ba-140	2.02E+07	2.47E+04	1.30E+06	0.00E+00	8.38E+03	1.68E+04	3.11E+07
32 La-140	2.60E-02	1.28E-02	3.40E-03	0.00E+00	0.00E+00	0.00E+00	7.33E+02
33 Ce-141	9.72E+03	6.49E+03	7.46E+02	0.00E+00	3.06E+03	0.00E+00	1.86E+07
34 Ce-144	8.72E+05	3.61E+05	4.68E+04	0.00E+00	2.15E+05	0.00E+00	2.19E+08

All nuclides (except H-3) calculated per ODCM equation 2.3-25
H-3 calculated per ODCM equation 2.3-30

P&I ORGAN DOSE FACTORS

Table 2.3-12

R VALUES FOR BEAVER VALLEY SITE

(sq meter-mrem/yr per uCi/sec)

Pathway = Meat
Age Group = Child

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	2.34E+02	2.34E+02	2.34E+02	2.34E+02	2.34E+02	2.34E+02
2 P-32	6.29E+09	2.94E+08	2.43E+08	0.00E+00	0.00E+00	0.00E+00	1.74E+08
3 Cr-51	0.00E+00	0.00E+00	7.31E+03	4.06E+03	1.11E+03	7.41E+03	3.88E+05
4 Mn-54	0.00E+00	5.68E+06	1.51E+06	0.00E+00	1.59E+06	0.00E+00	4.75E+06
5 Fe-59	3.04E+08	4.91E+08	2.45E+08	0.00E+00	0.00E+00	1.42E+08	5.12E+08
6 Co-57	0.00E+00	4.21E+06	8.52E+06	0.00E+00	0.00E+00	0.00E+00	3.45E+07
7 Co-58	0.00E+00	1.28E+07	3.91E+07	0.00E+00	0.00E+00	0.00E+00	7.45E+07
8 Co-60	0.00E+00	4.72E+07	1.39E+08	0.00E+00	0.00E+00	0.00E+00	2.61E+08
9 Zn-65	2.68E+08	7.15E+08	4.44E+08	0.00E+00	4.50E+08	0.00E+00	1.25E+08
10 Rb-86	0.00E+00	4.87E+08	2.99E+08	0.00E+00	0.00E+00	0.00E+00	3.13E+07
11 Sr-89	3.85E+08	0.00E+00	1.10E+07	0.00E+00	0.00E+00	0.00E+00	1.49E+07
12 Sr-90	7.03E+09	0.00E+00	1.78E+09	0.00E+00	0.00E+00	0.00E+00	9.47E+07
13 Y-91	1.42E+06	0.00E+00	3.81E+04	0.00E+00	0.00E+00	0.00E+00	1.90E+08
14 Zr-95	2.09E+06	4.59E+05	4.09E+05	0.00E+00	6.57E+05	0.00E+00	4.79E+08
15 Nb-95	2.54E+06	9.90E+05	7.07E+05	0.00E+00	9.30E+05	0.00E+00	1.83E+09
16 Nb-97	***********	***********	***********	0.00E+00	***********	0.00E+00	***********
17 Mo-99	0.00E+00	9.79E+04	2.42E+04	0.00E+00	2.09E+05	0.00E+00	8.09E+04
18 Tc-99m	5.33E-21	1.05E-20	1.73E-19	0.00E+00	1.52E-19	5.31E-21	5.95E-18
19 Ru-103	1.26E+08	0.00E+00	4.85E+07	0.00E+00	3.18E+08	0.00E+00	3.26E+09
20 Ru-106	3.12E+09	0.00E+00	3.89E+08	0.00E+00	4.21E+09	0.00E+00	4.85E+10
21 Ag-110m	5.99E+06	4.04E+06	3.23E+06	0.00E+00	7.53E+06	0.00E+00	4.81E+08
22 Sb-124	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23 Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24 Te-127m	1.33E+09	3.59E+08	1.58E+08	3.19E+08	3.80E+09	0.00E+00	1.08E+09
25 Te-129m	1.47E+09	4.11E+08	2.29E+08	4.75E+08	4.33E+09	0.00E+00	1.80E+09
26 I-131	1.41E+07	1.42E+07	8.04E+06	4.68E+09	2.32E+07	0.00E+00	1.26E+06
27 I-133	4.84E-01	5.99E-01	2.27E-01	1.11E+02	9.98E-01	0.00E+00	2.41E-01
28 Cs-134	6.35E+08	1.04E+09	2.20E+08	0.00E+00	3.23E+08	1.16E+08	5.62E+06
29 Cs-136	1.38E+07	3.78E+07	2.45E+07	0.00E+00	2.01E+07	3.00E+06	1.33E+06
30 Cs-137	9.02E+08	8.63E+08	1.27E+08	0.00E+00	2.81E+08	1.01E+08	5.40E+06
31 Ba-140	3.72E+07	3.26E+06	2.17E+06	0.00E+00	1.06E+04	1.94E+04	1.89E+07
32 La-140	4.76E-02	1.66E-02	5.61E-03	0.00E+00	0.00E+00	0.00E+00	4.63E+02
33 Ce-141	1.83E+04	9.13E+03	1.36E+04	0.00E+00	4.00E+03	0.00E+00	1.14E+07
34 Ce-144	1.64E+06	5.15E+05	8.77E+04	0.00E+00	2.85E+05	0.00E+00	1.34E+08

All nuclides (except H-3) calculated per ODCM equation 2.3-25
H-3 calculated per ODCM equation 2.3-30

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P&I ORGAN DOSE FACTORS

Table 2.3-13

R VALUES FOR BEAVER VALLEY SITE

(sq meter-mrem/yr per uCi/sec)

Pathway = Cow Milk
Age Group = Adult

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	7.63E+02	7.63E+02	7.63E+02	7.63E+02	7.63E+02	7.63E+02
2 P-32	1.45E+10	9.01E+08	5.60E+08	0.00E+00	0.00E+00	0.00E+00	1.63E+09
3 Cr-51	0.00E+00	0.00E+00	2.38E+04	1.42E+04	5.24E+03	3.15E+04	5.98E+06
4 Mn-54	0.00E+00	5.95E+06	1.13E+06	0.00E+00	1.77E+06	0.00E+00	1.82E+07
5 Fe-59	2.40E+07	5.63E+07	2.16E+07	0.00E+00	0.00E+00	1.57E+07	1.68E+08
6 Co-57	0.00E+00	9.10E+05	1.51E+06	0.00E+00	0.00E+00	0.00E+00	2.31E+07
7 Co-58	0.00E+00	3.67E+06	8.22E+06	0.00E+00	0.00E+00	0.00E+00	7.43E+07
8 Co-60	0.00E+00	1.12E+07	2.46E+07	0.00E+00	0.00E+00	0.00E+00	2.10E+08
9 Zn-65	9.60E+08	3.12E+09	1.41E+09	0.00E+00	2.09E+09	0.00E+00	1.96E+09
10 Rb-86	0.00E+00	2.19E+09	1.02E+09	0.00E+00	0.00E+00	0.00E+00	4.32E+08
11 Sr-89	1.16E+09	0.00E+00	3.33E+07	0.00E+00	0.00E+00	0.00E+00	1.86E+08
12 Sr-90	3.16E+10	0.00E+00	7.76E+09	0.00E+00	0.00E+00	0.00E+00	9.14E+08
13 Y-91	6.78E+03	0.00E+00	1.81E+02	0.00E+00	0.00E+00	0.00E+00	3.73E+06
14 Zr-95	7.40E+02	2.37E+02	1.61E+02	0.00E+00	3.72E+02	0.00E+00	7.52E+05
15 Nb-95	6.77E+04	3.77E+04	2.03E+04	0.00E+00	3.72E+04	0.00E+00	2.29E+08
16 Nb-97	2.81E-12	7.11E-13	2.60E-13	0.00E+00	8.30E-13	0.00E+00	2.62E-09
17 Mo-99	0.00E+00	2.11E+07	4.01E+06	0.00E+00	4.77E+07	0.00E+00	4.88E+07
18 Tc-99m	2.83E+00	7.99E+00	1.02E+02	0.00E+00	1.21E+02	3.91E+00	4.73E+03
19 Ru-103	8.29E+02	0.00E+00	3.57E+02	0.00E+00	3.16E+03	0.00E+00	9.68E+04
20 Ru-106	1.43E+04	0.00E+00	1.81E+03	0.00E+00	2.77E+04	0.00E+00	9.27E+05
21 Ag-110m	4.16E+07	3.84E+07	2.28E+07	0.00E+00	7.58E+07	0.00E+00	1.57E+10
22 Sb-124	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23 Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24 Te-127m	3.44E+07	1.23E+07	4.19E+08	8.79E+06	1.40E+08	0.00E+00	1.15E+08
25 Te-129m	4.95E+07	1.85E+07	7.84E+06	1.70E+07	2.07E+08	0.00E+00	2.49E+08
26 I-131	2.52E+08	3.60E+08	2.06E+08	1.18E+11	6.17E+08	0.00E+00	9.50E+07
27 I-133	3.29E+06	5.72E+06	1.75E+06	8.41E+08	9.99E+06	0.00E+00	5.14E+06
28 Cs-134	3.89E+09	9.27E+09	7.58E+09	0.00E+00	3.00E+09	9.96E+08	1.62E+08
29 Cs-136	2.23E+08	8.82E+08	6.35E+08	0.00E+00	4.91E+08	6.73E+07	1.00E+08
30 Cs-137	4.99E+09	6.82E+09	4.47E+09	0.00E+00	2.32E+09	7.70E+08	1.32E+08
31 Ba-140	2.28E+07	2.87E+04	1.49E+06	0.00E+00	9.74E+03	1.64E+04	4.70E+07
32 La-140	3.84E+00	1.93E+00	5.11E-01	0.00E+00	0.00E+00	0.00E+00	1.42E+05
33 Ce-141	3.99E+03	2.70E+03	3.06E+02	0.00E+00	1.25E+03	0.00E+00	1.03E+07
34 Ce-144	2.54E+05	1.08E+05	1.36E+04	0.00E+00	6.29E+04	0.00E+00	8.58E+07

All nuclides (except H-3) calculated per ODCM equation 2.3-24
H-3 calculated per ODCM equation 2.3-28

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P&I ORGAN DOSE FACTORS

Table 2.3-14

R VALUES FOR BEAVER VALLEY SITE

(sq meter-area/yr per uCi/sec)

Pathway = Cow Milk
Age Group = Teen

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	9.94E+02	9.94E+02	9.94E+02	9.94E+02	9.94E+02	9.94E+02
2 P-32	2.67E+10	1.86E+09	1.04E+09	0.00E+00	0.00E+00	0.00E+00	2.25E+09
3 Cr-51	0.00E+00	0.00E+00	4.15E+04	2.31E+04	9.10E+03	5.93E+04	6.97E+06
4 Mn-54	0.00E+00	9.91E+06	1.96E+06	0.00E+00	2.95E+06	0.00E+00	2.03E+07
5 Fe-59	4.18E+07	9.76E+07	3.77E+07	0.00E+00	0.00E+00	3.08E+07	2.31E+08
6 Co-57	0.00E+00	1.60E+06	2.68E+06	0.00E+00	0.00E+00	0.00E+00	2.98E+07
7 Co-58	0.00E+00	6.17E+06	1.42E+07	0.00E+00	0.00E+00	0.00E+00	8.51E+07
8 Co-60	0.00E+00	1.89E+07	4.26E+07	0.00E+00	0.00E+00	0.00E+00	2.46E+08
9 Zn-65	1.51E+09	5.23E+09	2.44E+09	0.00E+00	3.34E+09	0.00E+00	2.21E+09
10 Rb-86	0.00E+00	3.99E+09	1.87E+09	0.00E+00	0.00E+00	0.00E+00	5.91E+08
11 Sr-89	2.14E+09	0.00E+00	6.12E+07	0.00E+00	0.00E+00	0.00E+00	2.55E+08
12 Sr-90	4.47E+10	0.00E+00	1.10E+10	0.00E+00	0.00E+00	0.00E+00	1.25E+09
13 Y-91	1.25E+04	0.00E+00	3.35E+02	0.00E+00	0.00E+00	0.00E+00	5.11E+06
14 Zr-95	1.29E+03	4.08E+02	2.81E+02	0.00E+00	6.00E+02	0.00E+00	9.42E+05
15 Nb-95	1.16E+05	6.41E+04	3.53E+04	0.00E+00	6.21E+04	0.00E+00	2.74E+08
16 Nb-97	5.13E-12	1.27E-12	4.65E-13	0.00E+00	1.49E-12	0.00E+00	3.04E-08
17 Mo-99	0.00E+00	3.80E+07	7.25E+06	0.00E+00	8.70E+07	0.00E+00	6.81E+07
18 Tc-99m	4.90E+00	1.37E+01	1.77E+02	0.00E+00	2.04E+02	7.59E+00	8.98E+03
19 Ru-103	1.47E+03	0.00E+00	6.30E+02	0.00E+00	5.20E+03	0.00E+00	1.23E+05
20 Ru-106	2.03E+04	0.00E+00	3.32E+03	0.00E+00	5.08E+04	0.00E+00	1.26E+06
21 Ag-110m	6.87E+07	6.50E+07	3.95E+07	0.00E+00	1.24E+08	0.00E+00	1.83E+10
22 Sb-124	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23 Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24 Te-127m	6.34E+07	2.25E+07	7.54E+06	1.51E+07	2.57E+08	0.00E+00	1.58E+08
25 Te-129m	9.08E+07	3.36E+07	1.43E+07	2.92E+07	3.79E+08	0.00E+00	3.40E+08
26 I-131	4.57E+08	6.39E+08	3.43E+08	1.87E+11	1.10E+09	0.00E+00	1.26E+08
27 I-133	6.01E+06	1.02E+07	3.11E+06	1.42E+09	1.79E+07	0.00E+00	7.71E+06
28 Cs-134	6.76E+09	1.59E+10	7.38E+09	0.00E+00	5.06E+09	1.93E+09	1.98E+08
29 Cs-136	3.60E+08	1.50E+09	1.01E+09	0.00E+00	8.15E+08	1.28E+08	1.20E+08
30 Cs-137	9.05E+09	1.20E+10	4.19E+09	0.00E+00	4.10E+09	1.59E+09	1.71E+08
31 Ba-140	4.12E+07	5.05E+04	2.65E+06	0.00E+00	1.71E+04	3.39E+04	6.35E+07
32 La-140	6.89E+00	3.39E+00	9.01E-01	0.00E+00	0.00E+00	0.00E+00	1.94E+05
33 Ce-141	7.32E+03	4.89E+03	5.62E+02	0.00E+00	2.30E+03	0.00E+00	1.40E+07
34 Ce-144	4.87E+05	1.93E+05	2.51E+04	0.00E+00	1.15E+05	0.00E+00	1.17E+08

All nuclides (except H-3) calculated per ODCM equation 2.3-24
H-3 calculated per ODCM equation 2.3-28

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Table 2.3-15

R VALUES FOR BEAVER VALLEY SITE

(sq meter-mrem/yr per uCi/sec)

Pathway = Cow Milk
Age Group = Child

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	1.57E+03	1.57E+03	1.57E+03	1.57E+03	1.57E+03	1.57E+03
2 P-32	6.59E+10	3.09E+09	2.54E+09	0.00E+00	0.00E+00	0.00E+00	1.82E+09
3 Cr-51	0.00E+00	0.00E+00	6.46E+04	4.70E+04	1.28E+04	8.58E+04	4.49E+06
4 Mn-54	0.00E+00	1.48E+07	3.95E+06	0.00E+00	4.16E+06	0.00E+00	1.24E+07
5 Fe-59	9.70E+07	1.57E+08	7.82E+07	0.00E+00	0.00E+00	4.55E+07	1.63E+08
6 Co-57	0.00E+00	2.73E+06	5.52E+06	0.00E+00	0.00E+00	0.00E+00	2.24E+07
7 Co-58	0.00E+00	9.43E+06	2.89E+07	0.00E+00	0.00E+00	0.00E+00	5.50E+07
8 Co-60	0.00E+00	2.94E+07	8.67E+07	0.00E+00	0.00E+00	0.00E+00	1.63E+08
9 Zn-65	2.95E+09	7.87E+09	4.89E+09	0.00E+00	4.96E+09	0.00E+00	1.38E+09
10 Rb-86	0.00E+00	7.40E+09	4.55E+09	0.00E+00	0.00E+00	0.00E+00	4.76E+08
11 Sr-89	5.29E+09	0.00E+00	1.51E+08	0.00E+00	0.00E+00	0.00E+00	2.05E+08
12 Sr-90	7.55E+10	0.00E+00	1.91E+10	0.00E+00	0.00E+00	0.00E+00	1.02E+09
13 Y-91	3.08E+04	0.00E+00	8.24E+02	0.00E+00	0.00E+00	0.00E+00	4.11E+06
14 Zr-95	3.00E+03	6.60E+02	5.88E+02	0.00E+00	9.45E+02	0.00E+00	6.89E+05
15 Nb-95	2.61E+05	1.02E+05	7.26E+04	0.00E+00	9.54E+04	0.00E+00	1.88E+08
16 Nb-97	1.25E-11	2.25E-12	1.05E-12	0.00E+00	2.50E-12	0.00E+00	6.94E-07
17 Mo-99	0.00E+00	6.92E+07	1.71E+07	0.00E+00	1.48E+08	0.00E+00	5.72E+07
18 Tc-99m	1.12E+01	2.20E+01	3.65E+02	0.00E+00	3.20E+02	1.12E+01	1.25E+04
19 Ru-103	3.49E+03	0.00E+00	1.34E+03	0.00E+00	8.78E+03	0.00E+00	9.01E+04
20 Ru-106	6.49E+04	0.00E+00	8.10E+03	0.00E+00	8.76E+04	0.00E+00	1.01E+06
21 Ag-110m	1.49E+08	1.01E+08	8.05E+07	0.00E+00	1.87E+08	0.00E+00	1.20E+10
22 Sb-124	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23 Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24 Te-127m	1.56E+08	4.21E+07	1.86E+07	3.74E+07	4.46E+08	0.00E+00	1.27E+08
25 Te-129m	2.23E+08	6.24E+07	3.47E+07	7.20E+07	6.56E+08	0.00E+00	2.72E+08
26 I-131	1.11E+09	1.11E+09	6.33E+08	3.68E+11	1.83E+09	0.00E+00	9.92E+07
27 I-133	1.46E+07	1.81E+07	6.83E+06	3.36E+09	3.01E+07	0.00E+00	7.28E+06
28 Cs-134	1.56E+10	2.56E+10	5.40E+09	0.00E+00	7.93E+09	2.85E+09	1.38E+08
29 Cs-136	8.58E+08	2.38E+09	1.53E+09	0.00E+00	1.26E+09	1.87E+08	8.29E+07
30 Cs-137	2.16E+10	2.09E+10	3.08E+09	0.00E+00	6.80E+09	2.45E+09	1.31E+08
31 Ba-140	9.94E+07	8.71E+06	5.80E+06	0.00E+00	2.84E+04	5.19E+04	5.04E+07
32 La-140	1.65E+01	5.77E+00	1.94E+00	0.00E+00	0.00E+00	0.00E+00	1.61E+05
33 Ce-141	1.80E+04	8.99E+03	1.34E+04	0.00E+00	3.94E+03	0.00E+00	1.12E+07
34 Ce-144	1.15E+06	3.61E+05	6.15E+04	0.00E+00	2.00E+05	0.00E+00	9.41E+07

All nuclides (except H-3) calculated per ODCM equation 2.3-24
H-3 calculated per ODCM equation 2.3-28

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Table 2.3-18

R VALUES FOR BEAVER VALLEY SITE

(sq meter-mrem/yr per uCi/sec)

Pathway = Cow Milk
Age Group = Infant

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	2.38E+03	2.38E+03	2.38E+03	2.38E+03	2.38E+03	2.38E+03
2 P-32	1.36E+11	7.99E+09	5.27E+09	0.00E+00	0.00E+00	0.00E+00	1.84E+09
3 Cr-51	0.00E+00	0.00E+00	1.34E+05	8.75E+04	1.91E+04	1.70E+05	3.91E+06
4 Mn-54	0.00E+00	2.76E+07	6.25E+06	0.00E+00	6.11E+06	0.00E+00	1.01E+07
5 Fe-59	1.81E+08	3.16E+08	1.25E+08	0.00E+00	0.00E+00	9.35E+07	1.51E+08
6 Co-57	0.00E+00	6.36E+06	1.03E+07	0.00E+00	0.00E+00	0.00E+00	2.17E+07
7 Co-58	0.00E+00	1.89E+07	4.70E+07	0.00E+00	0.00E+00	0.00E+00	4.78E+07
8 Co-60	0.00E+00	6.00E+07	1.42E+08	0.00E+00	0.00E+00	0.00E+00	1.43E+08
9 Zn-65	3.87E+09	1.36E+10	6.27E+09	0.00E+00	6.60E+09	0.00E+00	1.15E+10
10 Rb-86	0.00E+00	1.88E+10	9.28E+09	0.00E+00	0.00E+00	0.00E+00	4.81E+08
11 Sr-89	1.01E+10	0.00E+00	2.89E+08	0.00E+00	0.00E+00	0.00E+00	2.07E+08
12 Sr-90	8.22E+10	0.00E+00	2.09E+10	0.00E+00	0.00E+00	0.00E+00	1.03E+09
13 Y-91	5.79E+04	0.00E+00	1.54E+03	0.00E+00	0.00E+00	0.00E+00	4.15E+06
14 Zr-95	5.33E+03	1.30E+03	9.22E+02	0.00E+00	1.40E+03	0.00E+00	6.47E+05
15 Nb-95	4.87E+05	2.01E+05	1.16E+05	0.00E+00	1.44E+05	0.00E+00	1.69E+08
16 Nb-97	2.83E-11	5.82E-12	2.03E-12	0.00E+00	4.39E-12	0.00E+00	1.77E-06
17 Mo-99	0.00E+00	1.77E+08	3.45E+07	0.00E+00	2.64E+08	0.00E+00	5.83E+07
18 Tc-99m	2.34E+01	4.82E+01	6.21E+02	0.00E+00	5.19E+02	2.52E+01	1.40E+04
19 Ru-103	7.08E+03	0.00E+00	2.36E+03	0.00E+00	1.47E+04	0.00E+00	8.59E+04
20 Ru-106	1.34E+05	0.00E+00	1.67E+04	0.00E+00	1.58E+05	0.00E+00	1.01E+06
21 Ag-110m	2.75E+08	2.01E+08	1.33E+08	0.00E+00	2.88E+08	0.00E+00	1.04E+10
22 Sb-124	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23 Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24 Te-127m	3.16E+08	1.05E+08	3.83E+07	9.14E+07	7.79E+08	0.00E+00	1.28E+08
25 Te-129m	4.58E+08	1.57E+08	7.06E+07	1.76E+08	1.15E+09	0.00E+00	2.74E+08
26 I-131	2.31E+09	2.72E+09	1.20E+09	8.95E+11	3.18E+09	0.00E+00	9.72E+07
27 I-133	3.08E+07	4.49E+07	1.31E+07	8.17E+09	5.28E+07	0.00E+00	7.60E+06
28 Cs-134	2.51E+10	4.69E+10	4.73E+09	0.00E+00	1.21E+10	4.95E+09	1.27E+08
29 Cs-136	1.68E+09	4.93E+09	1.84E+09	0.00E+00	1.97E+09	4.02E+08	7.49E+07
30 Cs-137	3.48E+10	4.07E+10	2.89E+09	0.00E+00	1.09E+10	4.43E+09	1.27E+08
31 Ba-140	2.05E+08	2.05E+05	1.05E+07	0.00E+00	4.86E+04	1.26E+05	5.02E+07
32 La-140	3.45E+01	1.36E+01	3.50E+00	0.00E+00	0.00E+00	0.00E+00	1.60E+05
33 Ce-141	3.57E+04	2.18E+04	2.57E+03	0.00E+00	6.72E+03	0.00E+00	1.13E+07
34 Ce-144	1.65E+06	6.75E+05	9.25E+04	0.00E+00	2.73E+05	0.00E+00	9.47E+07

All nuclides (except H-3) calculated per ODCM equation 2.3-24
H-3 calculated per ODCM equation 2.3-28

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P&I ORGAN DOSE FACTORS

Table 2.3-17

R VALUES FOR BEAVER VALLEY SITE

(sq meter-mrem/yr per uCi/sec)

Pathway = Goat Milk
Age Group = Adult

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	1.56E+03	1.56E+03	1.56E+03	1.56E+03	1.56E+03	1.56E+03
2 P-32	1.74E+10	1.08E+09	6.72E+08	0.00E+00	0.00E+00	0.00E+00	1.96E+09
3 Cr-51	0.00E+00	0.00E+00	2.85E+03	1.70E+03	6.28E+02	3.78E+03	7.17E+05
4 Mn-54	0.00E+00	7.14E+05	1.36E+05	0.00E+00	2.12E+05	0.00E+00	2.18E+06
5 Fe-59	3.12E+05	7.32E+05	2.81E+05	0.00E+00	0.00E+00	2.05E+05	2.44E+06
6 Co-57	0.00E+00	1.09E+05	1.82E+05	0.00E+00	0.00E+00	0.00E+00	2.77E+06
7 Co-58	0.00E+00	4.40E+05	9.86E+05	0.00E+00	0.00E+00	0.00E+00	8.91E+06
8 Co-60	0.00E+00	1.34E+06	2.96E+06	0.00E+00	0.00E+00	0.00E+00	2.52E+07
9 Zn-65	1.16E+08	3.74E+08	1.69E+08	0.00E+00	2.50E+08	0.00E+00	2.36E+08
10 Rb-86	0.00E+00	2.63E+08	1.22E+08	0.00E+00	0.00E+00	0.00E+00	5.18E+07
11 Sr-89	2.43E+09	0.00E+00	6.99E+07	0.00E+00	0.00E+00	0.00E+00	3.91E+08
12 Sr-90	6.64E+10	0.00E+00	1.63E+10	0.00E+00	0.00E+00	0.00E+00	1.92E+09
13 Y-91	8.14E+02	0.00E+00	2.18E+01	0.00E+00	0.00E+00	0.00E+00	4.48E+05
14 Zr-95	8.87E+01	2.85E+01	1.93E+01	0.00E+00	4.47E+01	0.00E+00	9.02E+04
15 Nb-95	8.13E+03	4.52E+03	2.43E+03	0.00E+00	4.47E+03	0.00E+00	2.74E+07
16 Nb-97	3.38E-13	8.54E-14	3.12E-14	0.00E+00	9.96E-14	0.00E+00	3.15E-10
17 Mo-99	0.00E+00	2.53E+06	4.81E+05	0.00E+00	5.72E+06	0.00E+00	5.86E+06
18 Tc-99m	3.39E-01	9.59E-01	1.22E+01	0.00E+00	1.46E+01	4.70E-01	5.67E+02
19 Ru-103	9.95E+01	0.00E+00	4.29E+01	0.00E+00	3.80E+02	0.00E+00	1.16E+04
20 Ru-106	1.72E+03	0.00E+00	2.18E+02	0.00E+00	3.32E+03	0.00E+00	1.11E+05
21 Ag-110m	4.99E+06	4.61E+06	2.74E+06	0.00E+00	9.07E+06	0.00E+00	1.88E+09
22 Sb-124	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23 Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24 Te-127m	4.13E+06	1.48E+06	5.03E+05	1.05E+06	1.68E+07	0.00E+00	1.38E+07
25 Te-129m	5.94E+06	2.22E+06	9.41E+05	2.04E+06	2.48E+07	0.00E+00	2.99E+07
26 I-131	3.02E+08	4.32E+08	2.48E+08	1.42E+11	7.40E+08	0.00E+00	1.14E+08
27 I-133	3.95E+06	6.87E+06	2.09E+06	1.01E+09	1.20E+07	0.00E+00	6.17E+06
28 Cs-134	4.67E+08	1.11E+09	9.09E+08	0.00E+00	3.60E+08	1.19E+08	1.95E+07
29 Cs-136	6.70E+08	2.65E+09	1.90E+09	0.00E+00	1.47E+09	2.02E+08	3.01E+08
30 Cs-137	1.50E+10	2.05E+10	1.34E+10	0.00E+00	6.95E+09	2.31E+09	3.96E+08
31 Ba-140	2.74E+06	3.44E+03	1.79E+05	0.00E+00	1.17E+03	1.97E+03	5.64E+06
32 La-140	4.60E-01	2.32E-01	6.13E-02	0.00E+00	0.00E+00	0.00E+00	1.70E+04
33 Ce-141	4.79E+02	3.24E+02	3.68E+01	0.00E+00	1.51E+02	0.00E+00	1.24E+06
34 Ce-144	3.05E+04	1.27E+04	1.64E+03	0.00E+00	7.55E+03	0.00E+00	1.03E+07

All nuclides (except H-3) calculated per ODCM equation 2.3-24
H-3 calculated per ODCM equation 2.3-28

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P&I ORGAN DOSE FACTORS

Table 2.3-18

R VALUES FOR BEAVER VALLEY SITE

(sq meter-mrem/yr per uCi/sec)

Pathway = Goat Milk
Age Group = Teen

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	2.03E+03	2.03E+03	2.03E+03	2.03E+03	2.03E+03	2.03E+03
2 P-32	3.21E+10	1.99E+09	1.24E+09	0.00E+00	0.00E+00	0.00E+00	2.70E+09
3 Cr-51	0.00E+00	0.00E+00	4.98E+03	2.77E+03	1.09E+03	7.11E+03	8.37E+05
4 Mn-54	0.00E+00	1.19E+06	2.36E+05	0.00E+00	3.55E+05	0.00E+00	2.44E+06
5 Fe-59	5.44E+05	1.27E+06	4.90E+05	0.00E+00	0.00E+00	4.00E+05	3.00E+06
6 Co-57	0.00E+00	1.92E+05	3.21E+05	0.00E+00	0.00E+00	0.00E+00	3.57E+06
7 Co-58	0.00E+00	7.40E+05	1.71E+06	0.00E+00	0.00E+00	0.00E+00	1.02E+07
8 Co-60	0.00E+00	2.27E+06	5.11E+06	0.00E+00	0.00E+00	0.00E+00	2.96E+07
9 Zn-65	1.81E+08	6.27E+08	2.93E+08	0.00E+00	4.01E+08	0.00E+00	2.66E+08
10 Rb-86	0.00E+00	4.79E+08	2.25E+08	0.00E+00	0.00E+00	0.00E+00	7.09E+07
11 Sr-89	4.49E+09	0.00E+00	1.29E+08	0.00E+00	0.00E+00	0.00E+00	5.35E+08
12 Sr-90	9.39E+10	0.00E+00	2.32E+10	0.00E+00	0.00E+00	0.00E+00	2.64E+09
13 Y-91	1.50E+03	0.00E+00	4.01E+01	0.00E+00	0.00E+00	0.00E+00	6.14E+05
14 Zr-95	1.55E+02	4.90E+01	3.37E+01	0.00E+00	7.19E+01	0.00E+00	1.13E+05
15 Nb-95	1.39E+04	7.69E+03	4.23E+03	0.00E+00	7.45E+03	0.00E+00	3.29E+07
16 Nb-97	6.15E-13	1.53E-13	5.57E-14	0.00E+00	1.79E-13	0.00E+00	3.65E-09
17 Mo-99	0.00E+00	4.56E+06	8.70E+05	0.00E+00	1.04E+07	0.00E+00	8.17E+06
18 Tc-99m	5.88E-01	1.64E+00	2.13E+01	0.00E+00	2.45E+01	9.11E-01	1.08E+03
19 Ru-103	1.77E+02	0.00E+00	7.56E+01	0.00E+00	6.24E+02	0.00E+00	1.48E+04
20 Ru-106	2.44E+03	0.00E+00	3.98E+02	0.00E+00	6.10E+03	0.00E+00	1.52E+05
21 Ag-110m	8.24E+06	7.80E+06	4.75E+06	0.00E+00	1.49E+07	0.00E+00	2.19E+09
22 Sb-124	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23 Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24 Te-127m	7.61E+06	2.70E+06	9.05E+05	1.81E+06	3.08E+07	0.00E+00	1.90E+07
25 Te-129m	1.09E+07	4.03E+06	1.72E+06	3.51E+06	4.55E+07	0.00E+00	4.08E+07
26 I-131	5.48E+08	7.67E+08	4.12E+08	2.24E+11	1.32E+09	0.00E+00	1.52E+08
27 I-133	7.21E+06	1.22E+07	3.73E+06	1.71E+09	2.15E+07	0.00E+00	9.28E+06
28 Cs-134	8.11E+08	1.91E+09	8.86E+08	0.00E+00	6.07E+08	2.32E+08	2.38E+07
29 Cs-136	1.14E+09	4.49E+09	3.02E+09	0.00E+00	2.44E+09	3.85E+08	3.61E+08
30 Cs-137	2.71E+10	3.61E+10	1.26E+10	0.00E+00	1.23E+10	4.77E+09	5.14E+08
31 Ba-140	4.94E+06	6.06E+03	3.18E+05	0.00E+00	2.05E+03	4.07E+03	7.62E+06
32 La-140	8.27E-01	4.06E-01	1.08E-01	0.00E+00	0.00E+00	0.00E+00	2.33E+04
33 Ce-141	8.79E+02	5.87E+02	6.74E+01	0.00E+00	2.76E+02	0.00E+00	1.68E+06
34 Ce-144	5.60E+04	2.32E+04	3.01E+03	0.00E+00	1.39E+04	0.00E+00	1.41E+07

All nuclides (except H-3) calculated per ODCM equation 2.3-24
H-3 calculated per ODCM equation 2.3-28

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P&I ORGAN DOSE FACTORS

Table 2.3-19

R VALUES FOR BEAVER VALLEY SITE

(sq meter-area/yr per uCi/sec)

Pathway = Goat Milk
Age Group = Child

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	3.20E+03	3.20E+03	3.20E+03	3.20E+03	3.20E+03	3.20E+03
2 P-32	7.91E+10	3.70E+09	3.05E+09	0.00E+00	0.00E+00	0.00E+00	2.19E+09
3 Cr-51	0.00E+00	0.00E+00	1.02E+04	5.64E+03	1.54E+03	1.03E+04	5.39E+05
4 Mn-54	0.00E+00	1.78E+06	4.74E+05	0.00E+00	4.99E+05	0.00E+00	1.49E+06
5 Fe-59	1.26E+06	2.04E+06	1.02E+06	0.00E+00	0.00E+00	5.91E+05	2.12E+06
6 Co-57	0.00E+00	3.27E+05	6.63E+05	0.00E+00	0.00E+04	0.00E+00	2.68E+06
7 Co-58	0.00E+00	1.13E+06	3.46E+06	0.00E+00	0.00E+00	0.00E+00	6.60E+06
8 Co-60	0.00E+00	3.53E+06	1.04E+07	0.00E+00	0.00E+00	0.00E+00	1.95E+07
9 Zn-65	3.54E+08	9.44E+08	5.87E+08	0.00E+00	5.95E+08	0.00E+00	1.66E+08
10 Rb-86	0.00E+00	8.88E+08	5.46E+08	0.00E+00	0.00E+00	0.00E+00	5.71E+07
11 Sr-89	1.11E+10	0.00E+00	3.17E+08	0.00E+00	0.00E+00	0.00E+00	4.30E+08
12 Sr-90	1.59E+11	0.00E+00	4.02E+10	0.00E+00	0.00E+00	0.00E+00	2.14E+09
13 Y-91	3.70E+03	0.00E+00	9.89E+01	0.00E+00	0.00E+00	0.00E+00	4.93E+05
14 Zr-95	3.60E+02	7.92E+01	7.05E+01	0.00E+00	1.13E+02	0.00E+00	8.27E+04
15 Nb-95	3.13E+04	1.22E+04	8.71E+03	0.00E+00	1.14E+04	0.00E+00	2.25E+07
16 Nb-97	1.49E-12	2.70E-13	1.26E-13	0.00E+00	2.99E-13	0.00E+00	8.33E-08
17 Mo-99	0.00E+00	8.30E+06	2.05E+06	0.00E+00	1.77E+07	0.00E+00	6.87E+06
18 Tc-99m	1.35E+00	2.65E+00	4.39E+01	0.00E+00	3.64E+01	1.34E+00	1.51E+03
19 Ru-103	4.18E+02	0.00E+00	1.61E+02	0.00E+00	1.05E+03	0.00E+00	1.08E+04
20 Ru-106	7.79E+03	0.00E+00	9.72E+02	0.00E+00	1.05E+04	0.00E+00	1.21E+05
21 Ag-110m	1.79E+07	1.21E+07	9.65E+06	0.00E+00	2.25E+07	0.00E+00	1.44E+09
22 Sb-124	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23 Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24 Te-127m	1.88E+07	5.05E+06	2.23E+06	4.48E+06	5.35E+07	0.00E+00	1.52E+07
25 Te-129m	2.68E+07	7.48E+06	4.16E+06	8.64E+06	7.87E+07	0.00E+00	3.27E+07
26 I-131	1.33E+09	1.34E+09	7.60E+08	4.42E+11	2.19E+09	0.00E+00	1.19E+08
27 I-133	1.75E+07	2.17E+07	8.20E+06	4.03E+09	3.61E+07	0.00E+00	8.73E+06
28 Cs-134	1.87E+09	3.07E+09	6.48E+08	0.00E+00	9.52E+08	3.42E+08	1.66E+07
29 Cs-136	2.58E+09	7.08E+09	4.58E+09	0.00E+00	3.77E+09	5.62E+08	2.49E+08
30 Cs-137	6.54E+10	6.26E+10	9.24E+09	0.00E+00	2.04E+10	7.34E+09	3.92E+08
31 Ba-140	1.19E+07	1.05E+06	6.96E+05	0.00E+00	3.40E+03	6.23E+03	6.04E+06
32 La-140	1.98E+00	6.92E-01	2.33E-01	0.00E+00	0.00E+00	0.00E+00	1.93E+04
33 Ce-141	2.16E+03	1.08E+03	1.60E+03	0.00E+00	4.73E+02	0.00E+00	1.35E+06
34 Ce-144	1.38E+05	4.33E+04	7.37E+03	0.00E+00	2.40E+04	0.00E+00	1.13E+07

All nuclides (except H-3) calculated per ODCM equation 2.3-24
H-3 calculated per ODCM equation 2.3-28

ATTACHMENT J

P&I ORGAN DOSE FACTORS

Table 2.3-20

R VALUES FOR BEAVER VALLEY SITE

(sq meter-mrem/yr per uCi/sec)

Pathway = Goat Milk
Age Group = Infant

Nuclide	Bone	Liver	T. Body	Thyroid	Kidney	Lung	GI-LLI
1 H-3	0.00E+00	4.86E+03	4.86E+03	4.86E+03	4.86E+03	4.86E+03	4.86E+03
2 P-32	1.83E+11	9.59E+09	6.32E+09	0.00E+00	0.00E+00	0.00E+00	2.21E+09
3 Cr-51	0.00E+00	0.00E+00	1.61E+04	1.05E+04	2.29E+03	2.04E+04	4.69E+05
4 Mn-54	0.00E+00	3.31E+06	7.50E+05	0.00E+00	7.33E+05	0.00E+00	1.21E+06
5 Fe-59	2.35E+06	4.11E+06	1.62E+06	0.00E+00	0.00E+00	1.21E+06	1.96E+06
6 Co-57	0.00E+00	7.64E+05	1.24E+06	0.00E+00	0.00E+00	0.00E+00	2.60E+06
7 Co-58	0.00E+00	2.26E+06	5.64E+06	0.00E+00	0.00E+00	0.00E+00	5.64E+06
8 Co-60	0.00E+00	7.20E+06	1.70E+07	0.00E+00	0.00E+00	0.00E+00	1.71E+07
9 Zn-65	4.76E+08	1.63E+09	7.53E+08	0.00E+00	7.92E+08	0.00E+00	1.38E+09
10 Rb-86	0.00E+00	2.25E+09	1.11E+09	0.00E+00	0.00E+00	0.00E+00	5.77E+07
11 Sr-89	2.11E+10	0.00E+00	6.06E+08	0.00E+00	0.00E+00	0.00E+00	4.34E+08
12 Sr-90	1.73E+11	0.00E+00	4.39E+10	0.00E+00	0.00E+00	0.00E+00	2.16E+09
13 Y-91	6.94E+03	0.00E+00	1.85E+02	0.00E+00	0.00E+00	0.00E+00	4.98E+05
14 Zr-95	6.40E+02	1.56E+02	1.11E+02	0.00E+00	1.68E+02	0.00E+00	7.77E+04
15 Nb-95	5.84E+04	2.41E+04	1.39E+04	0.00E+00	1.72E+04	0.00E+00	2.03E+07
16 Nb-97	3.16E-12	6.74E-13	2.43E-13	0.00E+00	5.27E-13	0.00E+00	2.13E-07
17 Mo-99	0.00E+00	2.12E+07	4.14E+06	0.00E+00	3.17E+07	0.00E+00	6.99E+06
18 Tc-99m	2.81E+00	5.79E+00	7.46E+01	0.00E+00	6.23E+01	3.03E+00	1.68E+03
19 Ru-103	8.47E+02	0.00E+00	2.63E+02	0.00E+00	1.76E+03	0.00E+00	1.03E+04
20 Ru-106	1.60E+04	0.00E+00	2.00E+03	0.00E+00	1.90E+34	0.00E+00	1.22E+05
21 Ag-110m	3.30E+07	2.41E+07	1.60E+07	0.00E+00	3.45E+07	0.00E+00	1.25E+09
22 Sb-124	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
23 Sb-125	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
24 Te-127m	3.80E+07	1.26E+07	4.59E+06	1.10E+07	9.35E+07	0.00E+00	1.53E+07
25 Te-129m	5.50E+07	1.89E+07	8.47E+06	2.11E+07	1.38E+08	0.00E+00	3.28E+07
26 I-131	2.77E+09	3.27E+09	1.44E+09	1.07E+12	3.82E+09	0.00E+00	1.17E+08
27 I-133	3.70E+07	5.39E+07	1.58E+07	9.80E+09	6.34E+07	0.00E+00	9.12E+06
28 Cs-134	3.02E+09	5.62E+09	5.68E+08	0.00E+00	1.45E+09	5.93E+08	1.53E+07
29 Cs-136	5.03E+09	1.48E+10	5.52E+09	0.00E+00	5.90E+09	1.21E+09	2.25E+08
30 Cs-137	1.04E+11	1.22E+11	8.66E+09	0.00E+00	3.28E+10	1.33E+10	3.82E+08
31 Ba-140	2.45E+07	2.45E+04	1.26E+06	0.00E+00	5.83E+03	1.51E+04	6.03E+06
32 La-140	4.14E+00	1.63E+00	4.19E-01	0.00E+00	0.00E+00	0.00E+00	1.92E+04
33 Ce-141	4.29E+03	2.62E+03	3.08E+02	0.00E+00	8.07E+02	0.00E+00	1.35E+06
34 Ce-144	1.98E+05	8.11E+04	1.11E+04	0.00E+00	3.28E+04	0.00E+00	1.14E+07

All nuclides (except H-3) calculated per ODCM equation 2.3-24
H-3 calculated per ODCM equation 2.3-28

ATTACHMENT K
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CONTINUOUS RELEASE DEPOSITION PARAMETERS (0-5 MILES)

TABLE 2.3-21

PV-1/2 DEPOSITION PARAMETERS ($\overline{D/Q}$) FOR
CONTINUOUS RELEASES >500 HRS/YR OR >150 HRS/QTR
(meters^{-2})

DISTANCES TO THE CONTROL LOCATIONS, IN MILES

SECTOR	0.0 - 0.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	2.5 - 3.0	3.0 - 3.5	3.5 - 4.0	4.0 - 4.5	4.5 - 5.0
N	6.00E-10	8.60E-09	3.14E-09	1.76E-09	8.12E-10	5.70E-10	4.24E-10	3.29E-10	2.63E-10	2.15E-10
NNE	6.66E-10	5.64E-09	1.98E-09	2.55E-09	1.33E-09	1.07E-09	6.75E-10	5.23E-10	4.56E-10	3.74E-10
NE	1.03E-09	1.57E-09	1.32E-09	3.62E-09	2.63E-09	1.64E-09	1.23E-09	6.13E-10	7.85E-10	6.42E-10
ENE	1.13E-09	1.55E-09	3.69E-09	3.27E-09	2.31E-09	1.29E-09	1.21E-09	6.78E-10	6.72E-10	3.89E-10
E	1.35E-09	1.28E-08	4.09E-09	3.12E-09	1.91E-09	1.36E-09	1.01E-09	7.83E-10	4.15E-10	5.10E-10
ESE	9.82E-10	7.85E-09	4.40E-09	2.46E-09	1.47E-09	1.03E-09	5.65E-10	5.05E-10	3.25E-10	3.00E-10
SE	2.76E-09	6.41E-09	3.52E-09	1.97E-09	1.18E-09	8.27E-10	5.68E-10	4.40E-10	2.93E-10	2.43E-10
SSE	2.22E-09	4.66E-09	3.01E-09	1.68E-09	1.02E-09	7.14E-10	4.25E-10	3.29E-10	2.19E-10	1.80E-10
S	3.00E-09	4.81E-09	3.76E-09	2.10E-09	1.36E-09	9.52E-10	5.12E-10	3.96E-10	2.68E-10	2.20E-10
SSW	1.44E-08	2.89E-09	7.83E-10	8.84E-10	5.70E-10	4.00E-10	2.55E-10	1.98E-10	1.84E-10	1.51E-10
SW	1.89E-08	5.55E-09	1.55E-09	8.71E-10	2.61E-10	3.94E-10	1.57E-10	2.50E-10	2.54E-10	2.08E-10
WSW	1.57E-09	6.63E-09	1.36E-09	1.04E-09	5.44E-10	2.39E-10	3.84E-10	2.98E-10	2.17E-10	1.78E-10
W	3.78E-10	2.95E-09	1.84E-09	1.03E-09	6.63E-10	4.66E-10	1.37E-10	2.68E-10	1.12E-10	1.75E-10
WNW	4.54E-10	4.13E-10	3.09E-10	4.71E-10	7.35E-10	5.16E-10	1.93E-10	1.10E-10	1.12E-10	1.80E-10
NW	4.52E-10	4.09E-10	2.86E-10	1.18E-09	7.04E-10	4.94E-10	3.37E-10	2.10E-10	2.09E-10	1.71E-10
NNW	3.40E-10	2.05E-09	1.63E-09	9.12E-10	5.86E-10	4.13E-10	2.79E-10	2.16E-10	1.73E-10	1.42E-10

TABLE 2.3-22

CV-1 AND CV-2 DEPOSITION PARAMETERS $\overline{(D/Q)}$ FOR
CONTINUOUS RELEASES >500 HRS/YR OR >150 HRS/QTR
(meters^{-2})

SECTOR	DISTANCES TO THE CONTROL LOCATIONS, IN MILES									
	0.0 - 0.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	2.5 - 3.0	3.0 - 3.5	3.5 - 4.0	4.0 - 4.5	4.5 - 5.0
N	4.46E-08	7.73E-09	3.24E-09	1.81E-09	1.08E-09	7.57E-10	5.16E-10	4.00E-10	2.91E-10	2.38E-10
NNE	5.42E-08	9.39E-09	3.37E-09	1.89E-09	1.22E-09	8.54E-10	6.35E-10	4.92E-10	3.94E-10	3.22E-10
NE	7.32E-08	1.27E-08	6.21E-09	3.47E-09	2.24E-09	1.57E-09	1.00E-09	7.77E-10	5.69E-10	4.66E-10
ENE	7.77E-08	1.35E-08	6.51E-09	3.64E-09	2.50E-09	1.76E-09	1.31E-09	1.01E-09	6.58E-10	5.39E-10
E	6.08E-08	1.05E-08	3.79E-09	2.12E-09	1.37E-09	9.59E-10	6.54E-10	5.06E-10	4.05E-10	3.32E-10
ESE	3.23E-08	5.60E-09	2.54E-09	1.42E-09	8.46E-10	5.94E-10	4.05E-10	3.14E-10	2.28E-10	1.87E-10
SE	3.29E-08	5.70E-09	2.59E-09	1.45E-09	9.32E-10	6.55E-10	4.12E-10	3.19E-10	2.55E-10	2.09E-10
SSE	2.84E-08	4.92E-09	2.06E-09	1.15E-09	6.29E-10	4.42E-10	2.99E-10	2.32E-10	1.85E-10	1.52E-10
S	3.67E-08	6.37E-09	2.26E-09	1.26E-09	8.14E-10	5.71E-10	3.86E-10	2.99E-10	2.39E-10	1.96E-10
SSW	2.61E-08	4.52E-09	1.60E-09	8.97E-10	5.78E-10	4.06E-10	3.02E-10	2.34E-10	1.70E-10	1.39E-10
SW	3.06E-08	5.30E-09	2.62E-09	1.47E-09	8.01E-10	5.62E-10	4.18E-10	3.24E-10	2.35E-10	1.93E-10
WSW	4.60E-08	7.97E-09	3.34E-09	1.87E-09	1.20E-09	8.45E-10	5.87E-10	4.55E-10	3.38E-10	2.77E-10
W	6.49E-08	1.13E-08	4.72E-09	2.64E-09	1.19E-09	8.36E-10	6.22E-10	4.82E-10	3.85E-10	3.15E-10
WNW	9.25E-08	1.60E-08	6.43E-09	3.60E-09	2.21E-09	1.55E-09	1.16E-09	8.96E-10	5.79E-10	4.75E-10
NW	1.19E-07	2.07E-08	8.68E-09	4.86E-09	2.99E-09	2.10E-09	1.56E-09	1.21E-09	7.83E-10	6.41E-10
NNW	5.22E-08	9.04E-09	3.79E-09	2.12E-09	1.28E-09	9.00E-10	6.25E-10	4.84E-10	3.59E-10	2.94E-10

ATTACHMENT K
Page 3 of 7
CONTINUOUS RELEASE DEPOSITION PARAMETERS (0-5 MILES)

TABLE 2.3-23

VV-1 AND VV-2 DEPOSITION PARAMETERS ($\overline{D/Q}$) FOR CONTINUOUS RELEASES >500 HRS/YR OR >150 HRS/QTR (meters^{-2})

Same as Table 2.3-22

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CONTINUOUS RELEASE DEPOSITION PARAMETERS (0-5 MILES)

TABLE 2.3-24

TV-2 DEPOSITION PARAMETERS $(\overline{D/Q})$ FOR
CONTINUOUS RELEASES >500 HRS/YR OR >150 HRS/QTR
(meters^{-2})

Same as Table 2.3-22

ATTACHMENT K
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CONTINUOUS RELEASE DEPOSITION PARAMETERS (0-5 MILES)

TABLE 2.3-25

CB-2 DEPOSITION PARAMETERS $(\overline{D/Q})$ FOR
CONTINUOUS RELEASES >500 HRS/YR OR >150 HRS/QTR
(meters^{-2})

Same as Table 2.3-22

ATTACHMENT K
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CONTINUOUS RELEASE DEPOSITION PARAMETERS (0-5 MILES)

TABLE 2.3-26

DV-2 DEPOSITION PARAMETERS $(\overline{D/Q})$ FOR
CONTINUOUS RELEASES >500 HRS/YR OR >150 HRS/QTR
(meters^{-2})

Same as Table 2.3-22

ATTACHMENT K
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CONTINUOUS RELEASE DEPOSITION PARAMETERS (0-5 MILES)

TABLE 2.3-27

WV-2 DEPOSITION PARAMETERS $(\overline{D/Q})$ FOR
CONTINUOUS RELEASES >500 HRS/YR OR >150 HRS/QTR
(meters^{-2})

Same as Table 2.3-22

ATTACHMENT L

CONTINUOUS RELEASE DEPOSITION PARAMETERS (SPECIAL DISTANCES)

TABLE 2.3-28

PV-1/2 DEPOSTION PARAMETERS (D/Q) FOR CONTINUOUS RELEASES
>500 HRS/YR OR >150 HRS/QTR FOR SPECIAL DISTANCES
(IDENTIFIED IN ATTACHMENT E TABLE 2.2-3)
(1E-9 meters^{-2})

INDIVIDUAL RECEPTORS

DOWNWIND SECTOR	SITE BOUNDARY	VEGETABLE GARDEN	MILK COW	MILK GOAT	MEAT ANIMAL	RESIDENCE
N	.600	2.340	--	.572	.707	2.510
NNE	.673	3.220	--	.524	2.920	3.220
NE	.766	1.280	.660	.111	.660	1.200
ENE	1.010	5.080	--	.702	--	1.760
E	1.370	4.420	.401	1.290	1.290	4.420
ESE	.984	6.390	--	2.340	6.390	6.180
SE	11.000	3.680	.466	.466	1.300	3.680
SSE	7.060	3.220	.423	.105	3.140	4.320
S	5.780	1.540	1.410	--	2.610	2.730
SSW	2.040	1.040	.578	.208	1.040	1.460
SW	1.610	1.120	--	.693	.979	1.120
WSW	1.710	1.310	.370	--	1.190	1.310
W	.377	.659	.138	--	.518	.659
WNW	.424	.746	.497	.029	.746	.746
NW	.447	.425	--	.070	.488	.422
NNW	.340	1.840	--	.043	.545	1.92

ATTACHMENT L
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CONTINUOUS RELEASE DEPOSITION PARAMETERS (SPECIAL DISTANCES)

TABLE 2.3-29

CV-1 AND CV-2 DEPOSTION PARAMETERS (D/Q) FOR CONTINUOUS RELEASES >500 HRS/YR OR >150 HRS/QTR FOR SPECIAL DISTANCES (IDENTIFIED IN ATTACHMENT E TABLE 2.2-3)
(1E-9 meters^{-2})

INDIVIDUAL RECEPTORS

DOWNWIND SECTOR	SITE BOUNDARY	VEGETABLE GARDEN	MILK COW	MILK GOAT	MEAT ANIMAL	RESIDENCE
N	25.40	2.05	--	.693	.847	2.19
NNE	18.80	2.02	--	.459	1.850	2.11
NE	63.40	29.30	.455	.078	.455	30.40
ENE	65.90	8.92	--	.661	--	32.20
E	38.00	3.90	.382	1.020	1.020	22.70
ESE	17.10	3.56	--	1.380	3.560	3.56
SE	13.80	3.03	.350	.350	1.100	3.03
SSE	10.50	2.65	.317	.094	2.570	3.68
S	10.60	1.05	.934	--	1.860	1.95
SSW	5.59	1.26	.663	.266	1.260	4.42
SW	3.94	2.21	--	1.320	1.920	2.21
WSW	27.50	2.65	.596	--	2.380	2.65
W	31.60	1.23	.645	--	.960	1.23
WNW	39.10	2.23	1.490	.045	2.230	2.23
NW	70.60	15.00	--	.276	1.990	15.60
NNW	31.50	6.52	--	.068	1.090	9.91

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CONTINUOUS RELEASE DEPOSITION PARAMETERS (SPECIAL DISTANCES)

TABLE 2.3-30

VV-1 AND VV-2 DEPOSTION PARAMETERS (D/Q) FOR CONTINUOUS RELEASES >500 HRS/YR OR >150 HRS/QTR FOR SPECIAL DISTANCES (IDENTIFIED IN ATTACHMENT E TABLE 2.2-3)
(1E-9 meters^{-2})

Same as Table 2.3-29

ATTACHMENT L
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CONTINUOUS RELEASE DEPOSITION PARAMETERS (SPECIAL DISTANCES)

TABLE 2.3-31

TV-2 DEPOSTION PARAMETERS (D/Q) FOR CONTINUOUS RELEASES >500 HRS/YR OR >150 HRS/QTR FOR SPECIAL DISTANCES (IDENTIFIED IN ATTACHMENT E TABLE 2.2-3)
(1E-9 meters^{-2})

INDIVIDUAL RECEPTORS

DOWNWIND SECTOR	SITE BOUNDARY	VEGETABLE GARDEN	MILK COW	MILK GOAT	MEAT ANIMAL	RESIDENCE
N	20.20	2.05	--	.693	.847	2.190
NNE	34.90	2.02	--	.459	1.850	2.110
NE	54.20	29.30	.455	.078	.455	30.400
ENE	57.50	8.92	--	.661	--	32.200
E	38.10	3.90	.382	1.020	1.020	22.700
ESE	18.60	3.56	--	1.380	3.560	3.560
SE	19.00	3.03	.351	.351	1.100	3.030
SSE	13.30	2.65	.318	.094	2.570	3.690
S	11.30	10.40	.934	--	1.860	1.950
SSW	6.44	1.26	.664	.266	1.260	4.430
SW	3.95	2.21	--	1.320	1.920	2.210
WSW	25.10	2.65	.597	--	2.380	2.650
W	28.40	1.23	.646	--	.961	1.230
WNW	30.90	2.23	1.490	.045	2.230	2.230
NW	56.10	14.90	--	.276	1.980	15.500
NNW	25.10	6.53	--	.068	1.100	9.920

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CONTINUOUS RELEASE DEPOSITION PARAMETERS (SPECIAL DISTANCES)

TABLE 2.3-32

CB-2 DEPOSTION PARAMETERS (D/Q) FOR CONTINUOUS RELEASES
>500 HRS/YR OR >150 HRS/QTR FOR SPECIAL DISTANCES
(IDENTIFIED IN ATTACHMENT E TABLE 2.2-3)
(1E-9 meters^{-2})

Same as Table 2.3-31

ATTACHMENT L
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CONTINUOUS RELEASE DEPOSITION PARAMETERS (SPECIAL DISTANCES)

TABLE 2.3-33

DV-2 DEPOSTION PARAMETERS (D/Q) FOR CONTINUOUS RELEASES
>500 HRS/YR OR >150 HRS/QTR FOR SPECIAL DISTANCES
(IDENTIFIED IN ATTACHMENT E TABLE 2.2-3)
(1E-9 meters^{-2})

Same as Table 2.3-29

ATTACHMENT L
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CONTINUOUS RELEASE DEPOSITION PARAMETERS (SPECIAL DISTANCES)

TABLE 2.3-34

WV-2 DEPOSTION PARAMETERS (D/Q) FOR CONTINUOUS RELEASES >500 HRS/YR OR >150 HRS/QTR FOR SPECIAL DISTANCES (IDENTIFIED IN ATTACHMENT E TABLE 2.2-3)
(1E-9 meters^{-2})

Same as Table 2.3-29

ATTACHMENT M
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BATCH RELEASE DISPERSION PARAMETERS (SPECIAL DISTANCES)

TABLE 2.3-35

CV-1 AND CV-2 DISPERSION PARAMETERS (X/Q) FOR BATCH RELEASES ≥500 HRS/YR OR ≥150 HRS/QTR FOR SPECIAL DISTANCES (IDENTIFIED IN ATTACHMENT E TABLE 2.2-3) (sec/m^3)

INDIVIDUAL RECEPTORS

DOWNWIND SECTOR*	SITE BOUNDARY	VEGETABLE GARDEN	MILK COW	MILK GOAT	MEAT ANIMAL	RESIDENCE
N	8.21E-5	8.38E-6	--	3.72E-6	4.34E-6	8.82E-6
NNE	3.04E-5	4.71E-6	--	1.40E-6	4.38E-6	4.87E-6
NE	4.59E-5	2.21E-5	6.05E-7	1.38E-7	6.05E-7	2.28E-5
ENE	3.72E-5	5.25E-6	--	5.66E-7	--	1.88E-5
E	2.93E-5	3.79E-6	5.15E-7	1.17E-6	1.17E-6	1.78E-5
ESE	2.47E-5	5.61E-6	--	2.34E-6	5.61E-6	5.61E-6
SE	2.14E-5	5.00E-6	8.13E-7	8.13E-7	2.03E-6	5.00E-6
SSE	2.21E-5	6.31E-6	1.11E-6	3.92E-7	6.13E-6	8.49E-6
S	2.15E-5	3.03E-6	2.76E-6	--	4.93E-6	5.14E-6
SSW	2.18E-5	6.58E-6	3.81E-6	1.82E-6	6.58E-6	1.78E-5
SW	1.82E-5	1.03E-5	--	6.67E-6	9.12E-6	1.03E-5
WSW	1.09E-4	1.29E-5	4.10E-6	--	1.19E-5	1.29E-5
W	1.49E-4	1.05E-5	6.55E-6	--	8.77E-6	1.05E-5
WNW	1.91E-4	1.72E-5	1.28E-5	1.23E-6	1.72E-5	1.72E-5
NW	3.08E-4	6.13E-5	--	3.80E-6	1.36E-5	6.36E-5
NNW	1.80E-4	3.54E-5	--	1.35E-6	9.27E-6	5.29E-5

*Measured relevant to center point between BV-1 and BV-2 Containment Buildings

Period of Record: 1976 - 1980

ATTACHMENT M
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BATCH RELEASE DISPERSION PARAMETERS (SPECIAL DISTANCES)

TABLE 2.3-36

VV-1 AND VV-2 DISPERSION PARAMETERS (X/Q) FOR BATCH RELEASES ≥500 HRS/YR OR ≥150 HRS/QTR FOR SPECIAL DISTANCES (IDENTIFIED IN ATTACHMENT E TABLE 2.2-3) (sec/m^3)

INDIVIDUAL RECEPTORS

DOWNWIND SECTOR*	SITE BOUNDARY	VEGETABLE GARDEN	MILK COW	MILK GOAT	MEAT ANIMAL	RESIDENCE
N	9.75E-5	1.00E-5	--	4.21E-6	4.95E-6	1.06E-5
NNE	3.78E-5	5.11E-6	--	1.43E-6	4.72E-6	5.30E-6
NE	6.13E-5	2.70E-5	6.20E-7	1.40E-7	6.20E-7	2.81E-5
ENE	4.83E-5	5.58E-6	--	5.71E-7	--	2.24E-5
E	3.66E-5	3.99E-6	5.25E-7	1.19E-6	1.19E-6	2.10E-5
ESE	2.99E-5	6.13E-6	--	2.43E-6	6.13E-6	6.13E-6
SE	2.55E-5	5.29E-6	8.24E-7	8.24E-7	2.13E-6	5.29E-6
SSE	2.65E-5	6.72E-6	1.12E-6	3.95E-7	6.53E-6	9.22E-6
S	2.52E-5	3.14E-6	2.83E-6	--	5.29E-6	5.53E-6
SSW	2.60E-5	7.34E-6	4.15E-6	1.92E-6	7.34E-6	2.09E-5
SW	2.13E-5	1.18E-5	--	7.41E-6	1.04E-5	1.18E-5
WSW	1.34E-4	1.51E-5	4.46E-6	--	1.38E-5	1.51E-5
W	1.77E-4	1.25E-5	7.40E-6	--	1.02E-5	1.25E-5
WNW	2.33E-4	2.07E-5	1.49E-5	1.30E-6	2.07E-5	2.07E-5
NW	3.32E-4	8.57E-5	--	4.24E-6	1.64E-5	8.85E-5
NNW	1.90E-4	4.69E-5	--	1.45E-6	1.09E-5	6.75E-5

*Measured relevant to center point between BV-1 and BV-2 Containment Buildings

Period of Record: 1976 - 1980

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BATCH RELEASE DISPERSION PARAMETERS (SPECIAL DISTANCES)

TABLE 2.3-37

PV-1/2 DISPERSION PARAMETERS (X/Q) FOR BATCH RELEASES ≥500 HRS/YR OR ≥150 HRS/QTR FOR SPECIAL DISTANCES (IDENTIFIED IN ATTACHMENT E TABLE 2.2-3) (sec/m^3)

INDIVIDUAL RECEPTORS

DOWNWIND SECTOR*	SITE BOUNDARY	VEGETABLE GARDEN	MILK COW	MILK GOAT	MEAT ANIMAL	RESIDENCE
N	3.09E-9	3.30E-6	--	1.13E-6	1.34E-6	3.36E-6
NNE	2.85E-9	2.68E-6	--	6.52E-7	2.47E-6	2.68E-6
NE	2.02E-10	7.42E-9	5.44E-7	1.24E-7	5.44E-7	5.51E-9
ENE	1.02E-9	3.21E-6	--	6.29E-7	--	1.67E-9
E	2.15E-9	2.91E-6	4.96E-7	1.14E-6	1.14E-6	2.91E-6
ESE	6.90E-9	4.97E-6	--	1.95E-6	4.97E-6	4.81E-6
SE	2.91E-6	3.52E-6	6.02E-7	6.02E-7	1.43E-6	3.52E-6
SSE	4.91E-6	3.56E-6	6.53E-7	2.18E-7	3.47E-6	4.71E-6
S	2.41E-6	1.78E-6	1.65E-6	--	2.84E-6	2.96E-6
SSW	4.83E-6	2.52E-6	1.50E-6	6.60E-7	2.52E-6	3.96E-6
SW	4.82E-6	2.75E-6	--	1.78E-6	2.44E-6	2.75E-6
WSW	5.77E-7	2.81E-6	8.79E-7	--	2.57E-6	2.81E-6
W	2.88E-9	1.68E-6	4.89E-7	--	1.37E-6	1.68E-6
WNW	3.40E-9	1.61E-6	1.13E-6	1.10E-7	1.61E-6	1.61E-6
NW	1.34E-9	3.31E-8	--	2.03E-7	1.07E-6	3.10E-8
NNW	1.52E-9	3.73E-6	--	1.73E-7	1.31E-6	3.81E-6

*Measured relevant to BV-1 natural draft cooling tower

Period of Record: 1976 - 1980

ATTACHMENT N
Page 1 of 1
BATCH RELEASE DISPERSION PARAMETERS (0 - 5 MILES)

TABLE 2.3-38

PV-1/2 DISPERSION PARAMETERS $(\overline{D/Q})$ FOR
CONTINUOUS RELEASES ≥500 HRS/YR OR ≥150 HRS/QTR
(sec/m^3)

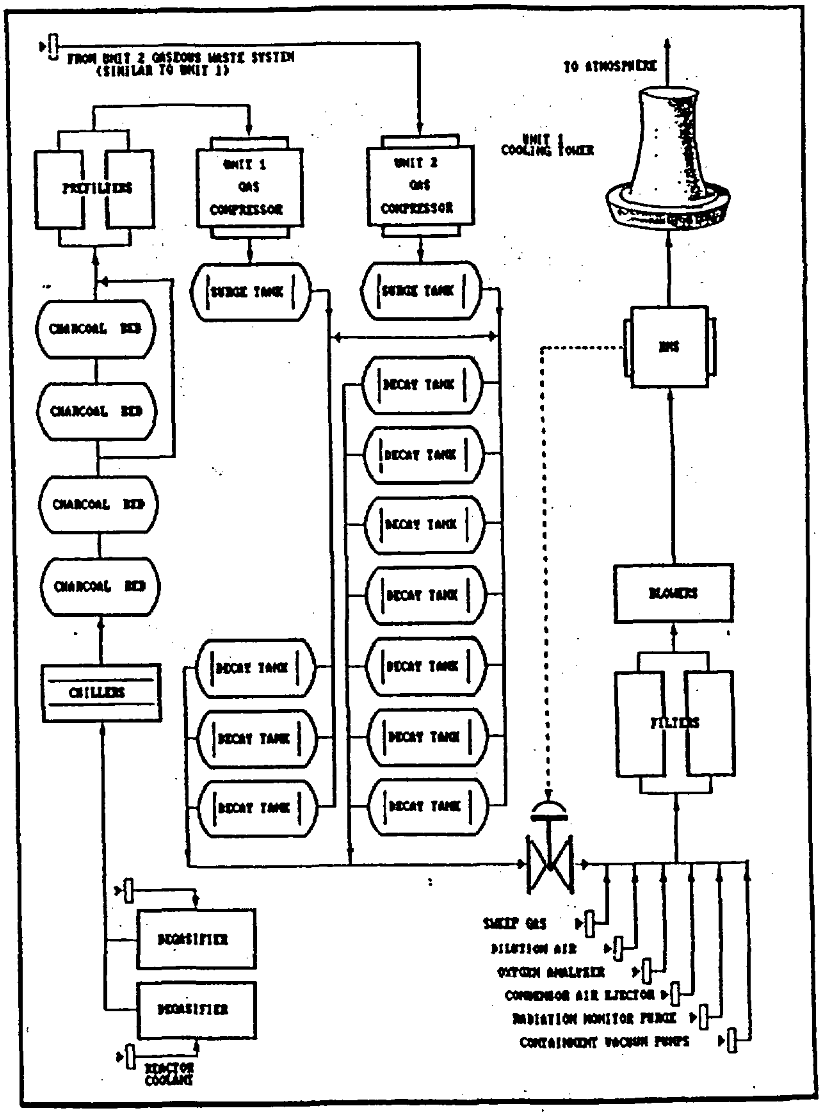
DISTANCES TO THE CONTROL LOCATIONS, IN MILES

SECTOR	0.0 - 0.5	0.5 - 1.0	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	2.5 - 3.0	3.0 - 3.5	3.5 - 4.0	4.0 - 4.5	4.5 - 5.0
N	2.75E-15	1.07E-5	4.10E-6	2.61E-6	1.51E-6	1.13E-6	8.84E-7	7.13E-7	5.93E-7	5.06E-7
NNE	5.90E-17	5.39E-6	2.83E-6	2.19E-6	1.36E-6	1.13E-6	8.05E-7	6.51E-7	5.64E-7	4.81E-7
NE	4.45E-16	1.67E-8	7.39E-8	2.28E-6	1.72E-6	1.19E-6	9.28E-7	6.76E-7	7.34E-7	5.32E-7
ENE	1.92E-15	8.87E-8	2.60E-6	2.21E-6	1.66E-6	1.13E-6	9.25E-7	7.23E-7	6.06E-7	3.82E-7
E	1.84E-15	5.10E-6	2.77E-6	2.23E-6	1.44E-6	1.12E-6	8.74E-7	6.92E-7	5.11E-7	4.82E-7
ESE	2.96E-13	5.26E-6	3.48E-6	2.04E-6	1.34E-6	9.93E-7	6.70E-7	5.76E-7	4.37E-7	3.83E-7
SE	9.16E-8	3.13E-6	3.38E-6	1.99E-6	1.31E-6	9.58E-7	7.14E-7	5.74E-7	4.32E-7	3.68E-7
SSE	3.50E-8	4.86E-6	3.33E-6	1.95E-6	1.29E-6	9.42E-7	6.55E-7	5.24E-7	3.95E-7	3.32E-7
S	1.22E-7	4.12E-6	3.97E-6	2.34E-6	1.59E-6	1.17E-6	7.75E-7	6.24E-7	4.74E-7	4.00E-7
SSW	1.75E-5	6.22E-6	2.84E-6	2.18E-6	1.48E-6	1.08E-6	7.83E-7	6.31E-7	5.62E-7	4.77E-7
SW	2.08E-5	9.11E-6	3.47E-6	2.19E-6	1.25E-6	1.11E-6	8.19E-7	7.17E-7	6.89E-7	5.85E-7
WSW	8.56E-8	9.35E-6	3.16E-6	2.29E-6	1.46E-6	1.01E-6	9.06E-7	7.52E-7	5.99E-7	5.07E-7
W	5.44E-17	4.52E-6	4.21E-6	2.49E-6	1.69E-6	1.25E-6	4.86E-7	7.68E-7	5.80E-7	5.48E-7
WNW	9.25E-18	1.44E-8	5.66E-8	1.92E-6	1.59E-6	1.17E-6	7.75E-7	4.61E-7	5.28E-7	4.89E-7
NW	2.61E-16	1.98E-8	8.37E-8	2.24E-6	1.46E-6	1.08E-6	8.09E-7	6.12E-7	5.42E-7	4.60E-7
NNW	1.91E-15	3.91E-6	3.66E-6	2.15E-6	1.40E-6	1.08E-6	8.03E-7	6.48E-7	5.37E-7	4.56E-7

ATTACHMENT O
Page 1 of 1
GASEOUS RADWASTE SYSTEM

FIGURE 2.4-1

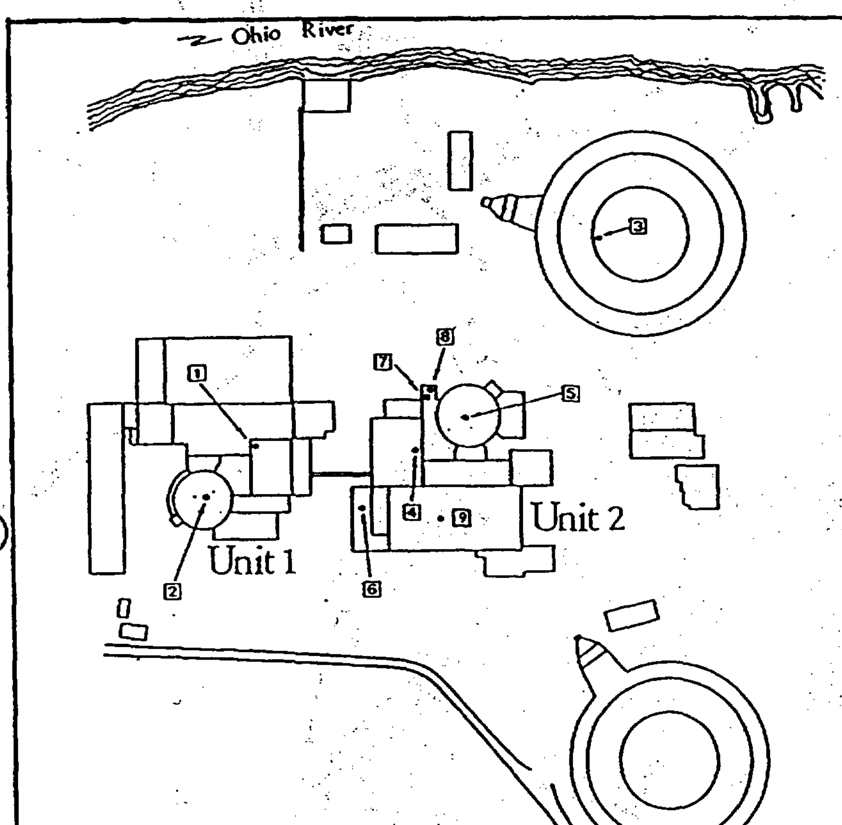
BV-1 AND 2 GASEOUS RADWASTE SYSTEM



ATTACHMENT P
Page 1 of 1
BV-1 AND BV-2 GASEOUS EFFLUENT RELEASE POINTS

FIGURE 2.4-2

BV-1 AND 2 GASEOUS EFFLUENT RELEASE POINTS



Release Point & Description		Elevation
1. Unit 1:	Ventilation Vent	79 feet = 24 meters
2. Unit 1:	Containment / SLCRS Vent	154 feet = 47 meters
3. Unit 1&2:	Process Vent	475 feet = 145 meters
4. Unit 2:	Ventilation Vent	85 feet = 26 meters
5. Unit 2:	Containment / SLCRS Vent	154 feet = 47 meters
6. Unit 2:	Condensate Polishing Building Vent	80 feet = 24 meters
7. Unit 2:	Waste Gas Storage Vault Vent	80 feet = 24 meters
8. Unit 2:	Decontamination Building Vent	80 feet = 24 meters
9. Unit 2:	Turbine Building Vent	109 feet = 33 meters

Note: The Release Point shown for the Unit 2 Turbine Building Vent is a representative exhaust point for the 10 roof exhaust outlets.

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ATTACHMENT Q
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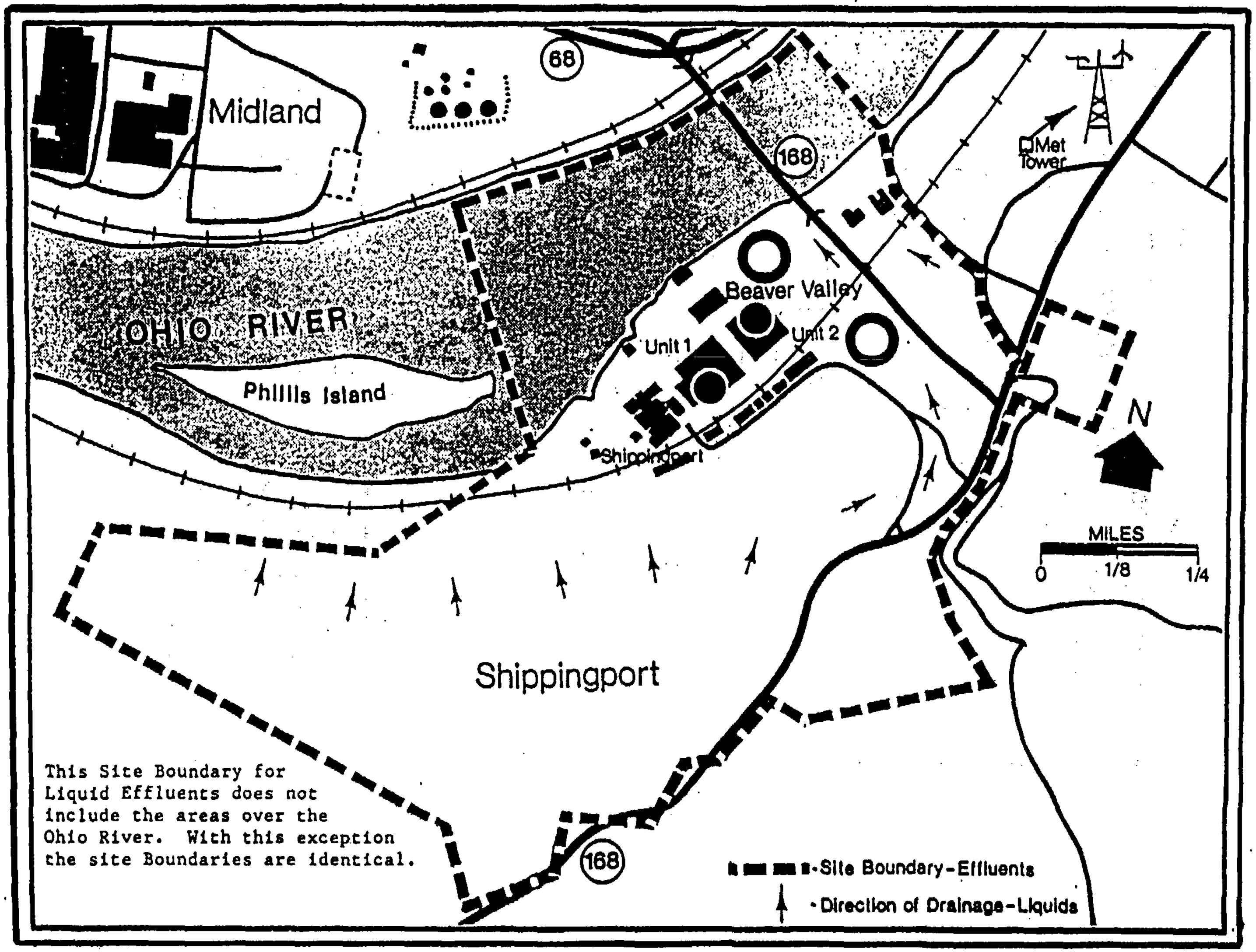
SITE BOUNDARY FOR GASEOUS EFFLUENTS

Figure 5-1



Beaver Valley Power Station

Unit 1/2

1/2-ODC-2.03

ODCM: Radiological Environmental Monitoring Program

Document Owner
Manager, Health Physics

Revision Number	0
Level Of Use	General Skill Reference
Safety Related Procedure	Yes

TABLE OF CONTENTS

1.0 PURPOSE

1.1 This procedure provides the Radiological Environmental Monitoring Program (REMP) requirements from the Radiological Branch Technical Position.[3.1.1]

1.1.1 Prior to issuance of this procedure, these items were located in Section 3 of the old ODCM.

2.0 SCOPE

2.1 This procedure is applicable to all station personnel that are qualified to perform activities as described and referenced in this procedure.

3.0 REFERENCES AND COMMITMENTS

3.1 References

3.1.1 Radiological Branch Technical Position, Revision 1, 1979.

3.1.2 Regulatory Guide 1.109, Calculation of Annual Dose to Man From Routine Releases of Reactor Effluents For the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I, Revision 1, 1977.

3.1.3 NUREG-1301, Offsite Dose Calculation Manual Guidance; Standard Radiological Effluent Controls for Pressurized Water Reactors (Generic Letter 89-01, Supplement No. 1).

3.1.4 Regulatory Guide 1.111, Methods For Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases From Light-Water-Cooled Reactors, Revision 1, July 1977.

3.1.5 1/2-ADM-1640, Control of the Offsite Dose Calculation Manual

3.1.6 1/2-ADM-0100, Procedure Writers Guide

3.1.7 1/2-ADM-0101, Review and Approval of Documents

3.2 Commitments

3.2.1 10 CFR 50 Appendix I

4.0 RECORDS AND FORMS

4.1 Records

4.1.1 Any calculation supporting ODCM changes shall be documented, as appropriate, by a retrievable document (e.g., letter or calculation package) with an appropriate RTL number.

4.2 **Forms**

4.2.1 None.

5.0 PRECAUTIONS AND LIMITATIONS

5.1 The specified detection capabilities are state-of-the-art for routine environmental measurements in industrial laboratories.

6.0 ACCEPTANCE CRITERIA

6.1 Any change to this procedure shall contain sufficient justification that the change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a and Appendix I to 10 CFR 50, and not adversely impact the accuracy or reliability of effluent dose or setpoint calculation.

6.1.1 All changes to this procedure shall be prepared in accordance with 1/2-ADM-0100[3.1.6] and 1/2-ADM-1640[3.1.5].

6.1.2 All changes to this procedure shall be reviewed and approved in accordance with 1/2-ADM-0101[3.1.7] and 1/2-ADM-1640[3.1.5].

7.0 PREREQUISITES

7.1 The user of this procedure shall be familiar with ODCM structure and format.

8.0 PROCEDURE

8.1 **REMP Overview**

8.1.1 Attachment A, Table 3.0-1 contains the site number, sector, distance, sample point description, sampling and collection frequency, analysis, and analysis frequency for various exposure pathways in the vicinity of the Beaver Valley Power Station for the REMP. Attachment B, Figures 3.0-1 through 3.0-6 show the location of the various sampling points.

8.2 **Sampling and Analysis Program**

8.2.1 Environmental samples shall be collected and analyzed according to Attachment A, Table 3.0-1. Analytical techniques used shall be such that the detection capabilities in 1/2-ODC-3.03, Table 4.12-1 are achieved.

8.2.2 The results of the radiological environmental monitoring are intended to supplement the results of the radiological effluent monitoring by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and modeling of the environmental exposure pathways.

8.2.2.1 The specified environmental monitoring program provides measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides which lead to the highest potential radiation exposures of individuals resulting from the station operation.

8.2.2.2 The initial radiological environmental monitoring program should be conducted for the first 3 years of commercial operation (or other period corresponding to a maximum burnup in the initial core cycle). Following this period, program changes may be proposed based on operational experience.

8.2.3 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.

8.2.3.1 IF specimens are unobtainable due to sampling equipment malfunction, THEN every effort shall be made to complete corrective action prior to the end of the next sampling period.

8.2.3.2 All deviations from the sampling schedule shall be documented in the annual REMP report.

8.3 **Crosscheck Program**

8.3.1 The laboratories of the licensee and licensee's contractors which perform analyses shall participate in the Environmental Protection Agency's (EPA's) Environmental Radioactivity Laboratory Intercomparisons Studies (Crosscheck) Program or equivalent program.

8.3.1.1 This participation shall include all of the determinations (sample medium-radionuclide combination) that are offered by EPA and that also are included in the monitoring program.

8.3.1.2 The results of analysis of these crosscheck samples shall be included in the annual REMP report. The participants in the crosscheck program may provide their program code so that the NRC can review the participant data directly in lieu of submission in the annual REMP report.

8.3.1.3 IF the results of a determination in the crosscheck program are outside the specified control limits, THEN the laboratory shall investigate the cause of the problem and take steps to correct it. The results of this investigation and corrective action shall be included in the annual REMP report.

8.3.2 The requirement for the participation in the crosscheck program, is based on the need for independent checks on the precision and accuracy of the measurements of radioactive material in environmental sample matrices as part of the quality assurance program for environmental monitoring in order to demonstrate the results are reasonably valid.

8.4 Land Use Census Program

8.4.1 A census shall be conducted annually during the growing season to determine the location of the nearest milk animal, and nearest garden greater than 50 square meters (500 sq. ft.) producing broad leaf vegetation in each of the 16 meteorological sectors within a distance of 8 km (5 miles).

8.4.1.1 For elevated releases as defined in Regulatory Guide 1.111[3.1.4], the census shall also identify the locations of all milk animals, and gardens greater than 50 square meters producing broad leaf vegetation out to a distance of 5 km (3 miles) for each radial sector.

8.4.1.2 IF it is learned from this census that the milk animals or gardens are present at a location which yields a calculated thyroid dose greater than those previously sampled, or if the census results in changes in the location used in ODCM dose calculations, THEN a written report shall be submitted to the Director of Operating Reactors, NRR (with a copy to the Director of the NRC Regional Office) within 30 days identifying the new location (distance and direction).

8.4.1.2.1 Milk animal or garden locations resulting in higher calculated doses shall be added to the surveillance program as soon as practicable.

8.4.1.3 The sampling location (excluding the control sample location) having the lowest calculated dose may then be dropped from the surveillance program at the end of the grazing or growing season during which the census was conducted. Any location from which milk can no longer be obtained may be dropped from the surveillance program after notifying the NRC in writing that they are no longer obtainable at that location.

8.4.1.4 The results of the land-use census shall be reported in the annual REMP report.

8.4.1.5 The census of milk animals and gardens producing broad leaf vegetation is based on the requirement in Appendix I of 10 CFR Part 50[3.2.1] to "Identify 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 consumption of milk from animals grazing on contaminated pasture and of leafy vegetation contaminated by airborne radioiodine is a major potential source of exposure. Samples from milk animals are considered a better indicator of radioiodine in the environment than vegetation.

8.4.1.5.1 IF the census reveals milk animals are not present or are unavailable for sampling, THEN vegetation must be sampled.

8.4.1.6 The 50 square meter garden, considering 20% used for growing broad leaf vegetation (i.e., similar to lettuce and cabbage), and a vegetation yield of 2 kg/m^2, will produce the 26 kg/yr assumed in Regulatory Guide 1.109[3.1.2], for child consumption of leafy vegetation.

8.5 Direct Radiation Monitoring Program

8.5.1 The increase in the number of direct radiation stations is to better characterize the individual exposure (mrem) and population exposure (man-rem) in accordance with Criterion 64 - monitoring radioactivity releases, of 10 CFR Part 50, Appendix A. The NRC will place a similar amount of stations in the area between the two rings designated in 1/2-ODC-3.03, Table 3.12-1.

- END -

ATTACHMENT A
Page 1 of 4
EXPOSURE PATHWAY AND SAMPLING REQUIREMENTS

TABLE 3.0-1

PROGRAM DETAILS

EXPOSURE PATHWAY AND/OR SAMPLE	SITE NO.	SECTOR[1]	MILES[2]	SAMPLE POINT DESCRIPTION[3]	SAMPLING AND COLLECTION FREQUENCY	TYPE AND FREQUENCY OF ANALYSES
1. AIRBORNE Radioiodine and Particulates	13	11	1.4	Meyer's Fame	Continuous sampler operation with collection at least weekly	Radioiodine Cartridge: I-131 analysis weekly.
	30	4	0.5	Shippingport (S.S.)		
	32	15	0.8	Midland (S.S.)		Particulate Sampler: Gross beta analysis following filter change[5]; Gamma isotopic analysis on composite (by location) quarterly.
	46.1	3	2.3	Industry, Midway Dr.		
	48	10	16.3	Weirton, W. Va., Weirton Water Tower, Collier Way[4]		
2. DIRECT RADIATION	10	3	1.0	Shippingport Boro	Continuous measurement with quarterly collection.	Gamma dose quarterly.
	13	11	1.4	Meyer's Farm		
	14	11	2.5	Hookstown		
	15	14	3.7	Georgetown Post Office		
	27	7	6.1	Brunton's		
	28	1	8.6	Sherman's Farm		
	29B	3	8.0	Beaver Valley Geriatric Center		
	30	4	0.5	Shippingport (S.S.)		
	32	15	0.8	Midland (S.S.)		
	45	5	2.2	Rt. 18 & Anderson Street		
	45.1	6	1.9	Raccoon Twp., Kennedy's Corner		
	46	3	2.5	Industry, Midway Drive		
	46.1	3	2.3	Industry, Rt. 86 - Garage		
	47	14	4.9	East Liverpool, OH Water Treatment Plant		
	48	10	16.3	Weirton, W. Va., Weirton Water Tower, Collier Way		
	51	5	8.0	Aliquippa (S.S.)		
	59	6	1.0	236 Green Hill Rd.		
	60	13	2.5	444 Hill Road		
	70	1	3.4	N. of Western. Beaver School-Engle Rd.		
	71	2	6.0	Brighton Twp., First Western Bank		

ATTACHMENT A
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EXPOSURE PATHWAY AND SAMPLING REQUIREMENTS

TABLE 3.0-1

PROGRAM DETAILS

EXPOSURE PATHWAY AND/OR SAMPLE	SITE NO.	SECTOR[1]	MILES[2]	SAMPLE POINT DESCRIPTION[3]	SAMPLING AND COLLECTION FREQUENCY	TYPE AND FREQUENCY OF ANALYSES
2. DIRECT RADIATION (continued)	72	3	3.3	Industry, Logan Park	Continuous measurement with quarterly collection.	Gamma dose quarterly.
	73	4	2.5	618 Squirrel Run Road		
	74	4	7.0	CCBC, 137 Poplar Avenue		
	75	5	4.1	117 Holt Road		
	76	6	3.8	Raccoon Elementary School		
	77	6	5.6	3614 Green Garden Road		
	78	7	2.7	Raccoon Municipal Building		
	79	8	4.4	Rt. 151 & Pross Ln.		
	80	9	8.2	Raccoon Park Office, Rt. 18		
	81	9	3.6	Millcreek United Presb. Church		
	82	9	6.9	Hanover Municipal Building		
	83	10	4.2	735 Mill Creek Road		
	84	11	8.3	Hancock Parks & Recreation Complex		
	85	12	5.7	Rts. 8 and 30 Intersection		
	86	13	6.2	East Liverpool, Oh., 1090 Ohio Avenue		
	87	14	7.0	Calcutta, Oh.– Calcutta Smith's Ferry Rd & Valley Drive		
	88	15	2.8	Midland Heights, 110 Summit Road		
	89	15	4.8	Ohioville, 488 Smith's Ferry Road		
	90	16	5.2	Opposite Fairview School		
	91	2	3.9	Pine Grove & Doyle Roads		
	92	12	2.8	Georgetown Road (S.S.)		
	93	16	1.1	Midland – Sunrise Hills		
	94	8	2.2	McCleary Road & Pole Cat Hollow Road		
	95	10	2.3	832 McCleary Road		

ATTACHMENT A
Page 3 of 4
EXPOSURE PATHWAY AND SAMPLING REQUIREMENTS

TABLE 3.0-1 (continued)

PROGRAM DETAILS

EXPOSURE PATHWAY AND/OR SAMPLE	SITE NO.	SECTOR[1]	MILES[2]	SAMPLE POINT DESCRIPTION[3]	SAMPLING AND COLLECTION FREQUENCY	TYPE AND FREQUENCY OF ANALYSES
3. WATERBORNE a) Surface (River)	49	3	5.0	Upstream side of Montgomery Dam[4]	Composite sample with sample collection at least monthly[6].	Gamma isotopic analysis monthly; tritium analysis on composite (by location) quarterly.
	2.1	14	1.5	Downstream, Midland – J&L		
b) Drinking Water	4	15	1.3	Midland Water Treatment Plant	Composite sample with sample collection at least bi-weekly[6].	I-131 analysis bi-weekly; gamma isotopic analysis on composite (by location) monthly; tritium analysis on composite (by location) quarterly.
	5	14	4.9	East Liverpool, Oh., Water Treatment Plant		
c) Ground Water				None required[7]		
d) Shoreline Sediment	2A	13	0.2	BVPS Outfall Discharge	Semi-annually.	Gamma isotopic analysis semi-annually.
4. INGESTION a) Milk	25	10	2.1	Searight's Farm	At least bi-weekly when animals are on pasture; at least monthly at other times.	Gamma isotopic and I-131 analysis on each sample.
	*[8]	--	--			
	*[8]	--	--			
	*[8]	--	--			
	96	10	10.4	Windsheimer's Farm[4]		
b) Fish	2A	13	0.2	BVPS Outfall Discharge	Semi-annually one sample of available species.	Gamma isotopic analysis. On edible portion.
	49	3	5.0	Upstream side of Montgomery Dam		
c) Food Products (Leafy Vegetables)	-- -- --	-- -- --	-- -- --	Three (3) locations within 5 miles of BVPS (Shippingport, Industry, and Georgetown)[9]	Annually at harvest time.	Gamma isotopic and I-131 analysis on edible portion.
	--	--	--	One (1) control location (Weirton, W. Va. area)[9]		

ATTACHMENT A
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EXPOSURE PATHWAY AND SAMPLING REQUIREMENTS

TABLE 3.0-1 (continued)

PROGRAM DETAILS

EXPOSURE PATHWAY AND/OR SAMPLE	SITE NO.	SECTOR[1]	MILES[2]	SAMPLE POINT DESCRIPTION[3]	SAMPLING AND COLLECTION FREQUENCY	TYPE AND FREQUENCY OF ANALYSES

[1] Sector numbers 1-16 correspond to the 16 compass direction sectors N - NNW.

[2] Distance (in miles) is as measured from BVPS Unit 1 Containment Building.

[3] All Sample Points, unless otherwise noted, are in the Commonwealth of Pennsylvania. Maps showing the approximate locations of the Sample Points are provided as Attachment B, Figures 3.0-1 through 3.0-6.

[4] This is a Control Station and is presumed to be outside the influence of BVPS effluents.

[5] A gamma isotopic analysis is to be performed on each sample when the gross beta activity is found to be greater than 10 times the mean of the Control Station sample.

[6] Composite samples are obtained by collecting an aliquot at intervals not exceeding 2 hours. For the upstream surface water location site 49, a weekly grab sample, composited each month based on river flow at time of sampling is also acceptable.

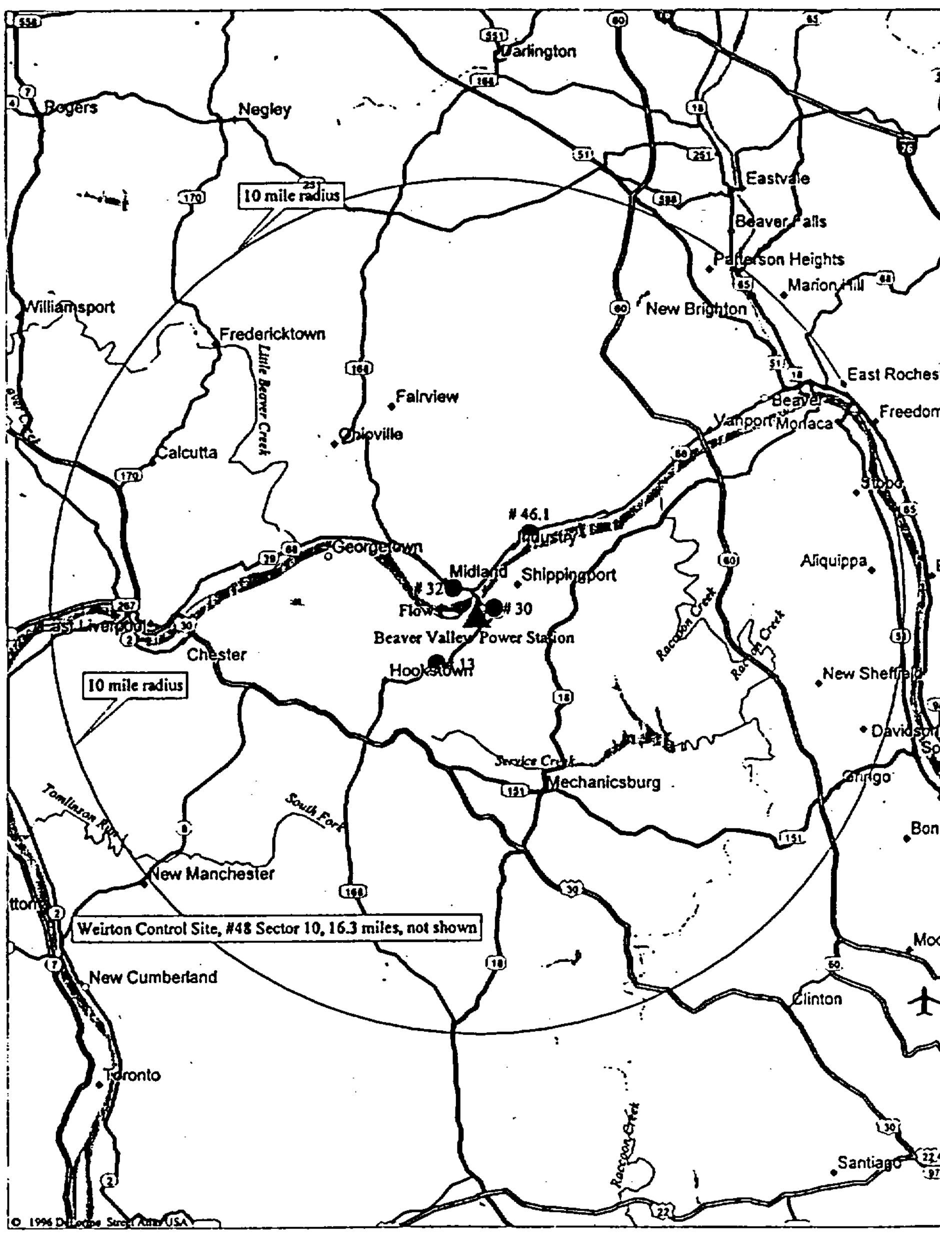
[7] Collection of Ground Water samples is not required as the hydraulic gradient or recharge properties are directed toward the river because of the high terrain in the river valley at the BVPS; thus, station effluents do not affect local wells and ground water sources in the area.

[8] These Sample Points will vary and are chosen based upon calculated annual deposition factors (highest).

[9] Exact location may vary due to availability of food products.

ATTACHMENT B
Page 1 of 7
LOCATION OF SAMPLING SITES

FIGURE 3.0-2
AIR SAMPLING LOCATIONS



Sector	Site #	Distance (miles)	Location
11	13	1.4	Meyer's Farm
4	30	0.5	Shippingport (S. S.)
15	32	0.8	Midland (S.S.)
3	46.1	2.3	Industry, Rt. 68 Garage
10	48	16.4	Weirton, W. Va.,-Weirton Water Tower, Collier Way

Beaver Valley Power Station		Procedure Number: 1/2-ODC-2.03	
Title: ODCM: Radiological Environmental Monitoring Program		Unit: 1/2	Level Of Use: General Skill Reference
		Revision: 0	Page Number: 13 of 18

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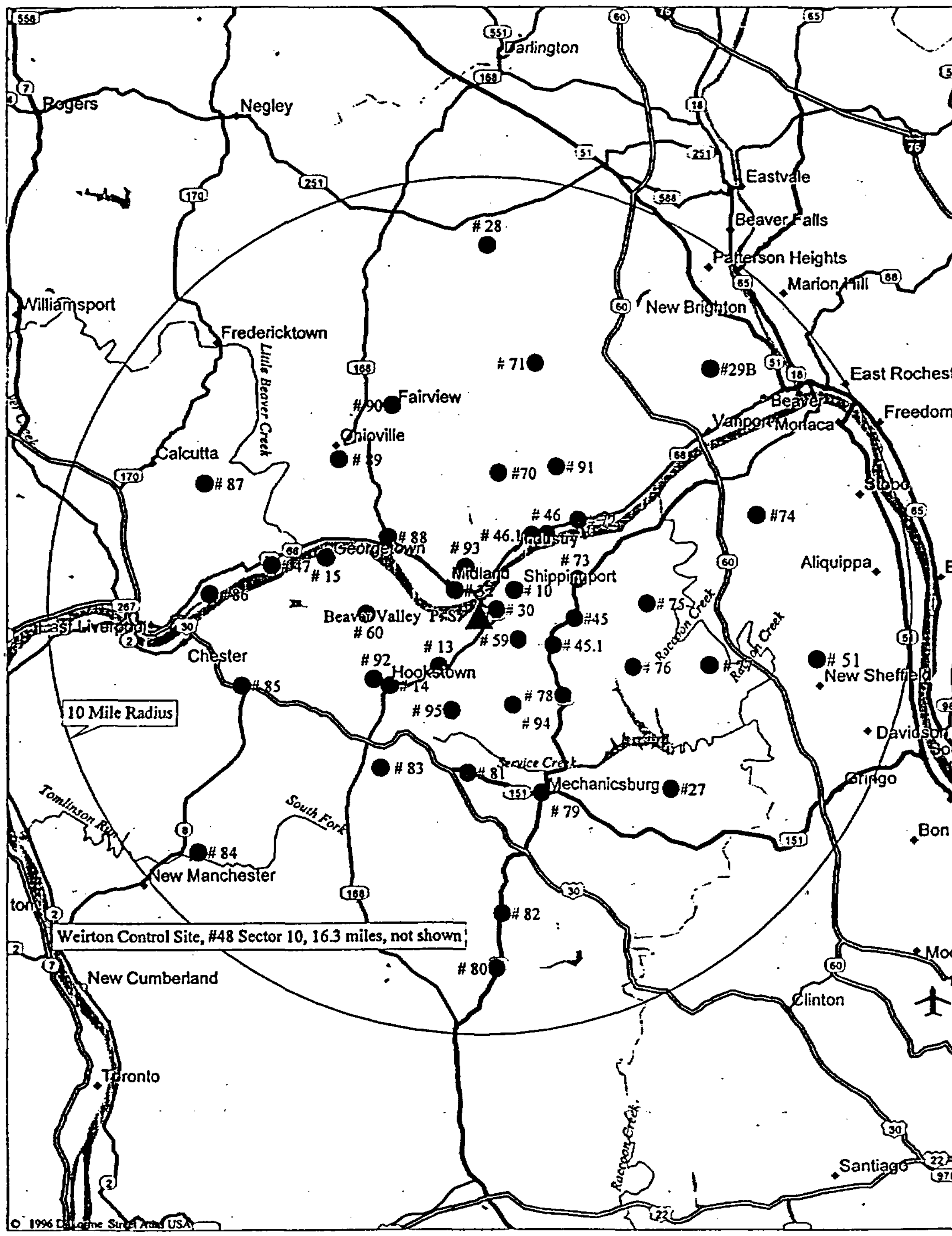
LOCATION OF SAMPLING SITES

FIGURE 3.0-2 (continued)

TLD LOCATIONS



ATTACHMENT B

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LOCATION OF SAMPLING SITES

FIGURE 3.0-2 (continued)

TLD LOCATIONS

Southeast

Sector	Site #	Distance (miles)	Location	Sector	Site #	Distance (miles)	Location
7	27	6.1	Brunton's Farm	7	78	2.7	Raccoon Municipal Bldg.
6	45.1	1.9	Raccoon Twp., Kennedy Corners	8	79	4.4	Rt. 151 & Pross Ln.
5	51	8.0	Aliquippa (S.S.)	9	80	8.2	Raccoon Park Office–Rt. 18
6	59	1.0	236 Green Hill Road	9	82	6.9	Hanover Municipal Building
6	76	3.8	Raccoon Elementary School	8	94	2.2	McCleary Road & Pole Cat Hollow Road
6	77	5.6	3614 Green Garden Road				

Northwest

Sector	Site #	Distance (miles)	Location	Sector	Site #	Distance (miles)	Location
14	15	3.7	Georgetown Post Office	14	87	7.0	Calcutta, Oh. - Calcutta Smith's Ferry Rd & Valley Drive
15	32	0.8	Midland (S.S.)	15	88	2.8	Midland Heights – 110 Summit Rd
14	47	4.9	E. Liverpool, Oh. (Water Company)	15	89	4.8	Ohioville – 488 Smith's Ferry Road
13	60	2.5	Haney's Farm	16	90	5.2	Opposite Fairview School
13	86	6.2	E. Liverpool, Oh., 1090 Ohio Avenue	16	93	1.1	Midland - Sunrise Hills

Northeast

Sector	Site #	Distance (miles)	Location	Sector	Site #	Distance (miles)	Location
4	10	1.0	Shippingport Boro	1	70	3.4	North of Western Beaver School – Engle Road
1	28	8.6	Sherman's Farm	2	71	6.0	Brighton Twp., First Western Bank
3	29B	8.0	Beaver Valley Geriatric Ctr.	3	72	3.3	Industry, Logan Park
4	30	0.5	Shippingport (S.S.)	4	73	2.5	618 Squirrel Run Road
5	45	2.2	Rt. 18 & Anderson Street	4	74	7.0	CCBC – 137 Poplar Avenue
3	46	2.5	Industry, Midway Drive	5	75	4.1	117 Holt Road
3	46.1	2.3	Industry, Rt. 68 - Garage	2	91	3.9	Pine Grove Rd. & Doyle Rd.

Southwest

Sector	Site #	Distance (miles)	Location	Sector	Site #	Distance (miles)	Location
11	13	1.4	Meyer's Farm	11	84	8.3	Hancock Co. Parks & Recreation Complex
11	14	2.5	Hookstown	12	85	5.7	Rts. 8 & 30 Intersection
10	48	16.3	Weirton, W. Va., - Weirton Water Tower, Collier Way	12	92	2.8	Georgetown Road
9	81	3.6	Millcreek United Presb. Church	10	95	2.3	832 McCleary Road
10	83	4.2	735 Mill Creek Road				

ATTACHMENT B
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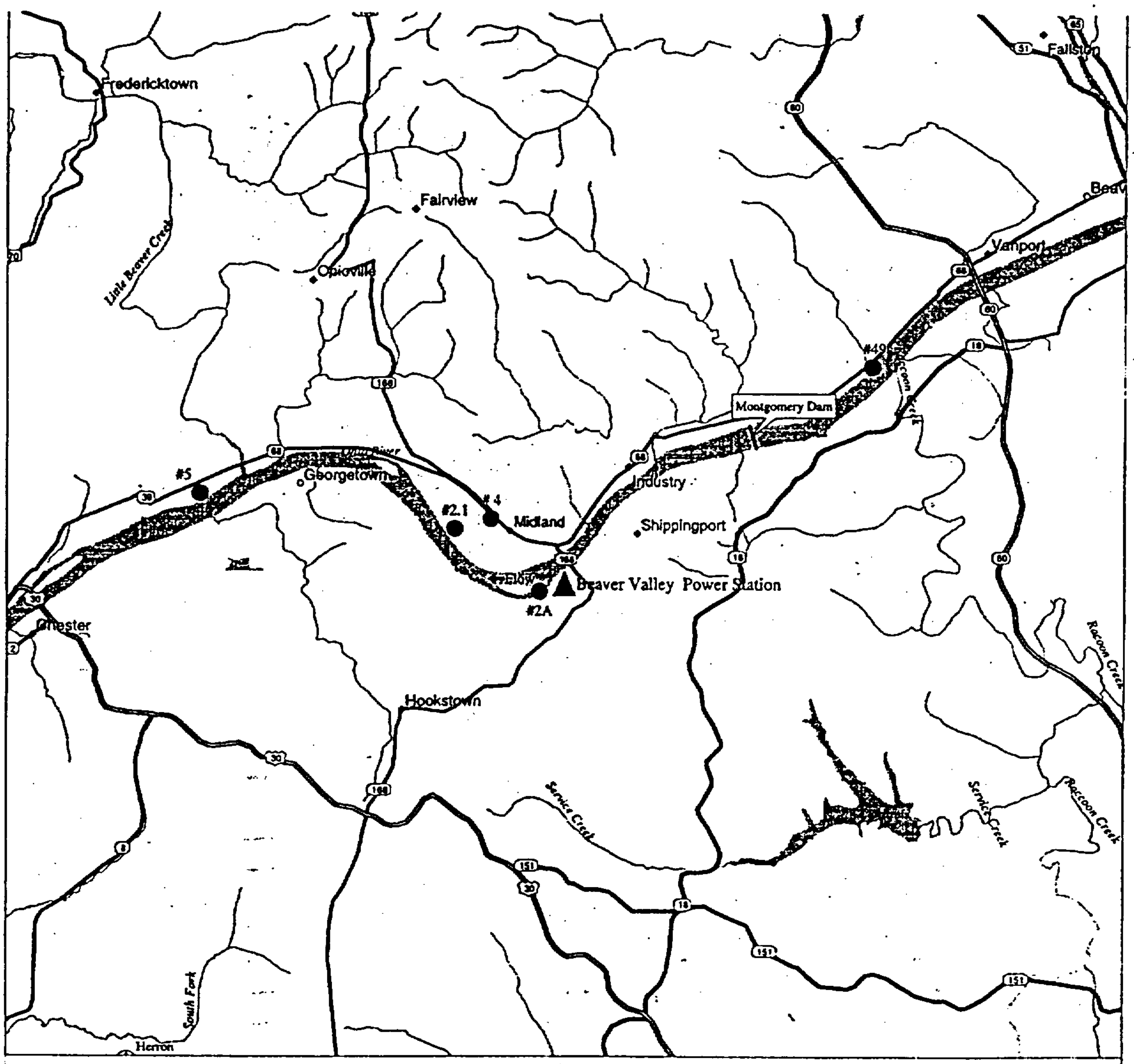
LOCATION OF SAMPLING SITES

FIGURE 3.0-3

SHORELINE, SEDIMENT, SURFACE WATER, AND DRINKING WATER SAMPLING LOCATIONS



Map 12.00

Water/Shoreline Sediment Sampling Locations

Sample Type	Sector	Site #	Distance (miles)	Location
Surface Water	14	2.1	1.5	Downstream, Midland - J&L
Surface Water	3	49	5.0	Upstream side of Montgomery Dam
Sediment	13	2A	0.2	BVPS Outfall Discharge
Drinking Water	15	4	1.3	Midland Water Treatment Plant
Drinking Water	14	5	4.9	E. Liverpool, Oh. Water Treatment Plant

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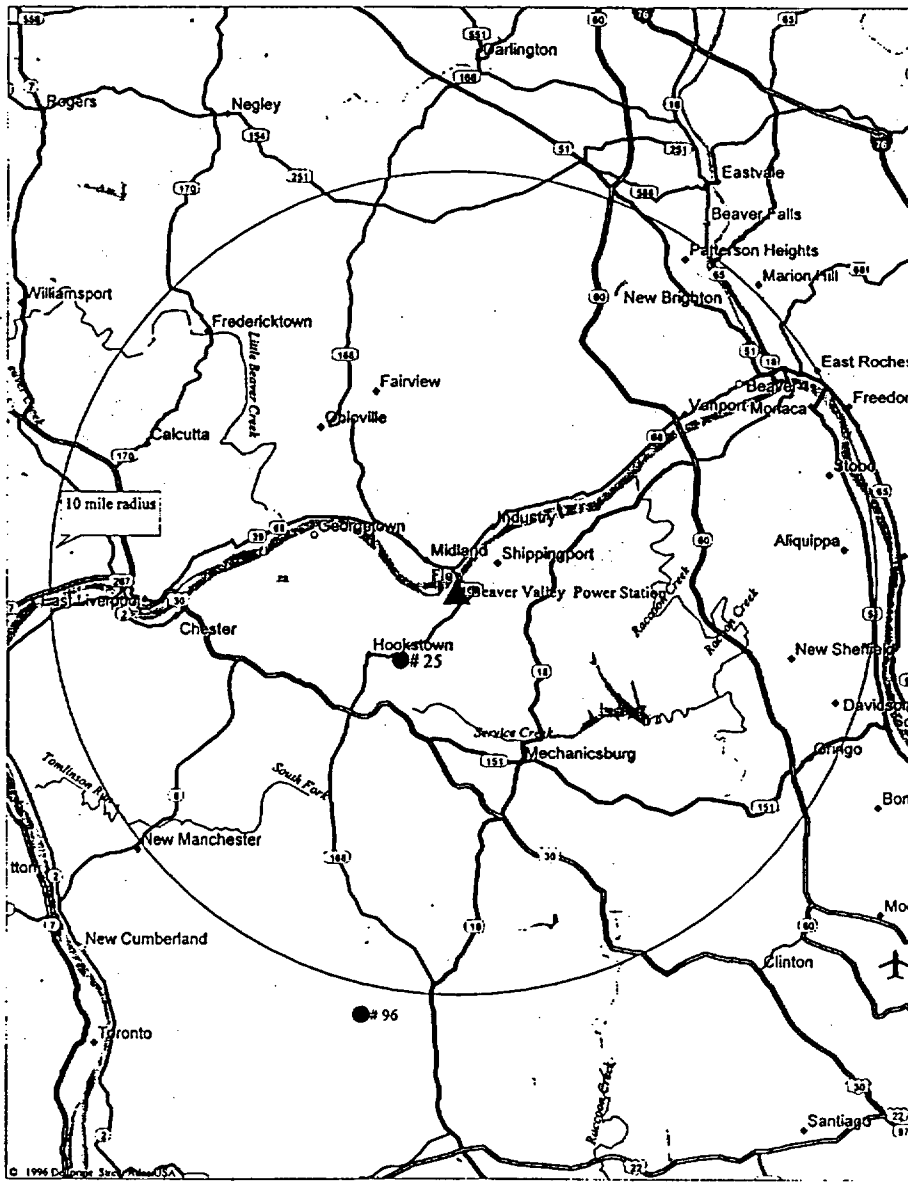
LOCATION OF SAMPLING SITES

FIGURE 3.0-4
MILK SAMPLING LOCATIONS



Milk Sampling Locations

Sector	Site #	Distance (miles)	Location
10	25*	2.1	Searight's Farm
10	96	10.4	Windsheimer Farm
	*		
	*		
	*		

*Three dairies based on highest deposition factors.

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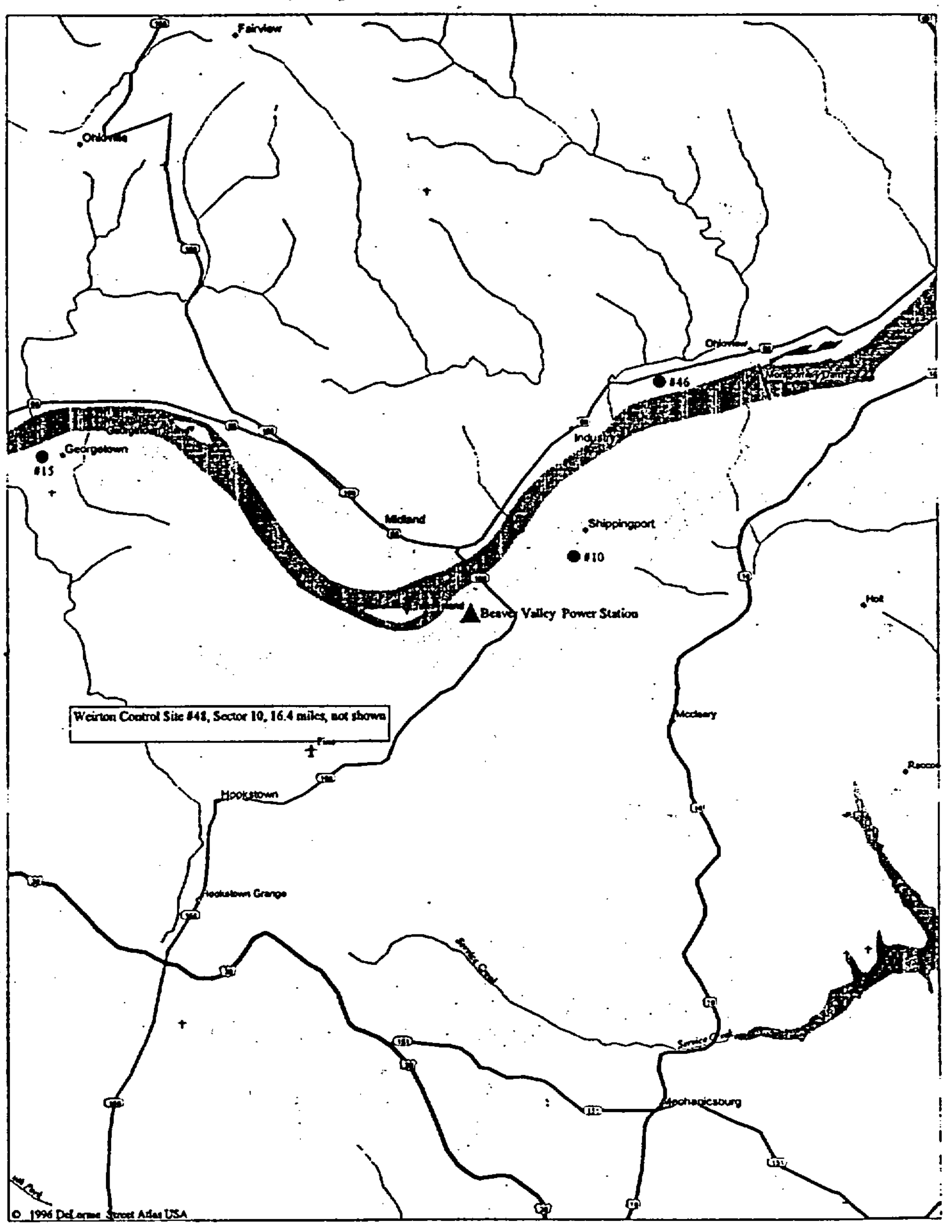
LOCATION OF SAMPLING SITES

FIGURE 3.0-5
FOODCROP SAMPLING LOCATIONS

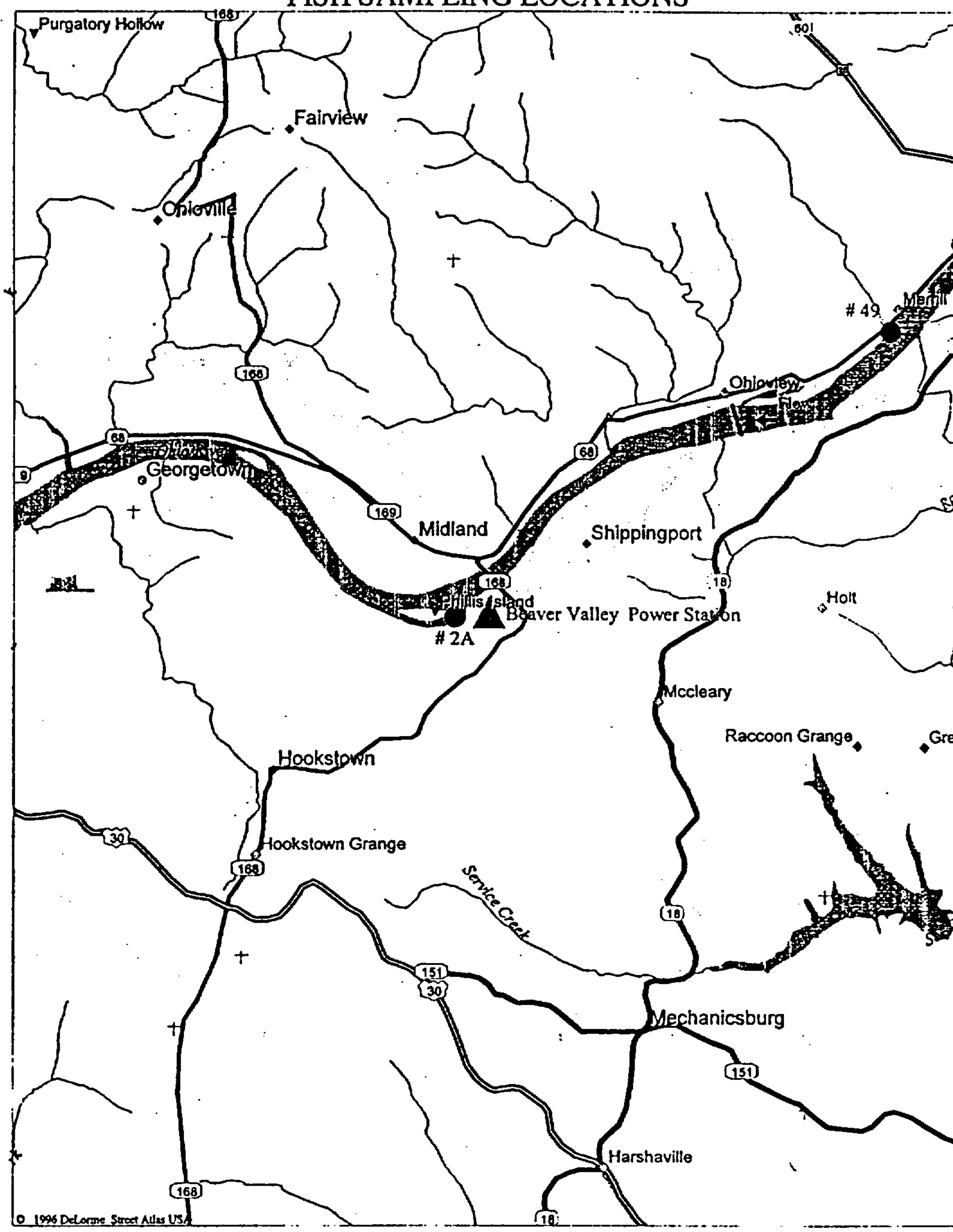


Food Sampling Locations

Site #	Description
10	Shippingport Boro
15	Georgetown Post Office
46	Industry, Midway Dr.
48	Weirton, W. Va., - Weirton Water Tower, Collier Way

ATTACHMENT B
Page 7 of 7
LOCATION OF SAMPLING SITES

FIGURE 3.0-6
FISH SAMPLING LOCATIONS



Fish Sampling Locations

Sector	Site #	Distance (miles)	Location
13	2A	0.2	BVPS Outfall Discharge
3	49	5.0	Upstream side of Montgomery Dam

Beaver Valley Power Station

Unit 1/2

1/2-ODC-2.04

ODCM: Information Related to 40 CFR 190

Document Owner
Manager, Health Physics

Revision Number	0
Level Of Use	General Skill Reference
Safety Related Procedure	Yes

TABLE OF CONTENTS

1.0 PURPOSE

1.1 This procedure provides the steps to be taken when the Total Dose of ODCM Control 4.11.4.1 exceeds twice the limit of any of the ODCM Controls specifying an Offsite Dose Limit.(3.1.2)

1.1.1 Prior to issuance of this procedure, these items were located in Section 4 of the old ODCM.

2.0 SCOPE

2.1 This procedure is applicable to all station personnel that are qualified to perform activities as described and referenced in this procedure.

3.0 REFERENCES AND COMMITMENTS

3.1 References

3.1.1 40 CFR Part 190

3.1.2 1/2-ODC-3.03, ODCM: Controls for RETS and REMP Programs

3.1.3 1/2-ADM-1640, Control of the Offsite Dose Calculation Manual

3.1.4 1/2-ADM-0100, Procedure Writer's Guide

3.1.5 1/2-ADM-0101, Review and Approval of Documents

3.2 Commitments

3.2.1 Technical Specification 6.9.2f, Special Reports

3.2.2 NUREG-1301, Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors (Generic Letter 89-01, Supplement No. 1)

4.0 RECORDS AND FORMS

4.1 Records

4.1.1 Any calculation supporting ODCM changes shall be documented, as appropriate, by a retrievable document (e.g.; letter or calculation package) with an appropriate RTL number.

4.2 Forms

4.2.1 None

5.0 PRECAUTIONS AND LIMITATIONS

5.1 The Offsite Dose Limits used to show compliance to this procedure are as follows:

5.1.1 ODCM Control 3.11.2.a; Liquid Effluents: ≤ 1.5 mrem/quarter Total Body or ≤ 5 mrem/quarter any Organ.

5.1.2 ODCM Control 3.11.2.b; Liquid Effluents: ≤ 3 mrem/year Total Body or ≤ 10 mrem/year any Organ.

5.1.3 ODCM Control 3.11.2.2.a; Gas Effluent-Noble Gas: ≤ 5 mrad/quarter Gamma, or ≤ 10 mrad/quarter Beta

5.1.4 ODCM Control 3.11.2.2.b; Gas Effluents-Noble Gas: ≤ 10 mrad/year Gamma ≤ 20 mrad/year Beta

5.1.5 ODCM Control 3.11.2.3.a; Gas Effluents-Particulates & Iodines: ≤ 7.5 mrem/quarter any organ

5.1.6 ODCM Control 3.11.2.3.b; Gas Effluents-Particulates & Iodines: ≤ 15 mrem/year any organ

5.1.7 ODCM Control 3.11.4.1; All Fuel Cycle Sources: ≤ 25 mrem/year Total Body or any Organ, except the thyroid, which is limited to ≤ 75 mrem/year

6.0 ACCEPTANCE CRITERIA

6.1 *Any changes to this procedure shall contain sufficient justification that the change will* maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50, and not adversely impact the accuracy or reliability of effluent dose or setpoint calculation.[3.2.2]

6.1.1 All changes to this procedure shall be prepared in accordance with 1/2-ADM-0100[3.1.4] and 1/2-ADM-1640.[3.1.3]

6.1.2 All changes to this procedure shall be reviewed and approved in accordance with 1/2-ADM-0101[3.1.5] and 1/2-ADM-1640.[3.1.3]

7.0 PREREQUISITES

7.1 The user of this procedure shall be familiar with ODCM structure and content.

8.0 PROCEDURE

8.1 Information Related To 40 CFR 190

8.1.1 CONTROL 3.11.4.1 requires that when the calculated doses associated with the effluent releases exceed twice the limits of ODCM CONTROL 3.11.1.2.a, 3.11.1.2.b, 3.11.2.2.a, 3.11.2.2.b, 3.11.2.3.a, or 3.11.2.3.b, the following shall be performed:

8.1.1.1 Calculations shall be made including direct radiation contributions from the units (including outside storage tanks, etc.) to determine whether the dose or dose commitment to any MEMBER OF THE PUBLIC from all facility releases of radioactivity and to radiation from uranium fuel cycle sources exceeds the limits of ≤ 25 mrem to the total body or any organ, except the thyroid, which is limited to ≤ 75 mrem for a calendar year.

8.1.1.1.1 If any of these limits are exceeded, prepare and submit to the Commission within 30 days a Special Report pursuant to Technical Specification 6.9.2f.[3.2.1] The following shall be included in the Special Report:

8.1.1.1.1.1 Define the corrective action to be taken to reduce subsequent releases to prevent recurrence of exceeding the limits of ODCM CONTROL 3.11.4.1.

8.1.1.1.1.2 Include the schedule for achieving conformance within the limits of ODCM CONTROL 3.11.4.1.

8.1.1.1.1.3 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.

8.1.1.1.1.4 Describe levels of radiation and concentrations of radioactive material involved, and the cause of exposure levels or concentrations.

8.1.1.1.1.5 If the estimated dose(s) exceeds the limits of ODCM CONTROL 3.11.4.1, and if the release condition resulting in violation of 40 CFR Part 190 has not already been corrected, 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.

8.2 Inside The Site Boundary Radiation Doses

8.2.1 In regards to assessment of radiation doses (from Radioactive Effluents) to MEMBERS OF THE PUBLIC due to their activities inside the site boundary, the following is provided:

8.2.1.1 A separate assessment of radiation doses from radioactive effluents to MEMBERS OF THE PUBLIC due to their activities inside the site boundary is generally not necessary because the exposure time for individuals not occupationally associated with the plant site is minimal in comparison to the exposure time considered for the dose calculation at or beyond the site boundary.

8.2.1.2 For reporting purposes, separate guidance for calculating radiation doses to a MEMBER OF THE PUBLIC inside the site boundary is not needed because the dose assessments for an offsite MEMBER OF THE PUBLIC is also assumed to be for a MEMBER OF THE PUBLIC conducting activities onsite.

8.2.1.2.1 This is verified by showing that the ground release χ/Q dispersion parameter used for dose calculation at the site boundary (0.352 miles NW) is greater than the χ/Q dispersion parameter at the location where a MEMBER OF THE PUBLIC would most likely have the maximum exposure time (0-0.5 miles N and 0-0.5 miles NNW). A comparison of these χ/Q dispersion parameters is as follows:

χ/Q Used for Dose Calculation	χ/Q Where an Assumed MEMBER OF THE PUBLIC Would Most Likely Have the Maximum Exposure Time		χ/Q References from 1/2-ODC-2.02
Site Boundary 0.352 miles NW	Inside the Site Boundary 0-0.5 miles N	Inside the Site Boundary 0-0.5 miles NNW	See Attachment F
9.24E-5 sec/m^3	2.33E-5 sec/m^3	5.47E-5 sec/m^3	Table 2.2-4
1.03E-4 sec/m^3	2.76E-5 sec/m^3	6.01E-5 sec/m^3	Table 2.2-5
7.35E-5 sec/m^3	2.44E-5 sec/m^3	5.57E-5 sec/m^3	Table 2.2-7
9.24E-5 sec/m^3	2.33E-5 sec/m^3	5.47E-5 sec/m^3	Table 2.2-8
9.24E-5 sec/m^3	2.33E-5 sec/m^3	5.47E-5 sec/m^3	Table 2.2-9
7.35E-5 sec/m^3	2.44E-5 sec/m^3	5.57E-5 sec/m^3	Table 2.2-10

- END -

Beaver Valley Power Station

Unit 1/2

1/2-ODC-3.01

ODCM: Dispersion Calculational Procedure and Source Term Inputs

Document Owner
Manager, Health Physics

Revision Number	0
Level Of Use	General Skill Reference
Safety Related Procedure	Yes

TABLE OF CONTENTS

1.0 PURPOSE

1.1 This procedure contains the basic methodology that was used for calculating dispersion (χ/Q) and deposition (D/Q).

1.1.1 Prior to issuance of this procedure, these items were located in Appendix A of the old ODCM.

1.2 This procedure also contains the input parameters to the various computer codes used by the Licensee and its subcontractors for determination of the liquid and gaseous source term mixes.

1.2.1 Prior to issuance of this procedure, these items were located in Appendix B of the old ODCM.

2.0 SCOPE

2.1 This procedure is applicable to all station personnel (including subcontractors) that are qualified to perform activities as described and referenced in this procedure.

3.0 REFEFERENCES AND COMMITMENTS

3.1 References

3.1.1 NUS-2173,Development Of Terrain Adjustment Factors For Use At the Beaver Valley Power Station, For the Straight-Line Atmospheric Dispersion Model, NUS Corporation, June 1978

3.1.2 NUREG/CR-2919, XOQDOQ: Computer Program For The Meteorological Evaluation Of Routine Effluent Releases At Nuclear Power Stations, September, 1982

3.1.3 Regulatory Guide 1.23, Meteorological Measurement Program for Nuclear Power Plants

3.1.4 Regulatory Guide 1.111, Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents In Routine Releases From Light-Water-Coded Reactors, Revision 1, July 1977

3.1.5 NRC Gale Code,

3.1.6 SWEC LIQ1BB Code,

3.1.7 SWEC GAS1BB Code,

3.1.8 NUREG-1301, Offsite Dose Calculation Manual Guidance, Standard Radiological Effluent Controls for Pressurized Water Reactors (Generic Letter 89-01, Supplement No. 1)

3.1.9 1/2-ADM-1640, Control of the Offsite Dose Calculation Manual

3.1.10 1/2-ADM-0100, Procedure Writer's Guide

3.1.11 1/2-ADM-0101, Review and Approval of Documents

3.2 Commitments

3.2.1 None

4.0 RECORDS AND FORMS

4.1 Records

4.1.1 Any calculation supporting generation of dispersion, deposition, or source term mixes shall be documented, as appropriate, by a retrievable document (e.g.; letter or calculation package) with an appropriate RTL number.

4.2 Forms

4.2.1 None

5.0 PRECAUTIONS AND LIMITATIONS

5.1 This procedure contains the information that was previously contained in Appendix A and Appendix B of the previous BV-1 and 2 Offsite Dose Calculation Manual.

5.1.1 In regards to this, the Tables that were transferred from Appendix A and Appendix B to the appropriate ATTACHMENTS of this procedure will still contain a prefix denoting an "A" or "B".

6.0 ACCEPTANCE CRITERIA

6.1 Any change to this procedure shall contain sufficient justification that the change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a and Appendix I to 10 CFR 50, and not adversely impact the accuracy or reliability of effluent dose or setpoint calculation.

6.1.1 All changes to this procedure shall be prepared in accordance with 1/2-ADM-0100[3.1.10] and 1/2-ADM-1640.[3.1.9]

6.1.2 All changes to this procedure shall be reviewed and approved in accordance with 1/2-ADM-0101[3.1.11] and 1/2-ADM-1640.[3.1.9]

7.0 PREREQUISITES

7.1 The user of this procedure shall be familiar with ODCM structure and content.

8.0 PROCEDURE

8.1 Summary of Dispersion and Deposition Methodology

8.1.1 Annual average and grazing season average values of relative concentration (χ/Q) and deposition (D/Q) were calculated for continuous and intermittent gaseous releases of activity from the site according to the straight-line airflow (Gaussian) model described in RG-1.111.[3.1.4]

8.1.1.1 Undecayed and undepleted sector average χ/Q and D/Q values were obtained for each of sixteen 22.5-degree sectors at the site boundary and maximum individual receptors.

8.1.1.2 For an elevated release, (i.e.; occurring at a height that is twice the height or more of a nearby structure) credit was taken for the effective release height which is comprised of the physical release height plus momentum plume rise minus the terrain height at a given receptor.

8.1.1.3 A building wake correction factor was used to adjust calculations for ground-level releases.

8.1.1.4 Airflow reversals were also accounted for by applying site-specific terrain recirculation factors for both ground and elevated releases at the site.[3.1.1]

8.1.1.5 The methodology employed in the calculation of intermittent release χ/Q and D/Q values is that described in NUREG/CR-2919.[3.1.2]

8.1.2 The site continuous gaseous release points that have been evaluated include the following:

8.1.2.1 PV-1/2: The Unit 1/2 Gaseous Waste/Process Vent attached to the Unit 1 natural draft cooling tower

8.1.2.2 CV-1 and CV-2: The Unit 1 Rx Containment/SLCRS Vented the Unit 2 SLCRS Filtered Pathway

8.1.2.3 VV-1 and VV-2: The Unit 1 Ventilation Vent and the Unit 2 SLCRS Unfiltered Pathway

8.1.2.4 TV-2: The Unit 2 Turbine Building Vent

8.1.2.5 CB-2: The Unit 2 Condensate Polishing Building Vent

8.1.2.6 DV-2: The Unit 2 Decontamination Building Vent

8.1.2.7 WV-2: The Unit 2 Gaseous Waste Storage Tank Vault Vent

8.1.3 The intermittent releases are from PV-1/2, VV-1, VV-2, CV-1 and CV-2.

8.1.4 Only PV-1/2 was considered to be an elevated release with all other release points being treated as ground level releases. A summary of the release characteristics and their locations is given in ATTACHMENT A.

8.1.5 Onsite meteorological data for the period January 1, 1976 through December 31, 1980 were used as input for the annual-average calculations.

8.1.5.1 The grazing season was represented by a six-month period from May 1 through October 31 for each year of the 5-year meteorological data base. This grazing season corresponds reasonably well with the growing season.

8.1.5.2 The data were collected according to guidance in NRC RG-1.23[3.1.3] as described in Section 2.3 of the BVPS-2 FSAR.

8.1.5.3 The parameters used in the χ/Q and D/Q calculations consist of wind speed, wind direction, and ΔT as an indicator of atmospheric stability. The lower level winds (35 ft) and ΔT (150-35 ft) were used for all release points except the Process Vent which required the use of 500 ft winds and ΔT (500-35 ft) which are representative of the release height (510 ft).

8.1.6 The annual average and grazing season χ/Q and D/Q values for the continuous and intermittent radioactive releases were calculated at the site boundary, nearest resident, nearest vegetable garden, nearest milk cow, nearest milk goat, and nearest meat animal.

8.1.6.1 In the case of the Process Vent releases, several of each receptor type were evaluated in each downwind sector to determine the maximum χ/Q and D/Q values.

8.1.6.2 The distances of the limiting maximum individual receptors from the radioactive release points are given in ATTACHMENT E (Table 2.2-3) of 1/2-ODC-2.02.

8.1.6.3 The continuous release annual average χ/Q values at the special locations for the Containment Vents, Ventilation Vents, Process Vent, Turbine Building Vents, Decontamination Building Vent, Waste Gas Storage Vault Vent, and Condensate Polishing Building Vent are given in ATTACHMENT F (Tables 2.2-4 through 2.2-10) of 1/2-ODC-2.02. Continuous release annual average χ/Q's for these same release points are also given at ten incremental downwind distances of 0-5 miles.

8.1.6.4 Continuous release D/Q values for these same release points are given in ATTACHMENT K (Tables 2.3-21 through 2.3-27) of 1/2-ODC-2.02 for the same 0-5 mile incremental distances, and in ATTACHMENT L (Tables 2.3-28 through 2.3-34) of 1/2-ODC-2.02 for the special locations.

8.1.6.5 Due to their location adjacent to the Containment Building, the Decontamination Building and Gaseous Waste Storage Tank Vault χ/Q's and D/Q's are the same as the Containment Vent χ/Q's and D/Q's.

8.1.6.6 Likewise, the Turbine Building Vent χ/Q's and D/Q's apply to the Condensate Polishing Building as well due to its location adjacent to the Turbine Building.

8.1.7 ATTACHMENT M (Tables 2.3-35 through 2.3-38) of 1/2-ODC-2.02 contain short term χ/Q values for batch releases originating from the Containment Vent, Ventilation Vent, and Process Vent releases respectively.

8.1.7.1 The values in these tables are based on 32 hours per year of Containment and Ventilation Vent purges and 74 hours per year of Process Vent purges.

8.2 Summary of Source Term Inputs

8.2.1 Liquid Source Term Inputs

8.2.1.1 Inputs to the NRC Gale Code used for generation of BV-1 Liquid Source Term Mixes are shown in ATTACHMENT B (Table B:1a).

8.2.1.2 Inputs to the SWEC LIQ1BB Code used for generation of BV-2 Liquid Source Term Mixes are shown in ATTACHMENT B (Table B:1b)

8.2.2 Gaseous Source Term Inputs

8.2.2.1 Inputs to the SWEC GAS1BB Code for generation of BV-1 Gaseous Source Term Mixes are shown in ATTACHMENT C (Table B:2a)

8.2.2.2 Inputs to the SWEC GAS1BB Code for generation of BV-2 Gaseous Source Term Mixes are shown in ATTACHMENT C (Table B:2b)

ATTACHMENT A
Page 1 of 1
BV-1 AND 2 RELEASE CONDITIONS

TABLE A:1

	VV-1 VENTILATION VENT (PAB EXHAUST) VV-2 SLCRS UNFILTERED PATHWAY	CV-1 RX CONTAINMENT/ SLCRS VENT CV-2 RX CONTAINMENT/ SLCRS FILTERED PATHWAY	PV-1/2 GASEOUS WASTE/PROCESS VENT	TV-2 TURBINE BUILDING VENT
TYPE OF RELEASE	GROUND LEVEL	GROUND LEVEL	ELEVATED	GROUND LEVEL
	Long Term And Short Term	Long Term And Short Term	Long Term And Short Term	Long Term And Short Term
Release Point Height (m)	26	47	155	33
Adjacent Building Height (m)	19	44	155	33
Relative Location To Adjacent Structures	E. Side Of Primary Auxiliary Bldg	Top Center Of Containment Dome	Atop Cooling Tower	Turbine Building
Exit Velocity (m/sec)	NA	NA	9.4	NA
Internal Stack Diameter (m)	NA	NA	0.25	NA
Building Cross-Sectional Area (m^2)	1600	1600	NA	NA
Purge Frequency* (hours/year)	32	32	74	NA
Purge Duration (hrs/release)	8	8	NA	NA

*Applied to Short Term calculations only

ATTACHMENT B
Page 1 of 1
LIQUID SOURCE TERM INPUTS

TABLE B:1a
INPUTS TO GALE CODE FOR GENERATION OF BV-1 LIQUID SOURCE TERM MIXES

BV-1 PWR INPUTS	VALUE
Thermal Power Level (megawatts)	2766.000
Plant Capacity Factor	.800
Mass Of Primary Coolant (thousand lbs)	345.000
Percent Fuel With Cladding Defects	.120
Primary System Letdown Rate (gpm)	60.000
Letdown Cation Demineralizer Flow	6.000
Number Of Steam Generators	3.000
Total Steam Flow (million lbs/hr)	11.620
Mass Of Steam In Each Steam Generator (thousand lbs)	6.772
Mass Of Liquid In Each Steam Generator (thousand lbs)	97.000
Total Mass Of Secondary Coolant (thousand lbs)	1296.000
Mass Of Water In Steam Generator (thousand lbs)	291.000
Blowdown Rate (thousand lbs/hr)	33.900
Primary To Secondary Leak Rate (lbs/day)	100.000
Fission Product Carry-Over Fraction	.001
Halogen Carry-Over Fraction	.010
Condensate Demineralizer Flow Fraction	0.000
Radwaste Dilution Flow (thousand gpm)	22.500

BV-1 LIQUID WASTE INPUTS

STREAM	FLOW RATE (gal/day)	FRACTION OF PCA	FRACTION DISCHARGE	COLLECTION TIME (days)	DELAY TIME (days)	DECONTAMINATION FACTORS I	DECONTAMINATION FACTORS Cs	DECONTAMINATION FACTORS OTHERS
Shim Bleed Rate	1.32E4	1.000	0.000	11.260	7.220	1E7	1E7	1E7
Equipment Drains	6.00E2	1.000	0.000	11.260	7.220	1E7	1E7	1E7
Clean Waste Input	7.50E1	1.000	1.000	0.071	0.648	1E5	2E4	1E5
Dirty Waste Input	1.35E3	0.035	1.000	0.071	0.648	1E5	2E4	1E5
Blowdown	9.75E4	--	1.000	0.071	0.648	1E5	2E4	1E5
Untreated Blowdown	0.0	--	--	--	--	--	--	--

ATTACHMENT B
Page 2 of 2
LIQUID SOURCE TERM INPUTS

TABLE B:1b
INPUTS TO SWEC LIQ1BB CODE FOR GENERATION OF BV-2 LIQUID SOURCE TERM MIXES

BV-2 PWR INPUTS	VALUE
Thermal Power Level (megawatts)	2766.000
Plant Capacity Factor	.800
Mass Of Primary Coolant (thousand lbs)	385.000
Percent Fuel With Cladding Defects	.120
Primary System Letdown Rate (gpm)	57.000
Letdown Cation Demineralizer Flow	5.700
Number Of Steam Generators	3.000
Total Steam Flow (million lbs/hr)	11.600
Mass Of Steam In Each Steam Generator (thousand lbs)	8.700
Mass Of Liquid In Each Steam Generator (thousand lbs)	100.000
Total Mass Of Secondary Coolant (thousand lbs)	2000.000
Mass Of Water In Steam Generator (thousand lbs)	298.000
Blowdown Rate (thousand lbs/hr)	22.300
Primary To Secondary Leak Rate (lbs/day)	100.000
Fission Product Carry-Over Fraction	.001
Halogen Carry-Over Fraction	.010
Condensate Demineralizer Flow Fraction	.700
Radwaste Dilution Flow (thousand gpm)	7.800

BV-2 LIQUID WASTE INPUTS

STREAM	FLOW RATE (gal/day)	FRACTION OF PCA	FRACTION DISCHARGE	COLLECTION TIME (hrs)	DELAY TIME (hrs)	DECONTAMINATION FACTORS I	CsRb	OTHERS
Containment Sump	40	1.000	1.0	35.5	6.2	1E3	1E4	1E4
Auxiliary Building Sump	200	0.100	1.0	35.5	6.2	1E3	1E4	1E4
Miscellaneous Sources	700	0.010	1.0	35.5	6.2	1E3	1E4	1E4
Rx Plant Samples	35	1.000	1.0	35.5	6.2	1E3	1E4	1E4
Lab Drains	400	0.002	1.0	35.5	6.2	1E3	1E4	1E4
Cond. Demin. Rinse Water	2685	1.1E-4	1.0	35.5	6.2	1E3	1E4	1E4
CVCS	60	--	1.0	1300	173	1E4	4E3	1E5
Turbine Bldg.Drains	7200	--	1.0	--	--	--	--	--

ATTACHMENT C
Page 1 of 1
GASEOUS SOURCE TERM INPUTS

TABLE B:2a
INPUTS TO SWEC GAS1BB CODE FOR GENERATION OF BV-1 GASEOUS SOURCE TERM MIXES

BV-1 PWR INPUTS	VALUE
Thermal Power Level (megawatts)	2766.000
Plant Capacity Factor	.800
Mass Of Primary Coolant (thousand lbs)	385.000
Percent Fuel With Cladding Defects	.120
Primary System Letdown Rate (gpm)	57.000
Letdown Cation Demineralizer Flow	5.700
Number Of Steam Generators	3.000
Total Steam Flow (million lbs/hr)	11.600
Mass Of Steam In Each Steam Generator (thousand lbs)	8.700
Mass Of Liquid In Each Steam Generator (thousand lbs)	100.000
Total Mass Of Secondary Coolant (thousand lbs)	2000.000
Mass Of Water In Steam Generator (thousand lbs)	298.000
Blowdown Rate (thousand lbs/hr)	52.000
Primary To Secondary Leak Rate (lbs/day)	100.000
Fission Product Carry-Over Fraction	.001
Halogen Carry-Over Fraction	.010
Condensate Demineralizer Flow Fraction	0.000
Radwaste Dilution Flow (thousand gpm)	15.000

BV-1 GASEOUS WASTE INPUTS	VALUE
<u>There Is Not Continuous Stripping Of Full Letdown Flow</u>	
Hold Up Time For Xenon (days)	39.000
Hold Up Time For Krypton (days)	2.000
Primary Coolant Leak To Auxiliary Building (lb/day)	160.000
Auxiliary Building Leak Iodine Partition Factor	7.5E-3
Gas Waste System Particulate Release Fraction	0.000
Auxiliary Building Charcoiodine Release Fraction	1.000
Auxiliary Building Particulate Release Fraction	1.000
Containment Volume (million cu-ft)	1.800
Frequency Of Primary Coolant Degassing (times/yr)	2.000
Primary To Secondary Leak Rate (lb/day)	100.000
<u>There Is A Kidney Filter</u>	
Containment Atmosphere Cleanup Rate (thousand cfm)	2.000
Purge Time Of Containment (hours)	8.000
<u>There Is Not A Condensate Demineralizer</u>	
Iodine Partition Factor (gas/liq) In Steam Generator	0.010
Frequency Of Containment Building High Vol Purge (times/yr)*	4.000
Containment Volume Purge Iodine Release Fraction	1.000
Containment Volume Purge Particulate Release Fraction	1.000
Steam Leak To Turbine Building (lbs/hr)	1700.000
Fraction Iodine Released From Blowdown Tank Vent	0.000
Fraction Iodine Released From Main Condensate Air Ejector	0.440
<u>There Is Not A Cryogenic Off Gas System</u>	

*2 cold and 2 hot purges

ATTACHMENT C
Page 2 of 2
GASEOUS SOURCE TERM INPUTS

TABLE B:2b
INPUTS TO SWEC GAS1BB CODE FOR GENERATION OF BV-2 GASEOUS SOURCE TERM MIXES

BV-2 PWR INPUTS	VALUE
Thermal Power Level (megawatts)	2766.000
Plant Capacity Factor	.800
Mass Of Primary Coolant (thousand lbs)	385.000
Percent Fuel With Cladding Defects	.120
Primary System Letdown Rate (gpm)	57.000
Letdown Cation Demineralizer Flow	5.700
Number Of Steam Generators	3.000
Total Steam Flow (million lbs/hr)	11.600
Mass Of Steam In Each Steam Generator (thousand lbs)	8.700
Mass Of Liquid In Each Steam Generator (thousand lbs)	100.000
Total Mass Of Secondary Coolant (thousand lbs)	2000.000
Mass Of Water In Steam Generator (thousand lbs)	298.000
Blowdown Rate (thousand lbs/hr)	22.300
Primary To Secondary Leak Rate (lbs/day)	100.000
Fission Product Carry-Over Fraction	.001
Halogen Carry-Over Fraction	.010
Condensate Demineralizer Flow Fraction	.700
Radwaste Dilution Flow (thousand gpm)	7.800

BV-2 GASEOUS WASTE INPUTS	VALUE
<u>There Is Not Continuous Stripping Of Full Letdown Flow</u>	
Hold Up Time For Xenon (days)	45.800
Hold Up Time For Krypton (days)	2.570
Primary Coolant Leak To Auxiliary Building (lb/day)	160.000
Auxiliary Building Leak Iodine Partition Factor	7.5E-3
Gas Waste System Particulate Release Fraction	0.000
Auxiliary Building Charcoiodine Release Fraction	0.100
Auxiliary Building Particulate Release Fraction	0.010
Containment Volume (million cu-ft)	1.800
Frequency Of Primary Coolant Degassing (times/yr)	2.000
Primary To Secondary Leak Rate (lb/day)	100.000
<u>There Is A Kidney Filter</u>	
Containment Atmosphere Cleanup Rate (thousand cfm)	20.000
Purge Time Of Containment (hours)	8.000
<u>There Is Not A Condensate Demineralizer</u>	
Iodine Partition Factor (gas/liq) In Steam Generator	0.010
Frequency Of Containment Building High Vol Purge (times/yr)*	4.000
Containment Volume Purge Iodine Release Fraction	1.000
Containment Volume Purge Particulate Release Fraction	1.000
Steam Leak To Turbine Building (lbs/hr)	1700.000
Fraction Iodine Released From Blowdown Tank Vent	0.000
Fraction Iodine Released From Main Condensate Air Ejector	0.270
<u>There Is Not A Cryogenic Off Gas System</u>	

*2 cold and 2 hot purges

Beaver Valley Power Station

Unit 1/2

1/2-ODC-3.02

ODCM: Bases For ODCM Controls

Document Owner
Manager, Radiation Protection

Revision Number	1
Level Of Use	General Skill Reference
Safety Related Procedure	Yes

TABLE OF CONTENTS

1.0 PURPOSE

1.1 This procedure contains the Bases for the ODCM Controls that were transferred from the Bases Section of the Technical Specification per Unit 1/2 Amendments 1A-188/2A-70, and in accordance with Generic Letter 89-01 and NUREG-1301 (Generic Letter 89-01, Supplement No. 1).(3.1.5, 3.2.10)

1.1.1 Prior to issuance of this procedure, these items were located in Appendix D of the old ODCM.

1.2 This procedure also contains the Bases for the ODCM Controls (for Radiation Monitoring Instrumentation) that were duplicated from the Bases Section of the Technical Specification per Unit 1/2 Amendments 1A-246/2A-124, and in accordance with NUREG-1431.(3.1.6, 3.2.11)

1.3 This procedure also contains the Bases for the ODCM Controls (for Liquid Holdup Tank Activity Limits and for Gas Decay/Storage Tank Activity Limits) that were transferred from the Bases Section of the Technical Specification per Unit 1/2 Amendments 1A-250/2A-130, and in accordance with NUREG-1431.(3.1.7, 3.2.11)

2.0 SCOPE

2.1 This procedure is applicable to all station personnel that are qualified to perform activities as described and referenced in this procedure.

3.0 REFERENCES AND COMMITMENTS

3.1 References

3.1.1 1/2-ODC-2.01, ODCM: Liquid Effluents

3.1.2 1/2-ODC-2.02, ODCM: Gaseous Effluents

3.1.3 1/2-ODC-3.03, ODCM: Controls for RETS and REMP Programs

3.1.4 1/2-ADM-1640, Control of the Offsite Dose Calculation Manual

3.1.5 Unit 1/2 Technical Specification 6.8.6, including Amendments 1A-188/2A-70 (LAR 1A-175/2A-37), Implemented August 7, 1995

3.1.6 Unit 1/2 Technical Specification 3.3.3.1, including Amendments 1A-246/2A-124 (LAR 1A-287/2A-159), Implemented April 11, 2002

3.1.7 Unit 1/2 Technical Specifications 3.11.1.4, 3.11.2.5 and 6.8.6, including Amendments 1A-250/2A-130 (LAR 1A-291/2A-163), Implemented August 7, 2002

3.1.8 1/2-ADM-0100, Procedure Writer's Guide

3.1.9 1/2-ADM-0101, Review and Approval of Documents

3.2 Commitments

3.2.1 10 CFR Part 20

3.2.2 10 CFR Part 50

3.2.3 40 CFR Part 141

3.2.4 40 CFR Part 190

3.2.5 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, October, 1977

3.2.6 Regulatory Guide 1.111, Methods For Estimating Atmospheric Transport And Dispersion of Gaseous Effluents In Routine Releases From Light-Water-Cooled Reactors, Revision 1, July, 1977

3.2.7 Regulatory Guide 1.113, Estimating Aquatic Dispersion Of Effluents From Accidental And Routine Reactor Releases For The Purpose Of Implementing Appendix I, April, 1977

3.2.8 NUREG-0133, Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants, October 1978

3.2.9 NUREG-0737, Clarification of TMI Action Plan Requirements, October, 1980

3.2.10 NUREG-1301, Offsite Dose Calculation Manual Guidance. Standard Radiological Effluent Controls For Pressurized Water Reactors (Generic Letter 89-01, Supplement No. 1)

3.2.11 NUREG-1431, Standard Technical Specifications - Westinghouse Plants Specifications

4.0 RECORDS AND FORMS

4.1 Records

4.1.1 Any calculation supporting ODCM changes shall be documented, as appropriate, by a retrievable document (eg; letter or calculation package) with an appropriate RTL number.

4.2 Forms

4.2.1 None

5.0 PRECAUTIONS AND LIIMITATIONS

5.1 The numbering of each specific ODCM Bases contained in this procedure does not appear to be sequential. This is intentional, as all ODCM Bases numbers remained the same when they were transferred from the Technical Specifications. This was done in an effort to minimize the amount of plant procedure changes and to eliminate any confusion associated with numbering changes.

6.0 ACCEPTANCE CRITERIA

6.1 Any change to this procedure shall contain sufficient justification that the change will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appenidx I to 10 CFR 50, and not adversely impact the accuracy or reliability of effluent dose or setpoint calculation.[3.2.10]

6.1.1 All changes to this procedure shall be prepared in accordance with 1/2-ADM-0100[3.1.8] and 1/2-ADM-1640.[3.1.4]

6.1.2 All changes to this procedure shall be reviewed and approved in accordance with 1/2-ADM-0101[3.1.9] and 1/2-ADM-1640.[3.1.4]

7.0 PREREQUISITES

7.1 The user of this procedure shall be familiar with ODCM structure and content.

8.0 PROCEDURE

8.1 See ATTACHMENT A for a complete description of Bases for ODCM Controls associated with Instrumentation.

8.2 See ATTACHMENT B for a complete description of Bases for ODCM Controls associated with Liquid Effluents.

8.3 See ATTACHMENT C for a complete description of Bases for ODCM Controls associated with Gaseous Effluents.

8.4 See ATTACHMENT D for a complete description of Bases for ODCM Controls associated with Total Dose.

8.5 See ATTACHMENT E for a complete description of Bases for ODCM Controls associated with the Radiological Environmental Monitoring Program (REMP).

-END-

ATTACHMENT A
Page 1 of 1
BASES FOR ODCM CONTROLS: INSTRUMENTATION

3/4.3.3.1 RADIATION MONITORING INSTRUMENTATION

The OPERABILITY of the radiation monitoring channels ensures that: 1) the radiation levels are continually measured in the areas served by the individual channels; 2) the alarm or automatic action is initiated when the radiation level trip setpoint is exceeded; and 3) sufficient information is available on selected plant parameters to monitor and assess these variables following an accident. This capability is consistent with the recommendations of NUREG-0737.[3.2.9]

3/4.3.3.9 RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

The radioactive liquid effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in liquid effluents during actual or potential releases of liquid effluents. The alarm/trip setpoints for these instruments shall be calculated in accordance with Section 1 of this manual to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20. The OPERABILITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50.[3.2.1, 3.2.2]

3/4.3.3.10 RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

The radioactive gaseous effluent instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in gaseous effluents during actual or potential releases of gaseous effluents. The alarm/trip setpoints for these instruments shall be calculated in accordance with Section 2 of this manual to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20. This instrumentation also includes provisions for monitoring (and controlling) the concentrations of potentially explosive gas mixtures in the waste gas holdup system. The OPERABILITY and use of this instrumentation is consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50.[3.2.1, 3.2.2]

ATTACHMENT B
Page 1 of 2
BASES FOR ODCM CONTROLS: LIQUID EFFLUENTS

3/4.11.1.1 LIQUID EFFLUENT CONCENTRATION

This CONTROL is provided to ensure that the concentration of radioactive materials released in Liquid waste effluents from the site to unrestricted areas will be less than 10 times the EC's specified in 10 CFR Part 20, Appendix B (20.1001-20-2401), Table 2, Column 2. This limitation provides additional assurance that the levels of radioactive materials in bodies of water outside the site will result in exposure within (1) the Section II.A design objectives of Appendix I, 10 CFR Part 50, to an individual and (2) the limits of 10 CFR Part 20.1302 to the population. The concentration limit for dissolved or entrained noble gases is based upon the assumption that Xe-135 is the controlling radioisotope and its MPC in air (submersion) was converted to an equivalent concentration in water using the methods described in International Commission on Radiological Protection (ICRP) Publication 2.[3.2.1, 3.2.2]

3/4.11.1.2 LIQUID EFFLUENT DOSE

This CONTROL is provided to implement the requirements of Sections II.A, III.A, and IV.A of Appendix I, 10 CFR Part 50. The Limiting Condition for Operation implements the guides set forth in Section II.A of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in liquid effluents will be kept "as low as is reasonably achievable." Also, for fresh water sites with drinking water supplies which can be potentially affected by plant operations, there is reasonable assurance that the operation of the facility will not result in radionuclide concentrations in the finished drinking water that are in excess of the requirements of 40 CFR 141. The dose calculations in the procedure 1/2-ODC-2.01 implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I is to be shown by calculational procedures based on models and data such that the actual exposure of an individual through appropriate pathways is unlikely to be substantially underestimated. The equations specified in procedure1/2-ODC-2.01 for calculating the doses due to the actual release rates of radioactive materials in liquid effluents are consistent with the methodology provided in Regulatory Guide 1.109, and Regulatory Guide 1.113. NUREG-0133 provides methods for dose calculations consistent with Regulatory Guides 1.109 and 1.113.[3.1.1, 3.2.2, 3.2.3, 3.2.5, 3.2.7, 3.2.8]

This CONTROL applies to the release of liquid effluents for Beaver Valley Power Station, Unit No. 1 or Unit No. 2. These units have shared radwaste treatment systems, the liquid effluents from the shared system are proportioned among the units sharing that system.

ATTACHMENT B
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BASES FOR ODCM CONTROLS: LIQUID EFFLUENTS

3/4.11.1.3 LIQUID WASTE TREATMENT SYSTEM

The CONTROL that the appropriate portions of this system be used when specified provides assurance that the releases of radioactive materials in liquid effluents will be kept "as low as is reasonably achievable." This specification implements the requirements of 10 CFR Part 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50 and design objective given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the liquid radwaste treatment system were specified as a suitable fraction of the dose design objectives set forth in Section II.A of Appendix I, 10 CFR Part 50, for liquid effluents. This specification applies to Beaver Valley Power Station, Unit No. 1 or Unit No. 2.[3.2.2]

3/4.11.1.4 LIQUID HOLDUP TANKS

8/2002

Restricting the quantity of radioactive material contained in the specified tanks provides assurance that in the event of an uncontrolled release of the tanks' contents, the resulting concentrations would be less than the limits of 10 CFR Part 20, Appendix B, Table 2, Column 2, at the nearest potable water supply and the nearest surface water supply in an unrestricted area.

ATTACHMENT C
Page 1 of 3
BASES FOR ODCM CONTROLS: GASEOUS EFFLUENTS

3/4.11.2.1 GASEOUS EFFLUENT DOSE RATE

This CONTROL is provided to ensure that the dose at anytime at the site boundary from gaseous effluents from all units on the site will be within the annual dose limits of 10 CFR Part 20 for unrestricted areas. The annual dose limits are the doses associated with the concentrations of 10 CFR Part 20, Appendix B, Table II, Column 1. These limits provide reasonable assurance that radioactive material discharged in gaseous effluents will not result in the exposure of an individual in an unrestricted area, either within or outside the site boundary, to annual average concentrations exceeding the limits specified in Appendix B, Table II of 10 CFR Part 20 (10 CFR Part 20.106(b)). For individuals who may at times be within the site boundary, the occupancy of the individual will be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the site boundary. The specified release rate limits restrict, at all times, the corresponding gamma and beta dose rates above background to an individual at or beyond the site boundary to ≤ 500 mrem/year to the total body or to ≤ 3,000 mrem/year to the skin. These release rate limits also restrict, at all times, the corresponding thyroid dose rate above background of a child via the inhalation pathway to ≤ 1,500 mrem/year.[3.2.1]

3/4.11.2.2 DOSE, NOBLE GASES

This CONTROL is provided to implement the requirements of Sections II.B, III.A, and IV.A of Appendix I, 10 CFR Part 50. The CONTROL implements the guides set forth in Section II.B of Appendix I. The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the release of radioactive material in gaseous effluents will be kept "as low as is reasonably achievable." The Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data such that the actual exposure of an individual through the appropriate pathways is unlikely to be substantially underestimated. The dose calculations established in procedure 1/2-ODC-2.02 for calculating the doses due to the actual release rates of radioactive noble gases in gaseous effluents are consistent with the methodology provided in Regulatory Guide 1.109, and Regulatory Guide 1.111. The equations in procedure 1/2-ODC-2.02 are provided for determining the air doses at the exclusion area boundary, and are based upon the historical average atmospheric conditions. NUREG-0133 provides methods for dose calculations consistent with Regulatory Guides 1.109 and 1.111. This specifications applies to the release of gaseous effluents from Beaver Valley Power Station, Unit No. 1 or Unit No. 2.[3.1.2, 3.2.2, 3.2.5, 3.2.6, 3.2.8]

ATTACHMENT C
Page 2 of 3
BASES FOR ODCM CONTROLS: GASEOUS EFFLUENTS

3/4.11.2.3 DOSE, RADIOIODINES, RADIOACTIVE MATERIAL IN PARTICULATE FORM AND RADIONUCLIDES OTHER THAN NOBLE GASES

This CONTROL is provided to implement the requirements of Sections II.C, III.A, and IV.A of Appendix I, 10 CFR Part 50. The CONTROLS are the guides set forth in Section II.C of Appendix I.[3.2.2]

The ACTION statements provide the required operating flexibility and at the same time implement the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive materials in gaseous effluents will be kept "as low as is reasonably achievable." The calculational methods specified in the surveillance requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculational procedures based on models and data such that the actual exposure of an individual through appropriate pathways is unlikely to be substantially underestimated. The calculational methods in procedure 1/2-ODC-2.02 are for calculating the doses due to the actual release rates of the subject materials are consistent with the methodology provided in Regulatory Guide 1.109, and Regulatory Guide 1.111. These equations also provide for determining the actual doses based upon the historical average atmospheric conditions. The release rate specifications for radioiodines, radioactive material in particulate form, and radionuclides other than noble gases are dependent on the existing radionuclide pathways to man, in the unrestricted area. The pathways which are examined in the development of these calculations are: 1) individual inhalation of airborne radionuclides, 2) deposition of radionuclides onto vegetation with subsequent consumption by man, 3) deposition onto grassy areas where milk animals and meat producing animals graze with consumption of the milk and meat by man, and 4) deposition on the ground with subsequent exposure of man. This CONTROL applies to radioactive material in particulate form and radionuclides other than noble gases released from Beaver Valley Power Station, Unit No. 1 or Unit No.2.[3.1.2, 3.2.2, 3.2.6, 3.2.7]

ATTACHMENT C
Page 3 of 3
BASES FOR ODCM CONTROLS: GASEOUS EFFLUENTS

3/4.11.2.4 GASEOUS RADWASTE TREATMENT SYSTEM

The CONTROL that the appropriate portions of these systems be used when specified provides reasonable assurance that the releases of radioactive materials in gaseous effluents will be kept "as low as is reasonably achievable." This specification implements the requirements of 10 CFR Part 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50, and design objective Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the systems were specified as a suitable fraction of the dose design objectives set forth in Sections II.B and II.C of Appendix I, 10 CFR Part 50, for gaseous effluents. This specification applies to gaseous radwaste from Beaver Valley Power Station, Unit No. 1 or Unit No. 2.[3.1.2, 3.2.2]

3/4.11.2.5 BV-1 GASEOUS WASTE STORAGE TANKS

Restricting the quantity of radioactivity contained in each gas storage tank provides assurance that in the event of an uncontrolled release of the tanks' contents, the resulting total body exposure to an individual located at the nearest exclusion area boundary for two hours immediately following the onset of the release will not exceed 0.5 rem. The specified limit restricting the quantity of radioactivity contained in each gas storage tank was specified to ensure that the total body exposure resulting from the postulated release remained a suitable fraction of the reference value set forth in 10 CFR 100.11 (a)(1).

3/4.11.2.5 BV-2 GASEOUS WASTE STORAGE TANKS

Restricting the quantity of radioactivity contained in any connected group of gaseous waste storage tanks provides assurance that in the event of an uncontrolled release of the tanks' contents, the resulting total body exposure to an individual located at the nearest exclusion area boundary for two hours immediately following the onset of the release will not exceed 0.5 rem. The specified limit restricting the quantity of radioactivity contained in any connected group of gaseous waste storage tanks was specified to ensure that the total body exposure resulting from the postulated release remained a suitable fraction of the reference value set forth in 10 CFR 100.11(a)(1). The curie content limit is applied individually to each gaseous waste storage tank and collectively to the number of unisolated gaseous waste storage tanks.

ATTACHMENT D
Page 1 of 1
BASES FOR ODCM CONTROLS: TOTAL DOSE

3/4.11.4 TOTAL DOSE

This CONTROL is provided to meet the dose limitations of 40 CFR Part 190 that have been incorporated into 10 CFR Part 20 by 46 FR 18525. The CONTROL requires the preparation and submittal of a Special Report whenever the calculated doses due to releases of radioactivity and to radiation from uranium fuel cycle sources exceed 25 mrems to the whole body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrems. For sites containing up to 4 reactors, it is highly unlikley that the resultant dose to a MEMBER OF THE PUBLIC will exceed the dose limits of 40 CFR Part 190 if the individual reactors remain within twice the dose design objectives of Appendix I, and if direct radiation doses from the units (including outside storages tanks, etc.) are kept small. The Special Report will describe a course of action that should result in the limitation of the annual dose to a MEMBER OF THE PUBLIC to within the 40 CFR Part 190 limits. For the purposes of the Special Report, it may be assumed that the dose commitment to the MEMBER OF THE PUBLIC from other uranium fuel cycle sources is negligible, with the exception that dose contributions from other nuclear fuel cycle facilities at the same site or within a radius of 5 miles must be considered. If the dose to any MEMBER OF THE PUBLIC is estimated to exceed the requirements of 40 CFR Part 190, the Special Report with a request for a variance (provided the release conditions resulting in violation of 40 CFR Part 190 have not already been corrected), in accordance with the provisions of 40 CFR 190.11 and 10 CFR 20.405c, is considered to be a timely request and fulfills the requirements of 40 CFR Part 190 until NRC staff action is completed. The variance only relates to the limits of 40 CFR Part 190, and does not apply in any way to the other requirements for dose limitation of 10 CFR Part 20, as addressed in ODCM CONTROL 3.11.1.1 and 3.11.2.1. An individual is not considered a MEMBER OF THE PUBLIC during any period in which he/she is engaged in carrying out any operation that is part of the nuclear fuel cycle.[3.1.3, 3.2.1, 3.2.2, 3.2.4]

ATTACHMENT E
Page 1 of 1
BASES FOR ODCM CONTROLS: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM (REMP)

3/4.12.1 MONITORING PROGRAM

The radiological monitoring program required by this CONTROL provides measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides which lead to the highest potential radiation exposures of MEMBER(S) OF THE PUBLIC resulting from the station operation. This monitoring program thereby supplements the radiological effluent monitoring program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and modeling of the environmental exposure pathways. The initially specified monitoring program will be effective for at least the first 3 years of commercial operation. Following this period, program changes may be initiated based on operational experience.

The detection capabilities required by ODCM Control 3.12.1, Table 4.12-1 are state-of-the-art for routine environmental measurements in industrial laboratories. The LLD's for drinking water meet the requirements of 40 CFR 141.(3.1.3, 3.2.3)

3/4.12.2 LAND USE CENSUS

ODCM CONTROL 3.12.2 is provided to ensure that changes in the use of unrestricted areas are identified and that modifications to the monitoring programs are made if required by the results of this census. The best survey information from the door-to-door survey, aerial survey, or by consulting with local agriculture authorities shall be used. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. Restricting the census to gardens of greater than 500 square feet provides assurance that significant exposure pathways via leafy vegetables will be identified and monitored since a garden of this size is the minimum required to produce the quantity (26 kg/year) of leafy vegetables assumed in Regulatory Guide 1.109 for consumption by a child. To determine this minimum garden size, the following assumptions were used: 1) that 20% of the garden was used for growing broad leaf vegetation (i.e., similar to lettuce and cabbage), and 2) a vegetation yield of 2 kg/square meter.(3.1.3, 3.2.2)

3/4.12.3 INTERLABORATORY COMPARISON PROGRAM

The ODCM CONTROL 3.12.3 for participation in an Interlaboratory Comparison Program is provided to ensure that independent checks on the precision and accuracy of the measurements of radioactive material in environmental sample matrices are performed as part of a quality assurance program for environmental monitoring in order to demonstrate that the results are reasonably valid.(3.1.3)

RTL #A9.621B

Beaver Valley Power Station

Unit 1/2

1/2-ODC-3.03

ODCM: Controls for RETS and REMP Programs

Document Owner
Manager, Nuclear Environmental and Chemistry

Revision Number	4
Level Of Use	General Skill Reference
Safety Related Procedure	Yes

TABLE OF CONTENTS

1.0 PURPOSE

1.1 This procedure includes selected Definitions and Tables as delineated in Section 1 of the Technical Specifications and selected Applicability and Surveillance Requirement statements as delineated in Section 3/4 of the Technical Specifications.

1.1.1 Prior to issuance of this procedure, these items were located in Appendix C of the old ODCM, and were added to this procedure for reference purposes, even though they are currently described in the Technical Specifications.

1.2 This procedure contains the controls for the Radiological Effluent Technical Specification (RETS) that were transferred from the Technical Specifications per Unit 1/2 Amendments 1A-188/2A-70, and in accordance with Generic Letter 89-01 and NUREG-1301.[3.2.10]

1.2.1 Prior to issuance of this procedure, these items were located in Appendix C of the old ODCM.

1.3 This procedure contains the reporting requirements for the Annual Radioactive Effluent Release Report and the Annual Radiological Environmental Report that were transferred from the Technical Specifications per Unit 1/2 Amendments 1A-188/2A-70 and in accordance with Generic Letter 89-01 and NUREG-1301.[3.2.10]

1.3.1 Prior to issuance of this procedure, these items were located in Appendix E of the old ODCM.

1.4 This procedure contains the controls for Radiation Monitoring Instrumentation that were transferred from the Technical Specification per Unit 1/2 Amendments 246/124, and in accordance with NUREG-1431.[3.2.11]

1.5 This procedure contains the controls for Liquid Holdup Tank Activity Limits and for Gas Decay/Storage Tank Activity Limits that were transferred from the Technical Specification per Unit 1/2 Amendment 250/130, and in accordance with NUREG-1431.[3.1.6, 3.2.11]

2.0 SCOPE

2.1 This procedure is applicable to all station personnel that are qualified to perform activities as described and referenced in this procedure.

3.0 REFERENCES AND COMMITMENTS

3.1 References

3.1.1 1/2-ODC-2.01, ODCM: Liquid Effluents

3.1.2 1/2-ODC-2.02, ODCM: Gaseous Effluents

3.1.3 1/2-ODC-3.02, ODCM: Bases for ODCM Controls

3.1.4 Unit 1/2 Technical Specification 6.8.6, including Amendments 188/70 (LAR 1A-175/2A-137) Implemented August 7, 1995.

3.1.5 Unit 1/2 Technical Specification 3.3.3.1, including Amendments 246/142 (LAR 1A-287/2A-159) Implemented April 11, 2002

3.1.6 Unit 1/2 Technical Specification 3.11.1.4, 3.11.2.5, 6.8.6 and 6.9.3, including Amendments 250/130 (LAR 1A-291/2A-163) Implemented August 7, 2002

3.1.7 1/2-ADM-1640, Control of the Offsite Dose Calculation Manual

3.1.8 1/2-ADM-0100, Procedure Writer's Guide

3.1.9 NOP-SS-3001, Procedure Review and Approval

3.1.10 CR 981489, ODCM Table 4.11-2 Row A (Waste Gas Storage Tank Discharge). CA-01, Revise Appendix C of the ODCM (Table 4.11-2) to add clarification as to where and when tritium samples are to be obtained for GWST discharges.

3.1.11 CR 981490, ODCM Table 4.11-2 Note e, and Related Chemistry Department Procedures. CA-01, Revise Appendix C of the ODCM (Table 4.11-2, note e) to specify the proper tritium sample point.

3.1.12 CR 993021, Apparent failure to test RM-1DA-100 trip function as required by ODCM. No ODCM changes are required for this CR.

3.1.13 CR 001682, ODCM Action 28 Guidance. CA-02, Revise Appendix C of the ODCM (Table 3.3-13, Action 28) to differentiate actions associated with Inoperable Process Flow Rate Monitors vs. Sample Flow Rate Monitors.

3.1.14 CR02-05711, TS and ODCM changes not reflected in 1OM.54.3.L5 Surveillance Log. CA-01, Revise 1/2-ODC-3.03 to add a requirement for applicable station groups notification of pending ODCM changes.

3.1.15 CR03-06123, Enhance Table 3.3-6 of 1/2-ODC-3.03 to Add More Preplanned Method of Monitoring. CA-01, Revise Table 3.3-6 and Table 4.3-3 to allow use of Eberline SPING Channel 5 as an additional 2nd PMM when the Unit 1 Mid or High Range Noble Gas Effluent Monitors are Inoperable.

3.1.16 CR03-06281, Gaseous Tritium Sampling Required by ODCM (1/2-ODC-3.03) Unclear for Chemistry. CA-01, Revise procedure Attachment K Table 4.11-2 for RP & Chemistry sampling of Gaseous Effluent Pathways to show which effluent pathways need sampled for compliance to ODCM Control 3.11.2.1 requirements.

3.1.17 CR03-07487, Results of NQA Assessment of the Radiological Effluents Program. CA-01, Revise Calculation Package No. ERS-ATL-95-007 to clarify the term "Surface Water Supply" per guidance presented in NUREG-0800 SRP 15.7.3. CA-05, Revise 1/2-ODC3.03 Control 3.11.1.4 to update the activity limits for the outside storage tanks.

3.1.18 CR03-07668, Benchmark Effluent & Environmental Programs VS Papers Presented at 13th REMP/RETS Workshop. CA-01, Evaluate procedure Attachment K Table 4.11-2 to reduce the amount of Effluent Samples obtained during a power transient.

3.1.19 CR03-09288, LAR 1A-321 & 2A-193, Increased Flexibility in Mode Restraints. CA-19, Review LAR 1A-321/2A-193 to identify the affected Rad Effluent procedures, programs, manuals, and applicable plant modification documents that will need to be revised to support implementing the LAR.

3.1.20 CR03-09959, RFA-Rad Protection Provide Clarification to ODCM 1/Day Air Tritium Sample. CA-01, Revise ODCM procedure 1/2-ODC-3.03 Attachment K (Table 4.11-2 note c & note e) to allow sampling of the appropriate building atmosphere.

3.1.21 CR03-11726, Typographical Error Found in ODCM 3.11.2.5. CA-01, Revise ODCM procedure 1/2-ODC-3.03, Attachment O, Control 3.11.2.5 to correct a typographical error. Specifically, the final word in Action (a) needs changed from "nad" to "and".

3.1.22 CR04-01643, Procedure Correction – Typographical Error in the ODCM. CA-01, Revise ODCM procedure 1/2-ODC-3.03, Attachment F, (Table 3.3-13 and 4.3-13) to correct a typographical error. Specifically, the Asset Number for the Vacuum Gauge used for measurement of sample flow (from the Alternate Sampling Device) needs changed from [PI-1GW-13] to [PI-1GW-135].

3.1.23 CR04-02275, Discrepancies in Table 3.3-13 of the ODCM. CA-01, Revise ODCM procedure 1/2-ODC-3.03, Attachment F, (Table 3.3-13 and 4.3-13) to add clarification that the "Sampler Flow Rate Monitors are the devices used for "Particulate and Iodine Sampling".

3.2 Commitments

3.2.1 10 CFR Part 20, Standards for Protection Against Radiation

3.2.2 10 CFR Part 50, Domestic Licensing of Production and Utilization Facilities

3.2.3 40 CFR Part 141

3.2.4 40 CFR Part 190, Environmental Radiation Protection Standards For Nuclear Power Operations.

3.2.5 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, October 1977

3.2.6 Regulatory Guide 1.111, Methods For Estimating Atmospheric Transport And Dispersion Of Gaseous Eflfuents In Routine Releases From Light-Water-Cooled Reactors, Revision 1, July 1977

3.2.7 Regulatory Guide 1.113, Estimating Aquatic Dispersion Of Effluents From Accidental And Routine Reactor Releases For The Purpose Of Implementing Appendix I, April 1977

3.2.8 NUREG-0133, Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants, October 1978

3.2.9 NUREG-0737, Clarification of TMI Action Plan Requirements, October 1980

3.2.10 NUREG-1301, Offsite Dose Calculation Manual Guidance; Standard Radiological Effluent Controls For Pressurized Water Reactors (Generic Letter 89-01, Supplement No. 1)

3.2.11 NUREG-1431, Standard Technical Specifications - Westinghouse Plants Specifications

3.2.12 NUREG-0800, Standard Review Plan, Postulated Radioactive Releases Due to Liquid-Containing Tank Failures, July 1981

3.2.13 Licensee Response to NRC Unresolved Item 50-334/83-30-05. The Radiation Monitor Particle Distribution Evaluation showed that the Licensee must continue to use correction factors to determine particulate activity in samples obtained from the effluent release pathways.

4.0 RECORDS AND FORMS

4.1 Records

4.1.1 Any calculation supporting ODCM changes shall be documented, as appropriate, by a retrievable document (e.g.; letter or calculation package) with an appropriate RTL number.

4.2 Forms

4.2.1 None

5.0 PRECAUTIONS AND LIMITATIONS

5.1 The numbering of each specific ODCM Control, ODCM Surveillance Requirement and ODCM Table contained in this procedure does not appear to be sequential. This is intentional, as all ODCM Control, ODCM Surveillance Requirement and ODCM Table numbers remained the same when they were transferred from the Technical Specifications. This was done in an effort to minimize the amount of plant procedure changes and to eliminate any confusion associated with numbering changes.

5.2 The numbering of each specific ODCM Report contained in this procedure does not appear to be sequential. This is intentional, as all ODCM Report numbers remained the same when they were transferred from the Technical Specifications. This was done in an effort to minimize the amount of plant procedure changes and to eliminate any confusion associated with numbering changes.

6.0 ACCEPTANCE CRITERIA

6.1 Any change to this procedure shall contain sufficient justification that the charge will maintain the level of radioactive effluent control required by 10 CFR 20.1302, 40 CFR Part 190, 10 CFR 50.36a, and Appendix I to 10 CFR 50, and not adversely impact the accuracy or reliability of effluent dose or setpoint calculation.[3.2.10]

6.1.1 All changes to this procedure shall be prepared in accordance with 1/2-ADM-0100[3.1.8] and 1/2-ADM-1640.[3.1.7]

6.1.2 Pending changes to this procedure shall be provided to applicable station groups. For example, IF Control 3.11.1.1 is being changed, THEN the proposed changes shall be provided to the applicable station groups (i.e.; owner of the procedures), identified in the MATRIX of ODCM procedure 1/2-ODC-1.01. This will allow the station groups to revise any affected procedures concurrent with the ODCM change.[3.1.14]

6.1.3 All changes to this procedure shall be reviewed and approved in accordance with NOP-SS-3001 [3.1.9] and 1/2-ADM-1640.[3.1.7]

7.0 PREREQUISITES

7.1 The user of this procedure shall be familiar with ODCM structure and content.

8.0 PROCEDURE

8.1 See ATTACHMENT A for a Table of Operational Modes and a Table of Frequency Notation.

8.2 See ATTACHMENT B for a list of defined terms used throughout the ODCM.

8.3 See ATTACHMENT C thru ATTACHMENT S for a complete description of all ODCM Controls.

8.4 See ATTACHMENT T for a description of the Annual Report required by the REMP Controls.

8.5 See ATTACHMENT U for a description of the Annual Report required by the RETS Controls.

- END -

ATTACHMENT A
Page 1 of 2
ODCM CONTROLS: OPERATIONAL MODES AND FREQUENCY NOTATION

TABLE 1.1

OPERATIONAL MODES

MODE	REACTIVITY CONDITION, K_{eff}	% RATED THERMAL POWER(1)	AVERAGE COOLANT TEMPERATURE
1. Power Operation	≥0.99	>5%	≥350°F
2. Startup	≥0.99	≤5%	≥350°F
3. Hot Standby	<0.99	0	≥350°F
4. Hot Shutdown	<0.99	0	350°F >T_{avg} >200°F
5. Cold Shutdown	<0.99	0	≤200°F
6. Refueling(2)	≤0.95	0	≤140°F

(1) Excluding decay heat.
(2) Reactor vessel head unbolted or removed and fuel in the vessel.

ATTACHMENT A

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ODCM CONTROLS: OPERATIONAL MODES AND FREQUENCY NOTATION

TABLE 1.2

FREQUENCY NOTATION

NOTATION	FREQUENCY
S	At least once per 12 hours
D	At least once per 24 hours
W	At least once per 7 days
M	At least once per 31 days
Q	At least once per 92 days
SA	At least once per 184 days
R	At least once per 18 months
S/U	Prior to each reactor startup
P	Completed prior to each release
N.A.	Not applicable

ATTACHMENT B
Page 1 of 3
ODCM CONTROLS: DEFINITIONS

The defined terms of this section appear in capitalized type and are applicable throughout these CONTROLS.

ACTION shall be those additional requirements specified as corollary statements to each principal CONTROL and shall be part of the CONTROLS.

CHANNEL CALIBRATION shall be the adjustment, as necessary, of the channel output such that it responds with the necessary range and accuracy to known values of the parameter which the channel monitors. The CHANNEL CALIBRATION shall encompass the entire channel including the sensor and alarm and/or trip functions, and shall include the CHANNEL FUNCTIONAL TEST. The CHANNEL CALIBRATION may be performed by any series of sequential, overlapping, or total channel steps such that the entire channel is calibrated.

CHANNEL CHECK shall be the qualitative assessment of channel behavior during operation by observation. This determination shall include, where possible, comparison of the channel indication and/or status with other indications and/or status derived from independent instrument channels measuring the same parameter.

CHANNEL FUNCTIONAL TEST shall be the injection of a simulated signal into the channel as close to the primary sensor as practicable to verify OPERABILITY including alarm and/or trip functions.

FREQUENCY NOTATION specified for the performance of Surveillance Requirements shall correspond to the intervals defined in Table 1.2.

GASEOUS RADWASTE TREATMENT SYSTEM is any system designed and installed to reduce radioactive gaseous effluents by collecting primary coolant system offgases from the primary system and providing for delay or holdup for the purpose of reducing the total radioactivity prior to release to the environment.

MEMBER(S) OF THE PUBLIC (10 CFR 20 and/or 10 CFR 50) means any individual except when that individual is receiving an occupational dose. **This definition is used to show compliance to ODCM CONTROL 3.11.1.1, 3.11.1.4, 3.11.2.1 and 3.11.2.5 that are based on 10 CFR Part 20. This definition is also used to show compliance to ODCM Controls 3.11.1.2, 3.11.1.3, 3.11.2.2, 3.11.2.3 and 3.11.2.4 that are based on 10 CFR Part 50.**

MEMBER(S) OF THE PUBLIC (40 CFR 190) means any individual that can receive a radiation dose in the general **environment**, whether he may or may not also be exposed to radiation in an occupation associated with a nuclear fuel cycle. However, an individual is not considered a MEMBER OF THE PUBLIC during any period in which he is engaged in carrying out any operation which is part of the nuclear fuel cycle. **This definition is used to show compliance to an ODCM CONTROL 3.11.4.1 that is based on 40 CFR Part 190.**

ATTACHMENT B
Page 2 of 3
ODCM CONTROLS: DEFINITIONS

OFFSITE DOSE CALCULATION MANUAL (ODCM) shall contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring Alarm/Trip Setpoints, and in the conduct of the Environmental Radiological Monitoring Program. The ODCM shall also contain (1) the Radioactive Effluent Controls and Radiological Environmental Monitoring Programs required by Technical Specification (TS) Section 6.8.6 and (2) descriptions of the information that should be included in the Annual Radiological Environmental Operating and Annual Radioactive Effluent Release Reports that are also required by the Administrative Controls Section of the TS

OPERABLE/OPERABILITY A system, subsystem, train, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified function(s). Implicit in this definition shall be the assumption that all necessary attendant instrumentation, controls, normal and emergency electric power sources, cooling or seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its function(s) are also capable of performing their related safety function(s).

OPERATIONAL MODE shall correspond to any one inclusive combination of core reactivity condition, power level, and average reactor coolant temperature specified in ATTACHMENT A Table 1.1.

PURGE or PURGING is the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration, or other operating conditions, in such a manner that replacement air or gas is required to purify the confinement.

RATED THERMAL POWER shall be a total reactor core heat transfer rate to the reactor coolant of 2689 MWt.

REPORTABLE EVENT shall be any of those conditions specified in Section 50.73 to 10 CFR Part 50.

SHUTDOWN means reactor power change to 0% power.

SITE BOUNDARY shall be that line beyond which the land is neither owned, nor leased, nor otherwise controlled by the licensee. The Figure for Liquid Effluent Site Boundary is contained in 1/2-ODC-2.01. The Figure for Gaseous Effluent Site Boundary is contained in 1/2-ODC-2.02.

STARTUP means reactor power change from 0% power.

SOURCE CHECK shall be the qualitative assessment of channel response when the channel sensor is exposed to a radioactive source.

THERMAL POWER shall be the total reactor core heat transfer rate to the reactor coolant.

UNRESTRICTED AREA means any area access to which is neither limited nor controlled by the licensee.

ATTACHMENT B
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ODCM CONTROLS: DEFINITIONS

VENTILATION EXHAUST TREATMENT SYSTEM is any system designed and installed to reduce gaseous radioiodine or radioactive material in particulate form in effluents by passing ventilation or vent exhaust gases through charcoal absorbers and/or HEPA filters for the purpose of removing iodines or particulates from the gaseous exhaust stream prior to the release to the environment (such a system is not considered to have any effect on noble gas effluents). Engineered Safety Feature (ESF) atmospheric cleanup systems are not considered to be VENTILATION EXHAUST TREATMENT SYSTEM components.

VENTING is the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration or other operating conditions, in such a manner that replacement air or gas is not provided or required during VENTING. Vent, used in system names, does not imply a VENTING process.

ATTACHMENT C
Page 1 of 3
ODCM CONTROLS: APPLICABILITY AND SURVEILLANCE REQUIREMENTS

CONTROLS: APPLICABILITY

3.0.1 Compliance with the ODCM CONTROLS in the succeeding ODCM CONTROLS is required during the OPERATIONAL MODES or other conditions specified therein; except that upon failure to meet the ODCM CONTROL, the associated ODCM ACTION requirements shall be met, except as provided in ODCM CONTROL 3.0.6.

3.0.2 Non-compliance with a ODCM CONTROL shall exist when the requirements of the ODCM CONTROL and associated ODCM ACTION requirements are not met within the specified time intervals. If the ODCM CONTROL is restored prior to expiration of the specified time intervals, completion of the ODCM ACTION requirements is not required.

3.0.3 When a ODCM CONTROL is not met (except as provided in the associated ODCM ACTION requirements) within one hour, action shall be initiated to place the unit in a MODE in which the ODCM CONTROL does not apply by placing it, as applicable, in:

1. At least HOT STANDBY within the next 6 hours,
2. At least HOT SHUTDOWN within the following 6 hours, and
3. At least COLD SHUTDOWN within the subsequent 24 hours.

Where corrective measures are completed that permit operation under the ODCM ACTION requirements, the ODCM ACTION may be taken in accordance with the specified time limits as measured from the time of failure to meet the ODCM CONTROL. Exceptions to these requirements are stated in the individual ODCM CONTROLS.

3.0.4 When an ODCM CONTROL is not met, entry into an OPERATIONAL MODE or specified condition in the Applicability shall only be made:

a. When the associated ODCM ACTIONS to be entered permit continued operation in the OPERATIONAL MODE or other specified condition in the Applicability for an unlimited period of time, or

b. After performance of a risk assessment addressing inoperable systems and components, consideration of the results, determination of the acceptability of entering the OPERATIONAL MODE or other specified condition in the Applicability, and establishment of risk management actions, if appropriate; exceptions to this ODCM CONTROL are stated in the individual ODCM CONTROLS, or

c. When an allowance is stated in the individual value, parameter, or other ODCM CONTROL.

ATTACHMENT C
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ODCM CONTROLS: APPLICABILITY AND SURVEILLANCE REQUIREMENTS

This ODCM CONTROL shall not prevent changes in OPERATIONAL MODES or other specified conditions in the Applicability that are required to comply with ODCM ACTIONS or that are part of a shutdown of the unit.

3.0.5 When a system, subsystem, train, component or device is determined to be inoperable solely because its emergency power source is inoperable, or solely because its normal power source is inoperable, it may be considered OPERABLE for the purpose of satisfying the requirements of its applicable ODCM Control for Operation, provided; (1) its corresponding normal or emergency power source is OPERABLE; and (2) all of its redundant system(s), subsystem(s), train(s), component(s) and device(s) are OPERABLE, or likewise satisfy the requirements of this specification. Unless both conditions (1) and (2) are satisfied within 2 hours, action shall be initiated to place the unit in a MODE in which the applicable ODCM CONTROL does not apply, by placing it, as applicable, in:

1. At least HOT STANDBY within the next 6 hours,
2. At least HOT SHUTDOWN within the following 6 hours, and
3. At least COLD SHUTDOWN within the subsequent 24 hours

This ODCM CONTROL is not applicable in MODES 5 or 6.

3.0.6 Equipment removed from service or declared inoperable to comply with ODCM ACTIONS may be returned to service under administrative control solely to perform testing required to demonstrate its OPERABILITY or the OPERABILITY of other equipment. This is an exception to ODCM CONTROL 3.0.1 for the system returned to service under administrative control to perform the testing required to demonstrate OPERABILITY.

ATTACHMENT C
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ODCM CONTROLS: APPLICABILITY AND SURVEILLANCE REQUIREMENTS

CONTROLS: SURVEILLANCE REQUIREMENTS

4.0.1 Surveillance Requirements shall be met during the OPERATIONAL MODES or other conditions specified for individual ODCM CONTROLS unless otherwise stated in an individual ODCM Surveillance Requirement. Failure to meet a ODCM Surveillance, whether such failure is experienced during the performance of the Surveillance or between performance of the Surveillance, shall be failure to meet the ODCM CONTROL. Failure to perform a Surveillance within the allowed surveillance interval, defined by ODCM Surveillance Requirement 4.0.2, shall be failure to meet the ODCM CONTROL except as provided in ODCM Surveillance Requirement 4.0.3. Surveillances do not have to be performed on inoperable equipment or variables outside specified limits.

4.0.2 Each ODCM Surveillance Requirement shall be performed within the specified time interval with a maximum allowable extension not to exceed 25% of the ODCM surveillance interval.

4.0.3 If it is discovered that a ODCM Surveillance was not performed within its allowed ODCM surveillance interval (defined by ODCM Surveillance Requirement 4.0.2), then compliance with the requirement to declare the ODCM CONTROL not met may be delayed, from the time of discovery, up to 24 hours or up to the limit of the specified surveillance interval, whichever is greater. This delay period is permitted to allow performance of the ODCM Surveillance. A risk evaluation shall be performed for any ODCM Surveillance delayed greater than 24 hours and the risk impact shall be managed.

If the ODCM Surveillance is not performed within the delay period, the ODCM CONTROL must immediately be declared not met, and the applicable ODCM ACTION(s) must be entered.

When a ODCM Surveillance is performed within the delay period and the ODCM Surveillance is not met, the ODCM CONTROL must immediately be declared not met, and the applicable ODCM ACTION(s) must be entered.

4.0.4 Entry into an OPERATIONAL MODE or other specified condition in the Applicablity of a ODCM CONTROL shall only be made when the ODCM Surveillances have been met within their allowed surveillance interval, except as provided by ODCM Surveillance Requirement 4.0.3. When a ODCM CONTROL is not met due to Surveillances not having been met, entry into an OPERATIONAL MODE or other specified condition in the Applicability shall only be made in accordance with ODCM CONTROL 3.0.4. This provision shall not prevent entry into OPERATIONAL MODES or other specified conditions in the Applicability, that are required to comply with ODCM ACTION requirements or that are part of a shutdown of the unit.

ATTACHMENT D
Page 1 of 8
ODCM CONTROLS: RADIATION MONITORING INSTRUMENTATION

CONTROLS: RADIATION MONITORING (HIGH RANGE INSTRUMENTATION)

3.3.3.1 The radiation monitoring instrumentation channels shown in Table 3.3-6 shall be OPERABLE with their alarm/trip setpoints within the specified limits.

APPLICABILITY: As shown in Table 3.3-6.

ACTION:

a. With a radiation monitoring channel alarm/trip setpoint exceeding the value shown in ODCM Control 3.3.3.1, Table 3.3-6, adjust the setpoint to within the limit within 4 hours or declare the channel inoperable.

b. With one or more radiation monitoring channels inoperable, take the ACTION shown in ODCM Control 3.3.3.1, Table 3.3-6.

c. The provisions of ODCM Control 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.3.3.1 Each radiation monitoring instrumentation channel shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST operations during the modes and at the frequencies shown in ODCM Control 3.3.3.1, Table 4.3-3.

ATTACHMENT D
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ODCM CONTROLS: RADIATION MONITORING INSTRUMENTATION

TABLE 3.3-6

BV-1 RADIATION MONITORING INSTRUMENTATION

Pri = Primary Instruments, PMM = Preplanned Method of Monitoring[(a)]

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	SETPOINT[(1)]	NOMINAL MEASUREMENT RANGE	ACTION
1. Noble Gas Effluent Monitors - SPINGS[(4)]					
a. Reactor Building/SLCRS (CV-1; Also called Elevated Release)					
Mid Range Noble Gas	(1)	1, 2, 3, & 4	≤798 cpm	10^{-3}-10^{3} uCi/cc[(2)]	35
Pri: (RM-1VS-110 Ch 7)					
1st PMM: (RM-1VS-112 SA-10)					
2nd PMM: (RM-1VS-107B, or 110 Ch 5)					
3rd PMM: Grab Sampling every 12 hours					
High Range Noble Gas	(1)	1, 2, 3, & 4	N/A	10^{-1}-10^{5} uCi/cc[(2)]	35
Pri: (RM-1VS-110 Ch 9)					
1st PMM: (RM-1VS-112 SA-9					
2nd PMM: (RM-1VS-107B, or 110 Ch 5)					
3rd PMM: Grab Sampling every 12 hours					
b. Auxiliary Building Ventilation System (VV-1; Also called Ventilation Vent)					
Mid Range Noble Gas	(1)	1, 2, 3, & 4	≤669 cpm	10^{-3}-10^{3} uCi/cc[(2)]	35
Pri: (RM-1VS-109 Ch 7)					
1st PMM: (RM-1VS-111 SA-10)					
2nd PMM: (RM-1VS-101B, or 109 Ch 5)					
3rd PMM: Grab Sampling every 12 hours					
High Range Noble Gas	(1)	1, 2, 3, & 4	N/A	10^{-1}-10^{5} uCi/cc[(2)]	35
Pri: (RM-1VS-109 Ch 9)					
1st PMM: (RM-1VS-111 SA-9)					
2nd PMM: (RM-1VS-101B, or 109 Ch 5)					
3rd PMM: Grab Sampling every 12 hours					
c. Gaseous Waste/Process Vent System (PV-1/2)					
Mid Range Noble Gas	(1)	1, 2, 3, & 4	N/A	10^{-3}-10^{3} uCi/cc[(3)]	35
Pri: (RM-1GW-109 Ch 7)					
1st PMM: (RM-1GW-110 SA-10)					
2nd PMM: (RM-1GW-108B, or 109 Ch 5)					
3rd PMM: Grab Sampling every 12 hours					
High Range Noble Gas	(1)	1, 2, 3, & 4	≤1.83E^{5} cpm	10^{-1}-10^{5} uCi/cc[(3)]	35
Pri: (RM-1GW-109 Ch 9)					
1st PMM: (RM-1GW-110 SA-9)					
2nd PMM: (RM-1GW-108B, or 109 Ch5)					
3rd PMM: Grab Sampling every 12 hours					

(a) Instruments or actions shown as PMM are the preplanned methods to be used when the primary instrument is inoperable. SINCE the PMM instruments shown are not considered comparable alternate monitoring channels, THEN the ODCM Surveillance Requirements do not apply to the PMM. Therefore, the reporting requirement of Action 35b would still apply when inoperability of the primary instrument exceeds 30 days.

ATTACHMENT D
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ODCM CONTROLS: RADIATION MONITORING INSTRUMENTATION

TABLE 3.3-6 (Continued)

BV-1 RADIATION MONITORING INSTRUMENTATION

Pri = Primary Instruments, PMM = Preplanned Method of Monitoring[(a)]

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	SETPOINT[(1)]	NOMINAL MEASUREMENT RANGE	ACTION
2. Noble Gas Effluent Steam Monitors					
a. Atmospheric Steam Dump Valve and Code Safety Relief Valve Discharge					
Pri: (RM-1MS-100A) PMM: (Form 1/2-HPP-4.02.009.F01)	(1)	1, 2, 3, & 4	$\leq$50 cpm	10^{-1}-10^{3} uCi/cc	35
Pri: (RM-1MS-100B) PMM: (Form 1/2-HPP-4.02.009.F01)	(1)	1, 2, 3, & 4	$\leq$50 cpm	10^{-1}-10^{3} uCi/cc	35
Pri: (RM-1MS-100C) PMM: (Form 1/2-HPP-4.02.009.F01)	(1)	1, 2, 3, & 4	$\leq$50 cpm	10^{-1}-10^{3} uCi/cc	35
b. Auxiliary Feedwater Pump Turbine Exhaust					
Pri: (RM-1MS-101) PMM: (Form 1/2-HPP-4.02.009.F01)	(1)	1, 2, 3, & 4	$\leq$ 650 cpm	10^{-1}-10^{3} uCi/cc	35

(a) Instruments or actions shown as PMM are the preplanned methods to be used when the primary instrument is inoperable. SINCE the PMM instruments shown are not considered comparable alternate monitoring channels, THEN the ODCM Surveillance Requirements do not apply to the PMM. Therefore, the reporting requirement of Action 35b would still apply when inoperability of the primary instrument exceeds 30 days.

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ODCM CONTROLS: RADIATION MONITORING INSTRUMENTATION

TABLE 3.3-6 (Continued)

BV-2 RADIATION MONITORING INSTRUMENTATION

Pri = Primary Instruments, PMM = Preplanned Method of Monitoring[a]

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	SETPOINT[1]	NOMINAL MEASUREMENT RANGE	ACTION
1. Noble Gas Effluent Monitors					
a. SLCRS Filtered Pathway (CV-2; Also called Elevated Release)					
Midrange Noble Gas (Xe-133)					
Pri: (2HVS-RQ109C)	(1)	1, 2, 3, & 4	N.A.	10^{-4}-10^{2} µCi/cc	35
1st PMM: (2HVS-RQ109D)					
2nd PMM: (2HVS-RQ109B)					
3rd PMM: Grab Sampling every 12 hours					
High Range Noble Gas (Xe-133)					
Pri: (2HVS-RQ109D)	(1)	1, 2, 3, & 4	N.A.	10^{-1}-10^{5} µCi/cc	35
1st PMM: (2HVS-RQ109C)					
2nd PMM: (2HVS-RQ109B)					
3rd PMM: Grab Sampling every 12 hours					

(a) Instruments or actions shown as PMM are the preplanned methods to be used when the primary instrument is inoperable. SINCE the PMM instruments shown are not considered comparable alternate monitoring channels, THEN the ODCM Surveillance Requirements do not apply to the PMM. Therefore, the reporting requirement of Action 35b would still apply when inoperability of the primary instrument exceeds 30 days.

ATTACHMENT D
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ODCM CONTROLS: RADIATION MONITORING INSTRUMENTATION

TABLE 3.3-6 (Continued)

TABLE NOTATIONS

(1) Above background

(2) Nominal range for Ch 7 and Ch 9. The Alarm in set on Ch 7.

(3) Nominal range for Ch 7 and Ch 9. The Alarm in set on Ch 9.

(4) Other SPING-4 channels are not applicable to this ODCM Control.

ACTION STATEMENTS

ACTION 35 With the number of OPERABLE channels less than required by the Minimum Channels OPERABLE requirement, either restore the inoperable Channel(s) to OPERABLE status within 72 hours, or:

a) Initiate the preplanned alternate method of monitoring the appropriate parameter(s), and

b) Return the channel to OPERABLE status within 30 days, or, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner.

ATTACHMENT D
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ODCM CONTROLS: RADIATION MONITORING INSTRUMENTATION

TABLE 4.3-3 (Continued)
BV-1 RADIATION MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Pri = Primary Instruments, PMM = Preplanned Method of Monitoring[(a)]

INSTRUMENT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
1. Noble Gas Effluent Monitors - SPINGS				
a. Reactor Building/SLCRS (CV-1; Also called Elevated Release)				
Mid Range Noble Gas Pri: (RM-1VS-110 Ch 7) 1st PMM: (RM-1VS-112 SA-10) 2nd PMM: (RM-1VS-107B, or VS-110 Ch 5) 3rd PMM: Grab Sampling every 12 hours	S	R	M	1, 2, 3, & 4
High Range Noble Gas Pri: (RM-1VS-110 Ch 9) 1st PMM: (RM-1VS-112 SA-9) 2nd PMM: (RM-1VS-107B, or VS-110 Ch 5) 3rd PMM: Grab Sampling every 12 hours	S	R	M	1, 2, 3, & 4
b. Auxiliary Building Ventilation System (VV-1; Also called Ventilation Vent)				
Mid Range Noble Gas Pri: (RM-1VS-109 Ch 7) 1st PMM: (RM-1VS-111 SA-10) 2nd PMM: (RM-1VS-101B, or VS-109 Ch 5) 3rd PMM: Grab Sampling every 12 hours	S	R	M	1, 2, 3, & 4
High Range Noble Gas Pri: (RM-1VS-109 Ch 9) 1st PMM: (RM-1VS-111 SA-9) 2nd PMM: (RM-1VS-101B, or VS-109 Ch 5) 3rd PMM: Grab Sampling every 12 hours	S	R	M	1, 2, 3, & 4
c. Gaseous Waste Process Vent System (PV-1,2)				
Mid Range Noble Gas Pri: (RM-1GW-109 Ch 7) 1st PMM: (RM-1GW-110 SA-10) 2nd PMM: (RM-1GW-108B, or GW-109 Ch 5) 3rd PMM: Grab Sampling every 12 hours	S	R	M	1, 2, 3, & 4
High Range Noble Gas Pri: RM-1GW-109 Ch 9) 1st PMM: (RM-1GW-110 SA-9) 2nd PMM: (RM-1GW-108B, or GW-109 Ch5) 3rd PMM: Grab Sampling every 12 hours	S	R	M	1, 2, 3, & 4

(a) Instruments or actions shown as PMM are the preplanned methods to be used when the primary instrument is inoperable. SINCE the PMM instruments shown are not considered comparable alternate monitoring channels, THEN the ODCM Surveillance Requirements do not apply to the PMM. Therefore, the reporting requirement of Action 35b would still apply when inoperability of the primary instrument exceeds 30 days.

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ODCM CONTROLS: RADIATION MONITORING INSTRUMENTATION

TABLE 4.3-3 (Continued)

BV-1 RADIATION MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Pri = Primary Instruments, PMM = Preplanned Method of Monitoring[(a)]

INSTRUMENT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
2. Noble Gas Effluent Steam Monitors				
a. Atmospheric Steam Dump Valve and Code Safety Relief Valve Discharge				
Pri: (RM-1MS-100A) PMM: (Form 1/2-HPP-4.02.009.F01)	S	R	M	1, 2, 3, & 4
Pri: (RM-1MS-100B) PMM: (Form 1/2-HPP-4.02.009.F01)	S	R	M	1, 2, 3, & 4
Pri: (RM-1MS-100C) PMM: (Form 1/2-HPP-4.02.009.F01)	S	R	M	1, 2, 3, & 4
b. Auxiliary Feedwater Pump Turbine Exhaust				
Pri: (RM-1MS-101) PMM: (Form 1/2-HPP-4.02.009.F01)	S	R	M	1, 2, 3, & 4

(a) Instruments or actions shown as PMM are the preplanned methods to be used when the primary instrument is inoperable. SINCE the PMM instruments shown are not considered comparable alternate monitoring channels, THEN the ODCM Surveillance Requirements do not apply to the PMM. Therefore, the reporting requirement of Action 35b would still apply when inoperability of the primary instrument exceeds 30 days.

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ODCM CONTROLS: RADIATION MONITORING INSTRUMENTATION

TABLE 4.3-3 (Continued)

BV-2 RADIATION MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Pri = Primary Instruments, PMM = Preplanned Method of Monitoring[(a)]

INSTRUMENT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES IN WHICH SURVEILLANCE REQUIRED
1. Noble Gas Effluent Monitors				
a. SLCRS Unfiltered Pathway (CV-2; Also called Elevated Release)				
Mid Range Noble Gas Pri: (2HVS-RQ109C) 1st PMM: (2HVS-RQ109D) 2nd PMM: (2HVS-RQ109B) 3rd PMM: Grab Sampling every 12 hours	S	R	M	1, 2, 3, & 4
High Range Noble Gas Pri: (2HVS-RQ109D) 1st PMM: (2HVS-RQ109C) 2nd PMM: (2HVS-RQ109B) 3rd PMM: Grab Sampling every 12 hours	S	R	M	1, 2, 3, & 4

(a) Instruments or actions shown as PMM are the preplanned methods to be used when the primary instrument is inoperable. SINCE the PMM instruments shown are not considered comparable alternate monitoring channels, THEN the ODCM Surveillance Requirements do not apply to the PMM. Therefore, the reporting requirement of Action 35b would still apply when inoperability of the primary instrument exceeds 30 days.

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ODCM CONTROLS: RETS INSTRUMENTATION FOR LIQUID EFFLUENTS

CONTROLS: RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

3.3.3.9 In accordance with BV-1 and BV-2 Technical Specification 6.8.6a, Item 1, the radioactive liquid effluent monitoring instrumentation channels shown in ODCM Control 3.3.3.9, Table 3.3-12 shall be OPERABLE with their alarm/trip setpoints set to ensure that the limits of ODCM CONTROL 3.11.1.1 are not exceeded. The alarm/trip setpoints of the radiation monitoring channels shall be determined in accordance with 1/2-ODC-2.01.

Applicability: During releases through the flow path.

Action:

a. With a radioactive liquid effluent monitoring instrumentation channel alarm/trip setpoint less conservative than required by the above specification, immediately suspend the release of radioactive liquid effluents monitored by the affected channel or correct the alarm/trip setpoint.

b. With one or more radioactive liquid effluent monitoring instrumentation channels inoperable, take the ACTION shown in ODCM Control 3.3.3.9, Table 3.3-12 or conservatively reduce the alarm setpoint. Exert a best effort to return the channel to operable status within 30 days, and if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner.

c. The provisions of ODCM CONTROL 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.3.3.9 Each radioactive liquid effluent monitoring instrumentation channel shall be demonstrated operable by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION, and CHANNEL FUNCTIONAL TEST operations at the frequencies shown in ODCM Control 3.3.3.9, Table 4.3-12.

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ODCM CONTROLS: RETS INSTRUMENTATION FOR LIQUID EFFLUENTS

TABLE 3.3-12

BV-1 RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

Pri = Primary Instruments, Alt = Alternate Instruments

INSTRUMENT	MINIMUM CHANNELS OPERABLE	ACTION
1. Gross Activity Monitors Providing Automatic Termination Of Release		
a. Liquid Waste Effluents Monitor Pri: (RM-1LW-104)	(1)	23
b. Liquid Waste Contaminated Drain Monitor Pri: (RM-1LW-116)	(1)	23
c. Auxiliary Feed Pump Bay Drain Monitor Pri: (RM-1DA-100)	(1)	24
2. Gross Activity Monitors Not Providing Termination Of Release		
a. Component Cooling-Recirculation Spray Heat Exchangers River Water Monitor Pri: (RM-1RW-100)	(1)	24
3. Flow Rate Measurement Devices		
a. Liquid Radwaste Effluent Line Pri: (FR-1LW-104) for (RM-1LW-104)	(1)	25
b. Liquid Waste Contaminated Drain Line Pri: (FR-1LW-103) for (RM-1LW-116)	(1)	25
c. Cooling Tower Blowdown Line Pri: (FT-1CW-101-1) or Alt: (FT-1CW-101) and (2CWS-FT101)	(1)	25
4. Tank Level Indicating Devices (for tanks outside plant building)		
a. Primary Water Storage Tank Pri: (LI-1PG-115A) for (1BR-TK-6A)	(1)	26
b. Primary Water Storage Tank Pri: (LI-1PG-115B) for (1BR-TK-6B)	(1)	26
c. Steam Generator Drain Tank Pri: (LI-1LW-110) for (1LW-TK-7A)	(1)	26
d. Steam Generator Drain Tank Pri: (LI-1LW-111) for (1LW-TK-7B)	(1)	26

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ODCM CONTROLS: RETS INSTRUMENTATION FOR LIQUID EFFLUENTS

TABLE 3.3-12 (continued)

BV-2 RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

Pri = Primary Instruments, Alt = Alternate Instruments

INSTRUMENT	MINIMUM CHANNELS OPERABLE	ACTION
1. Gross Radioactivity Monitor Providing Alarm And Automatic Termination Of Release		
a. Liquid Waste Process Effluent Monitor Pri: (2SGC-RQ100)	(1)	23
2. Gross Radioactivity Monitors Providing Alarm But Not Providing Termination Of Release		
a. None Required		
3. Flow Rate Measurement Devices		
a. Liquid Radwaste Effluent Pri: (2SGC-FS100)	(1)	25
b. Cooling Tower Blowdown Line Pri: (FT-1CW-101-1) or Alt: (FT-1CW-101) and (2CWS-FT101)	(1)	25
4. Tank Level Indicating Devices (for tanks outside plant buildings)		
a. None Required		

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ODCM CONTROLS: RETS INSTRUMENTATION FOR LIQUID EFFLUENTS

TABLE 3.3-12 (continued)

ACTION STATEMENTS

Action 23 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases may be initiated (or resumed) provided that prior to release:

1. At least two independent samples are analyzed in accordance with ODCM SURVEILLANCE REQUIREMENT 4.11.1.1.1, and at least two technically qualified members of the Facility Staff independently verify the release rate calculations[(1)] and discharge valving, or

2. Initiate monitoring with the comparable alternate monitoring channel. ODCM Surveillance requirements applicable to the inoperable channel shall apply to the comparable alternate monitoring channel when used to satisfy this ODCM CONTROL requirement.

Otherwise, suspend release of radioactive effluents via this pathway.

Action 24 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided:

1. That at least once per 12 hours grab samples are analyzed for gross radioactivity (beta or gamma) at a Lower Limit of Detection (LLD) of at least 1E-7 uCi/ml, or

2. Initiate monitoring with the comparable alternate monitoring channel. ODCM Surveillance requirements applicable to the inoperable channel shall apply to the comparable alternate monitoring channel when used to satisfy this ODCM CONTROL requirement.

(1) Since the computer software used for discharge permit generation automatically performs the release rate calculations, then the independent signatures on the discharge permit for "preparer" and "reviewer" satisfy the requirement for "...two technically qualified members of the Facility Staff independently verify the release rate calculations..."

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ODCM CONTROLS: RETS INSTRUMENTATION FOR LIQUID EFFLUENTS

Table 3.3-12 (continued)

ACTION STATEMENTS

Action 25 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided:

1. The flow rate is estimated at least once per 4 hours during actual releases. (Pump curves may be used to estimate flow), or

2. Initiate monitoring with the comparable alternate monitoring channel. ODCM Surveillance requirements applicable to the inoperable channel shall apply to the comparable alternate monitoring channel when used to satisfy this ODCM CONTROL requirement.

Action 26 With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, liquid additions to this tank may continue provided:

1. The tank liquid level is estimated during all liquid additions to the tank, or

2. Initiate monitoring with the comparable alternate monitoring channel. ODCM Surveillance requirements applicable to the inoperable channel shall apply to the comparable alternate monitoring channel when used to satisfy this ODCM CONTROL requirement.

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ODCM CONTROLS: RETS INSTRUMENTATION FOR LIQUID EFFLUENTS

TABLE 4.3-12

BV-1 RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Pri = Primary Instruments, Alt = Alternate Instruments

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST
1. Gross Beta or Gamma Radioactivity Monitors Providing Alarm And Automatic Termination Of Release				
a. Liquid Radwaste Effluent Line Pri: (RM-1LW-104)	D	P(5)	R(3)	Q(1)
b. Liquid Waste Contaminated Drain Line Pri: (RM-1LW-116)	D	P(5)	R(3)	Q(1)
c. Auxiliary Feed Pump Bay Drain Monitor Pri: (RM-1DA-100)	D	D	R(3)	Q(1)
2. Gross Beta Or Gamma Radioactivity Monitors Providing Alarm But Not Providing Automatic Termination Of Release				
a. Component Cooling - Recirculation Spray Heat Exchangers River Water Monitor Pri: (RM-1RW-100)	D	M(5)	R(3)	Q(2)
3. Flow Rate Monitors				
a. Liquid Radwaste Effluent Lines Pri: (FR-1LW-104) for (RM-1LW-104)	D(4)	NA	R	Q
b. Liquid Waste Contaminated Drain Line Pri: (FR-1LW-103) for (RM-1LW-116)	D(4)	NA	R	Q
c. Cooling Tower Blowdown Line Pri: (FT-1CW-101-1) or Alt: (FT-1CW-101) and (2CWS-FT101)	D(4)	NA	R	Q

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ODCM CONTROLS: RETS INSTRUMENTATION FOR LIQUID EFFLUENTS

TABLE 4.3-12 (continued)

BV-1 RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Pri = Primary Instruments, Alt = Alternate Instruments

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST
4. Tank Level Indicating Devices (for tanks outside plant buildings)				
a. Primary Water Storage Tank Pri: (LI-1PG-115A) for (1BR-TK-6A)	D*	NA	R	Q
b. Primary Water Storage Tank Pri: (LI -1PG-115B) for (1BR-TK-6B)	D*	NA	R	Q
c. Steam Generator Drain Tank Pri: (LI-1LW-110) for (1LW-TK-7A)	D*	NA	R	Q
d. Steam Generator Drain Tank Pri: (LI-1LW-111) for (1LW-TK-7B)	D*	NA	R	Q

*During liquid additions to the tank.

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ODCM CONTROLS: RETS INSTRUMENTATION FOR LIQUID EFFLUENTS

TABLE 4.3-12 (continued)

BV-2 RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Pri = Primary Instruments, Alt = Alternate Instruments

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST
1. Gross Radioactivity Monitor Providing Alarm And Automatic Termination Of Release				
a. Liquid Waste Process Effluent Pri: (2SGC-RQ100)	D	P(5)	R(8)(3)	Q(7)
2. Flow Rate Measurement Devices				
a. Liquid Radwaste Effluent Pri: (2SGC-FS100)	D(4)	NA	R	Q
b. Cooling Tower Blowdown Line Pri: (FT-1CW-101-1) or Alt: (FT-1CW-101) and (2CWS-FT101)	D(4)	NA	R	Q
3. Tank Level Indicating Devices (for tanks outside plant buildings)				
a. None Required				

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ODCM CONTROLS: RETS INSTRUMENTATION FOR LIQUID EFFLUENTS

TABLE 4.3-12 (continued)

TABLE NOTATION

(1) The CHANNEL FUNCTIONAL TEST shall also demonstrate that automatic isolation of this pathway and Control Room Alarm Annunciation occurs if any of the following conditions exist:

1. Instrument indicates measured levels above the alarm/trip setpoint.
2. Downscale failure.
3. Instrument controls not set in operate mode.

(2) The CHANNEL FUNCTIONAL TEST shall also demonstrate that Control Room Alarm Annunciation occurs if any of the following conditions exist:

1. Instrument indicates measured levels above the alarm/trip setpoint.
2. Downscale failure.
3. Instrument controls are not set in operate mode.

(3) The initial CHANNEL CALIBRATION for radioactivity measurement instrumentation shall be performed using one or more of the reference standards certified by the National Bureau of (Standards/NIST) or using standards that have been obtained from suppliers that participate in measurement assurance activities with NBS/NIST. These standards should permit calibrating the system over its intended range of energy and rate capabilities. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration should be used, at intervals of at least once per 18 months. This can normally be accomplished during refueling outages. (Existing plants may substitute previously established calibration procedures for this requirement).

(4) CHANNEL CHECK shall consist of verifying indication of flow during periods of release. CHANNEL CHECK shall be made at least once daily on any day on which continuous, periodic, or batch releases are made.

(5) A SOURCE CHECK may be performed utilizing the installed means or flashing the detector with a portable source to obtain an upscale increase in the existing count rate to verify channel response.

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ODCM CONTROLS: RETS INSTRUMENTATION FOR LIQUID EFFLUENTS

TABLE 4.3-12 (continued)

TABLE NOTATION

(6) The CHANNEL FUNCTIONAL TEST shall also demonstrate that automatic isolation of this pathway and Control Room Alarm Annunciation occurs when the instrument indicates measured levels above the Alarm/Trip Setpoint.

The CHANNEL FUNCTIONAL TEST shall also demonstrate that Control Alarm Annunciation occurs if any of the following conditions exists:

1. Downscale failure.
2. Instrument controls are not set in operate mode.

(7) The CHANNEL FUNCTIONAL TEST shall also demonstrate that automatic isolation of this pathway and Control Room Alarm Annunciation occurs if the instrument indicates measured levels above the alarm/trip setpoint.

(8) The CHANNEL CALIBRATION shall also demonstrate that Control Room Alarm Annunciation occurs if either of the following conditions exist:

1. Downscale failure.
2. Instrument controls are not set in operate mode.

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ODCM CONTROLS: RETS INSTRUMENT FOR GASEOUS RELEASES

CONTROLS: RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

3.3.3.10 In accordance with BV-1 and BV-2 Technical Specification 6.8.6a, Item 1, the radioactive gaseous effluent monitoring instrumentation channels shown in ODCM Control 3.3.3.10, Table 3.3-13 shall be operable with their alarm/trip setpoints set to ensure that the limits of ODCM CONTROL 3.11.2.1 are not exceeded. The alarm/trip setpoints of the radiation monitoring channels shall be determined in accordance with 1/2-ODC-2.02.

Applicability: During releases through the flow path.

Action:

a. With a radioactive gaseous process or effluent monitoring instrumentation channel alarm/trip setpoint less conservative than a value which will ensure that the limits of ODCM CONTROL 3.11.2.1 are met, immediately suspend the release of radioactive gaseous effluents monitored by the affected channel or correct the alarm/trip setpoint.

b. With one or more radioactive gaseous effluent monitoring instrumentation channels inoperable, take the ACTION shown in ODCM Control 3.3.3.10, Table 3.3-13 or conservatively reduce the alarm setpoint. Exert a best effort to return the channel to operable status within 30 days, and if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner.

c. The provisions of ODCM CONTROL 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.3.3.10 Each radioactive gaseous effluent monitoring instrumentation channel shall be demonstrated operable by performance of the CHANNEL CHECK, SOURCE CHECK, CHANNEL CALIBRATION, and CHANNEL FUNCTIONAL TEST operations at the frequencies shown in ODCM Control 3.3.3.10, Table 4.3-13.

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ODCM CONTROLS: RETS INSTRUMENT FOR GASEOUS RELEASES

TABLE 3.3-13

BV-1 RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Pri = Primary Instruments, Alt = Alternate Instruments

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABILITY	ACTION
1. Gaseous Waste/Process Vent System (PV-1,2)			
a. Noble Gas Activity Monitor Pri: (RM-1GW-108B) or **Alt For Continuous Release: (RM-1GW-109 Ch 5)** This channel may only be used as the comparable alternate monitoring channel for continuous releases via this pathway. **Alt For Batch Releases: (See Action 27)** RM-1GW-109 Ch 5 SHALL NOT be used as the comparable alternate monitoring channel for batch releases of the BV-1 GWDT's or the BV-2 GWST's. Specifically, SINCE this channel does not perform the same automatic isolation function as the primary channel, THEN ACTION 27 shall be followed for batch releases of the BV-1 GWDT's or the BV-2 GWST's via this pathway.	(1)	*	27,29,30A,30B
b. Particulate and Iodine Sampler Pri: (Filter Paper & Charcoal Cartridge for RM-1GW-109) or 1st Alt: (Filter Paper & Charcoal Cartridge for RM-1GW-110) or 2nd Alt: (Continuous collection via RASP Pump) or 3rd Alt: (Grab samples every 12 hours)	(1)	*	32
c. System Effluent Flow Rate Measuring Device Pri: (FR-1GW-108) or Alt: (RM-1GW-109 Ch 10)	(1)	*	28A
d. Sampler Flow Rate Measuring Device Used for Particulate and Iodine Sample Collection (see 1.b) Pri: (RM-1GW-109 Ch 15) or Alt: (Rotometer: FM-1GW-101, and Vacuum Gauge: PI-1GW-135)	(1)	*	28B
2. Auxiliary Building Ventilation System (VV-1; Also called Ventilation Vent)			
a. Noble Gas Activity Monitor Pri: (RM-1VS-101B) or Alt: (RM-1VS-109 Ch 5)	(1)	*	29,30A
b. Particulate and Iodine Sampler Pri: (Filter Paper & Charcoal Cartridge for RM-1VS-109) or 1st Alt: (Filter Paper & Charcoal Cartridge for RM-1VS-111) or 2nd Alt: (Continuous collection via RASP Pump) or 3rd Alt: (Grab samples every 12 hours)	(1)	*	32
c. System Effluent Flow Rate Measuring Device Pri: (FR-1VS-101) or Alt: (RM-1VS-109 Ch 10)	(1)	*	28A
d. Sampler Flow Rate Measuring Device Used for Particulate and Iodine Sample Collection (see 2.b) Pri: (RM-1VS-109 Ch 15) or Alt: (Rotometer: FM-1VS-102, and Vacuum Gauge: PI-1VS-659)	(1)	*	28B

*During Releases via this pathway.

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ODCM CONTROLS: RETS INSTRUMENT FOR GASEOUS RELEASES

TABLE 3.3-13 (continued)

BV-1 RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Pri = Primary Instruments, Alt = Alternate Instruments

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABILITY	ACTION
3. Reactor Building/SLCRS (CV-1; Also called Elevated Release)			
a. Noble Gas Activity Monitor Pri: (RM-1VS-107B) or Alt: (RM-1VS-110 Ch 5)	(1)	*	29,30A
b. Particulate and Iodine Sampler Pri: (Filter Paper & Charcoal Cartridge for RM-1VS-110) or 1st Alt: (Filter Paper & Charcoal Cartridge for RM-1VS-112) or 2nd Alt: (Continuous collection via RASP Pump) or 3rd Alt: (Grab samples every 12 hours)	(1)	*	32
c. System Effluent Flow Rate Measuring Device Pri: (FR-1VS-112) or Alt: (RM-1VS-110 Ch 10)	(1)	*	28A
d. Sampler Flow Rate Measuring Device Used for Particulate and Iodine Sample Collection (see 3.b) Pri: (RM-1VS-110 Ch 15) or Alt: (Rotometer: FM-1VS-103, and Vacuum Gauge: PI-1VS-660)	(1)	*	28B

*During Releases via this pathway.

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ODCM CONTROLS: RETS INSTRUMENT FOR GASEOUS RELEASES

TABLE 3.3-13 (continued)

BV-2 RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Pri = Primary Instruments, Alt = Alternate Instruments

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABILITY	ACTION
1. SLCRS Unfiltered Pathway (VV-2; Also called Ventilation Vent)			
a. **Noble Gas Activity Monitor** Pri: (2HVS-RQ101B)	(1)	*	29, 30B
b. **Particulate and Iodine Sampler** Pri: (Filter Paper & Charcoal Cartridge for 2HVS-RQ101) or 1st Alt: (Continuous collection via RASP Pump) or 2nd Alt: (Grab samples every 12 hours)	(1)	*	32
c. **Process Flow Rate Monitor** Pri: (Monitor Item 29 for 2HVS-VP101)	(1)	*	28A
d. **Sampler Flow Rate Monitor Used for Particulate and Iodine Sample Collection (see 1.b)** Pri: (2HVS-FIT101)	(1)	*	28B
2. SLCRS Filtered Pathway (CV-2; Also called Elevated Release)			
a. **Noble Gas Activity Monitor** Pri: (2HVS-RQ109B)	(1)	*	29, 30B
b. **Particulate and Iodine Sampler** Pri: (Filter Paper & Charcoal Cartridge for 2HVS-RQ109 High Flow Path) or 1st Alt: (Continuous collection via RASP Pump) or 2nd Alt: (Grab samples every 12 hours)	(1)	*	32
c. **Process Flow Rate Monitor** Pri: (Monitor Item 29 for 2HVS-FR22) or 1st Alt: (2HVS-FI22A and FI22C) or 2nd Alt: (2HVS-FI22B and FI22D)	(1)	*	28A
d. **Sampler Flow Rate Monitor Used for Particulate and Iodine Sample Collection (see 2.b)** Pri: (Monitor Items 28 and 72 for 2HVS-DAU109B)	(1)	*	28B
3. Decontamination Building Vent (DV-2)			
a. **Noble Gas Activity Monitor** Pri: (2RMQ-RQ301B)	(1)	*	29
b. **Particulate and Iodine Sampler** Pri: (Filter Paper & Charcoal Cartridge for 2RMQ-RQ301) or 1st Alt: (Continuous collection via RASP Pump) 2nd Alt: (Grab samples every 12 hours)	(1)	*	32
c. **Process Flow Rate Monitor**	None	None	None
d. **Sampler Flow Rate Monitor Used for Particulate and Iodine Sample Collection (see 3.b)** Pri: (2RMQ-FIT301)	(1)	*	28B

*During Releases via this pathway.

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ODCM CONTROLS: RETS INSTRUMENT FOR GASEOUS RELEASES

TABLE 3.3-13 (continued)

BV-2 RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Pri = Primary Instruments, Alt = Alternate Instruments

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABILITY	ACTION
4. Condensate Polishing Building Vent (CB-2)			
a. Noble Gas Activity Monitor Pri: (2HVL-RQ112B)	(1)	*	29
b. Particulate and Iodine Sampler Pri: (Filter Paper & Charcoal Cartridge for 2HVL-RQ112) 1st Alt: (Continuous collection via RASP Pump) 2nd Alt: (Grab samples every 12 hours)	(1)	*	32
c. Process Flow Rate Monitor	None	None	None
d. Sampler Flow Rate Monitor Used for Particulate and Iodine Sample Collection (see 4.b) Pri: (2HVL-FIT112)	(1)	*	28B
5. Waste Gas Storage Vault Vent (WV-2)			
a. Noble Gas Activity Monitor Pri: (2RMQ-RQ303B)	(1)	*	29
b. Particulate and Iodine Sampler Pri: (Filter Paper & Charcoal Cartridge for 2RMQ-RQ303) 1st Alt: (Continuous collection via RASP Pump) 2nd Alt: (Grab samples every 12 hours)	(1)	*	32
c. Process Flow Rate Monitor	None	None	None
d. Sampler Flow Rate Monitor Used for Particulate and Iodine Sample Collection (see 5.b) Pri: (2RMQ-FIT303)	(1)	*	28B

*During Releases via this pathway.

ODCM CONTROLS: RETS INSTRUMENT FOR GASEOUS RELEASES

TABLE 3.3-13 (continued)

ACTION STATEMENTS

Action 27 APPLICABLE FOR BATCH RELEASES OF BV-1 GASEOUS WASTE DECAY TANKS OR BV-2 GASEOUS WASTE STORAGE TANKS

With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, the contents of the Unit 1 Gaseous Waste Decay Tanks (GWDT's) or the Unit 2 Gaseous Waste Storage Tanks (GWST's) may be released to the environment provided that prior to initiating (or resuming) the release:

1. At least two independent samples of the tank's content are analyzed and at least two technically qualified members of the Facility Staff independently verify the release rate calculations and discharge valve lineup, or
2. Initiate continuous monitoring with the comparable alternate monitoring channel. ODCM Surveillance requirements applicable to the inoperable channel shall apply to the comparable alternate monitoring channel when used to satisfy this ODCM Control requirement.

Otherwise, suspend releases of radioactive effluents via this pathway.

Action 28A APPLICABLE FOR BV-1 SYSTEM EFFLUENT FLOW RATE MEASURING DEVICES OR BV-2 PROCESS FLOWRATE MONITORS

With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided:

1. The system/process flow rate is estimated at least once per 4 hours (or assumed to be at the ODCM design value(1)), or
2. Initiate continuous monitoring with the comparable alternate monitoring channel. ODCM Surveillance requirements applicable to the inoperable channel shall apply to the comparable alternate monitoring channel when used to satisfy this ODCM Control requirement.

(1) In lieu of estimating the system/process flow rate at least once per 4 hours, the system/process flow rate can be assumed to be at the following ODCM design values:

1,450 cfm = BV-1 Gaseous Waste/Process Vent System (PV-1,2)
62,000 cfm = BV-1 Auxiliary Building Ventilation System (VV-1)
49,300 cfm = BV-1 Reactor Building/SLCRS (CV-1)
23,700 cfm = BV-2 SLCRS Unfiltered Pathway (VV-2)
59,000 cfm = BV-2 SLCRS Filtered Pathway (CV-2)

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ODCM CONTROLS: RETS INSTRUMENT FOR GASEOUS RELEASES

TABLE 3.3-13 (continued)

ACTION STATEMENTS

Action 28B APPLICABLE FOR BV-1 SAMPLER FLOW RATE MEASURING DEVICES OR BV-2 SAMPLER FLOWRATE MONITORS

With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided:

1. The sampler flow rate is estimated at least once per 4 hours, or
2. Initiate continuous monitoring with the comparable alternate monitoring channel. ODCM Surveillance requirements applicable to the inoperable channel shall apply to the comparable alternate monitoring channel when used to satisfy this ODCM Control requirement.

Action 29 APPLICABLE FOR CONTINUOUS RELEASES

With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided:

1. Grab samples (or local monitor readings)[1] are taken at least once per 12 hours. If grab samples are taken, these samples are to be analyzed for gross activity within 24 hours, or
2. Initiate continuous monitoring with the comparable alternate monitoring channel. ODCM Surveillance requirements applicable to the inoperable channel shall apply to the comparable alternate monitoring channel when used to satisfy this ODCM CONTROL requirement.

(1) For BV-2, there are situations where the local monitor (e.g.; the RM-80) is capable of performing the intended monitoring function, but the communications are lost to the Control Room. In this case, the local monitor can be read at least once per 12 hours in-lieu of obtaining grab samples at least once per 12 hours.

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ODCM CONTROLS: RETS INSTRUMENT FOR GASEOUS RELEASES

TABLE 3.3-13 (continued)

ACTION STATEMENTS

Action 30A APPLICABLE FOR THE INITIAL BATCH PURGE OF THE BV-1 REACTOR CONTAINMENT

With the number of channels OPERABLE less than required by minimum Channels OPERABLE requirement, immediately suspend PURGING of Reactor Containment via this pathway if both RM-1VS-104A and B are not OPERABLE with the purge/exhaust system in service. The following should also be noted:

1. As stated, this Action is applicable for INOPERABLE monitors only when performing the initial batch purge of the reactor containment atmosphere (i.e.; immediately after reactor containment atmosphere equalization).

2. Since all other releases of reactor containment atmosphere (i.e.; after the initial batch purge) are considered continuous releases, then this Action is not applicable. Therefore, Action 29 is applicable for INOPERABLE monitors when performing a continuous release of the reactor containment atmosphere.

Action 30B APPLICABLE FOR THE INITIAL BATCH PURGE OF THE BV-2 REACTOR CONTAINMENT

With the number of channels OPERABLE less than required by Minimum Channels OPERABLE requirement, immediately suspend PURGING of Reactor Containment via this pathway if both 2HVR-RQ104A and 104B are not OPERABLE with the purge/exhaust system in service. The following should also be noted:

1. As stated, this Action is applicable for INOPERABLE monitors only when performing the initial batch purge of the reactor containment atmosphere (i.e.; immediately after reactor containment atmosphere equalization).

2. Since all other releases of reactor containment atmosphere (i.e.; after the initial batch purge) are considered continuous releases, then this Action is not applicable. Therefore, Action 29 is applicable for INOPERABLE monitors when performing a continuous release of the reactor containment atmosphere.

Action 32 APPLICABLE FOR CONTINUOUS RELEASES

With the number of channels OPERABLE less than required by the Minimum Channels OPERABLE requirement, effluent releases via this pathway may continue provided samples are continuously collected with auxiliary sampling equipment as required in ODCM Control 3.11.2.1, Table 4.11-2, or sampled and analyzed once every 12 hours.

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ODCM CONTROLS: RETS INSTRUMENT FOR GASEOUS RELEASES

TABLE 4.3-13

BV-1 RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Pri = Primary Instruments, Alt = Alternate Instruments

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST
1. Gaseous Waste/Process Vent System (PV-1,2)				
a. Noble Gas Activity Monitor Pri: (RM-1GW-108B) **Alt For Continuous Release: (RM-1GW-109 Ch 5)** This channel may only be used as the comparable alternate monitoring channel for continuous releases via this pathway. **Alt For Batch Releases: (See Action 27):** RM-1GW-109 Ch 5 SHALL NOT be used as the comparable alternate monitoring channel for batch releases of the BV-1 GWDT's or the BV-2 GWST's. Specifically, SINCE this channel does not perform the same automatic isolation function as the primary channel, THEN ACTION 27 shall be followed for batch releases of the BV-1 GWDT's or the BV-2 GWST's via this pathway	P	P(4)	R(3)	Q(1)
b. Particulate and Iodine Sampler Pri: (Filter Paper & Charcoal Cartridge for RM-1GW-109) or 1st Alt: (Filter Paper & Charcoal Cartridge for RM-1GW-110) or 2nd Alt: (Continuous collection via RASP Pump) or 3rd Alt: (Grab samples every 12 hours)	W	NA	NA	NA
c. System Effluent Flow Rate Measuring Device Pri: (FR-1GW-108) or Alt: (RM-1GW-109 Ch 10)	P	NA	R	Q
d. Sampler Flow Rate Measuring Device Used for Particulate and Iodine Sample Collection (see 1.b) Pri: (RM-1GW-109 Ch 15) or Alt: (Rotometer: FM-1GW-101, and Vacuum Gauge: PI-1GW-135)	D*	NA	R	Q
2. Auxiliary Building Ventilation System (VV-1; Also called Ventilation Vent)				
a. Noble Gas Activity Monitor Pri: (RM-1VS-101B) or Alt: (RM-1VS-109 Ch 5)	D	M(4), P(4)***	R(3)	Q(2)
b. Particulate and Iodine Sampler Pri: (Filter Paper & Charcoal Cartridge for RM-1VS-109) or 1st Alt: (Filter Paper & Charcoal Cartridge for RM-1VS-111) or 2nd Alt: (Continuous collection via RASP Pump) or 3rd Alt: (Grab samples every 12 hours)	W	NA	NA	NA
c. System Effluent Flow Rate Measurement Device Pri: (FR-1VS-101) or Alt: (RM-1VS-109 Ch 10)	D	NA	R	Q
d. Sampler Flow Rate Measuring Device Used for Particulate and Iodine Sample Collection (see 2.b) Pri: (RM-1VS-109 Ch 15) or Alt: (Rotometer: FM-1VS-102, and Vacuum Gauge: PI-1VS-659)	D	NA	R	Q

* During Releases via this pathway.
*** During purging of Reactor Containment via this pathway.

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ODCM CONTROLS: RETS INSTRUMENT FOR GASEOUS RELEASES

TABLE 4.3-13

BV-1 RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Pri = Primary Instruments, Alt = Alternate Instruments

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST
3. Reactor Building/SLCRS (CV-1; Also called Elevated Release)				
a. Noble Gas Activity Monitor Pri: (RM-1VS-107B)or Alt: (RM-1VS-110 Ch 5)	D	$M^{(4)}$, $P^{(4)}$***	$R^{(3)}$	$Q^{(2)}$
b. Particulate and Iodine Sampler Pri: (Filter Paper & Charcoal Cartridge for RM-1VS-110) or 1st Alt: (Filter Paper & Charcoal Cartridge for RM-1VS-112) or 2nd Alt: (Continuous collection via RASP Pump) or 3rd Alt: (Grab samples every 12 hours)	W	NA	NA	NA
c. System Effluent Flow Rate Measuring Device Pri: (FR-1VS-112) or Alt: (RM-1VS-110 Ch 10)	D	NA	R	Q
d. Sampler Flow Rate Measuring Device Used for Particulate and Iodine Sample Collection (see 3.b) Pri: (RM-1VS-110 Ch 15) or Alt: (Rotometer: FM-1VS-103, and Vacuum Gauge: PI-1VS-660)	D	NA	R	Q

*During releases via this pathway.
***During purging of Reactor Containment via this pathway.

ODCM CONTROLS: RETS INSTRUMENT FOR GASEOUS RELEASES

TABLE 4.3-13 (continued)

BV-2 RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Pri = Primary Instruments, Alt = Alternate Instruments

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST
1. SLCRS Unfiltered Pathway (VV-2; Also called Ventilation Vent)				
a. **Noble Gas Activity Monitor** Pri: (2HVS-RQ101B)	D	M(4), P(4)***	R(3)(6)	Q(5)
b. **Particulate and Iodine Sampler** Pri: (Filter Paper & Charcoal Cartridge for 2HVS-RQ101) or 1st Alt: (Continuous collection via RASP Pump) or 2nd Alt: (Grab samples every 12 hours)	W	NA	NA	NA
c. **Process Flow Rate Monitor** Pri: (Monitor Item 29 for 2HVS-VP101)	D	NA	R	Q
d. **Sampler Flow Rate Monitor Used for Particulate and Iodine Sample Collection (see 1.b)** Pri: (2HVS-FIT101)	D	NA	R	Q
2. SLCRS Filtered Pathway (CV-2; Also called Elevated Release)				
a. **Noble Gas Activity Monitor** Pri: (2HVS-RQ109B)	D	M(4), P(4)***	R(3)(6)	Q(5)
b. **Particulate and Iodine Sampler** Pri: (Filter Paper & Charcoal Cartridge for 2HVS-RQ109 High Flow Path) or 1st Alt: (Continuous collection via RASP Pump) or 2nd Alt: (Grab samples every 12 hours)	W	NA	NA	NA
c. **Process Flow Rate Monitor** Pri: (Monitor Item 29 for 2HVS-FR22) or 1st Alt: (2HVS-FI22A and FI22C) or 2nd Alt: (2HVS-FI22B and FI22D)	D	NA	R	Q
d. **Sampler Flow Rate Monitor Used for Particulate and Iodine Sample Collection (see 2.b)** Pri: (Monitor Items 28 and 72 for 2HVS-DAU109B)	D	NA	R	Q
3. Decontamination Building Vent (DV-2)				
a. **Noble Gas Activity Monitor** Pri: (2RMQ-RQ301B)	D	M(4)	R(3)(6)	Q(5)
b. **Particulate and Iodine Sampler** Pri: (Filter Paper & Charcoal Cartridge for 2RMQ-RQ301) or 1st Alt: (Continuous collection via RASP Pump) or 2nd Alt: (Grab samples every 12 hours)	W	NA	NA	NA
c. **Process Flow Rate Monitor**	NA	NA	NA	NA
d. **Sampler Flow Rate Monitor Used for Particulate and Iodine Sample Collection (see 3.b)** Pri: (2RMQ-FIT301)	D	NA	R	Q

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ODCM CONTROLS: RETS INSTRUMENT FOR GASEOUS RELEASES

TABLE 4.3-13 (continued)

BV-2 RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Pri = Primary Instruments, Alt = Alternate Instruments

INSTRUMENT	CHANNEL CHECK	SOURCE CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST
4. Condensate Polishing Building Vent (CB-2)				
a. **Noble Gas Activity Monitor** Pri: (2HVL-RQ112B)	D	M(4)	R(3)(6)	Q(5)
b. **Particulate and Iodine Sampler** Pri: (Filter Paper & Charcoal Cartridge for 2HVL-RQ112) or 1st Alt: (Continuous collection via RASP Pump) or 2nd Alt: (Grab samples every 12 hours)	W	NA	NA	NA
c. **Process Flow Rate Monitor**	NA	NA	NA	NA
d. **Sampler Flow Rate Monitor Used for Particulate and Iodine Sample Collection (see 4.b)** Pri: (2HVL-FIT112)	D	NA	R	Q
5. Waste Gas Storage Vault Vent (WV-2)				
a. **Noble Gas Activity Monitor** Pri: (2RMQ-RQ303B)	D	M(4)	R(3)(6)	Q(5)
b. **Particulate and Iodine Samples** Pri: (Filter Paper & Charcoal Cartridge for 2RMQ-RQ303) or 1st Alt: (Continuous collection via RASP Pump) or 2nd Alt: (Grab samples every 12 hours)	W	NA	NA	NA
c. **Process Flow Rate Monitor**	NA	NA	NA	NA
d. **Sampler Flow Rate Monitor Used for Particulate and Iodine Sample Collection (see 5.b)** Pri: (2RMQ-FIT303)	D	NA	R	Q

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ODCM CONTROLS: RETS INSTRUMENT FOR GASEOUS RELEASES

TABLE 4.3-13 (continued)

TABLE NOTATION

(1) The CHANNEL FUNCTIONAL TEST shall also demonstrate that automatic isolation of this pathway and Control Room Alarm Annunciation occurs if any of the following conditions exist:

a. Instrument indicates measured levels above the alarm/trip setpoint.
b. Downscale failure.
c. Instrument controls not set in operate mode.

(2) The CHANNEL FUNCTIONAL TEST shall also demonstrate that Control Room Alarm Annunciation occurs if any of the following conditions exist:

a. Instrument indicates measured levels above the alarm/trip setpoint.
b. Downscale failure.
c. Instrument controls not set in operate mode.

(3) The initial CHANNEL CALIBRATION for radioactivity measurement instrumentation shall be performed using one or more of the reference standards certified be National Bureau of Standards or using standards that have been obtained from suppliers that participate in measurement assurance activities with NBS. These standards should permit calibrating the system over its intended range of energy and rate capabilities. For subsequent CHANNEL CALIBRATION, sources that have been related to the initial calibration should be used, at intervals of at least once per 18 months. This can normally be accomplished during refueling outages.

(4) A SOURCE CHECK may be performed utilizing the installed means or flashing the detector with a portable source to obtain an upscale increase in the existing count rate to verify channel response.

(5) The CHANNEL FUNCTIONAL TEST shall also demonstrate that Control Room Alarm Annunciation occurs if the instrument indicates measured levels above the alarm/trip setpoint.

(6) The CHANNEL CALIBRATION shall also demonstrate that Control Room Alarm Annunciation occurs if either of the following conditions exist:

1. Downscale failure.
2. Instrument controls are not set in operate mode.

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Page 1 of 5
ODCM CONTROLS: LIQUID EFFLUENT CONCENTRATION

CONTROLS: LIQUID EFFLUENT CONCENTRATION

3.11.1.1 In accordance with BV-1 and BV-2 Technical Specification 6.8.6a, Items 2 and 3, the concentration of radioactive material released at any time from the site (see 1/2-ODC-2.01, Figure 5-1) shall be limited to 10 times the EC's specified in 10 CFR Part 20, Appendix B (20.1001-20.2401), Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases. This is referred to as the ODCM Effluent Concentration Limit (OEC). For dissolved or entrained noble gases, the concentration shall be limited to 2E-4 uCi/ml total activity.

Applicability: At all times.

Action:

a. With the concentration of radioactive material released from the site to unrestricted areas exceeding the above limits; immediately restore the concentration within the above limits, and

b. Submit a Special Report to the Commission within 30 days in accordance with 10 CFR 20.2203(a)(2)(v) and 10 CFR 50.4(b)(1).

c. The provisions of ODCM CONTROL 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.1.1.1 Radioactive liquid wastes shall be sampled and analyzed according to the sampling and analysis program of ODCM Control 3.11.1.1, Table 4.11-1*.

4.11.1.1.2 The results of radioactive analysis shall be used in accordance with 1/2-ODC-2.01 to assure that the concentration at the point of release are maintained within the limits of ODCM CONTROL 3.11.1.1.

4.11.1.1.3 When BV-1 primary to secondary leakage exceeds 0.1 gpm (142 gpd), samples of the Turbine Building Sump shall be obtained every 8 hours to ensure that the Turbine Building Sump concentration does not exceed 1 OEC. Once it is determined that an OEC is reached, the Turbine Building Sump shall be routed to the Chemical Waste Sump.

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ODCM CONTROLS: LIQUID EFFLUENT CONCENTRATION

SURVEILLANCE REQUIREMENTS (continued)

4.11.1.1.4 When BV-2 primary to secondary leakage exceeds 0.1 gpm (142 gpd), samples of the Turbine Building Sump shall be obtained every 8 hours to ensure that the Turbine Building Sump concentration does not exceed 1 OEC. Once it is determined that an OEC is reached, the Turbine Building Sump shall be routed to Steam Generator blowdown hold tank (2SGC-TK21A or 2SGC-TK21B).

4.11.1.1.5 Prior to the BV-2 Recirculation Drain Pump(s) (2DAS-P215A/B) discharging to catch basin 16, a grap sample will be taken. The samples will be analyzed for gross activity at a sensitivity of at least 1E-7 uCi/ml. Water volume discharged shall be estimated from the number of pump operations unless alternate flow or volume instrumentation is provided.

* Radioactive liquid discharges are normally via batch modes. BV-1 and BV-2 Turbine Building Drains shall be monitored as specified in ODCM SURVEILLANCE REQUIREMENT 4.11.1.1.3 and 4.11.1.1.4. The BV-2 Recirculation drain pump discharge shall be monitored as specified in ODCM SURVEILLANCE REQUIREMENT 4.11.1.1.5, respectively.

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ODCM CONTROLS: LIQUID EFFLUENT CONCENTRATION

TABLE 4.11-1

RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

LIQUID RELEASE TYPE	SAMPLING FREQUENCY	MINIMUM ANALYSIS FREQUENCY	TYPE OF ACTIVITY ANALYSIS	LOWER LIMIT OF DETECTION (LLD) (uCi/ml)[a]
A. Batch Waste Release Tanks[d]	P Each Batch[h]	P Each Batch[h]	Principal Gamma Emitters[f]	5E-7
			I-131	1E-6
	P One Batch/M[h]	M	Dissolved And Entrained Gases (Gamma Emitters)	1E-5
	P Each Batch[h]	M Composite[b]	H-3	1E-5
			Gross Alpha	1E-7
	P Each Batch[h]	Q Composite[b]	Sr-89, Sr-90	5E-8
			Fe-55	1E-6
B. Continuous Releases[e][g]	Grab Sample[g]	W Composite[c]	Principal Gamma Emitters[f]	5E-7
			I-131	1E-6
	Grab Sample[g]	M	Dissolved And Entrained Gases (Gamma Emitters)	1E-5
	Grab Sample[g]	M Composite[c]	H-3	1E-5
			Gross Alpha	1E-7
	Grab Sample[g]	Q Composite[c]	Sr-89, Sr-90	5E-8
			Fe-55	1E-6

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ODCM CONTROLS: LIQUID EFFLUENT CONCENTRATION

TABLE 4.11-1 (continued)

TABLE NOTATION

(a) The LLD is the smallest concentration of radioactive material in a sample that will be detected with 95% probability with 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system (which may include radiochemical separation):

$$LLD = \frac{4.66\ Sb}{(E)(V)(2.22)(Y)\exp(-\lambda\Delta T)}$$

where:

LLD is the lower limit of detection as defined above (as pCi 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 transformation);

V is the sample size (in units of mass or volume);

2.22 is the number of transformations per minute per picocurie;

Y is the fractional radiochemical yield (when applicable);

λ is the radioactive decay constant for the particular radionuclide;

ΔT is the elapsed time between sample collection (or end of the sample collection period) and time of counting (for environmental samples, not plant effluent samples).

The value of S_b used in the calculation of the LLD for a detection system shall be based on the actual observed variance of the background counting rate or of the counting rate of the blank samples (as appropriate) rather than on an unverified theoretically predicted variance. Typical values of E, V, Y and ΔT should be used in the calculations.

The LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as a posteriori (after the fact) limit for a particular measurement.

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ODCM CONTROLS: LIQUID EFFLUENT CONCENTRATION

TABLE 4.11-1 (continued)

TABLE NOTATION

(b) A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen which is representative of the liquids released.

(c) To be representative of the quantities and concentrations of radioactive materials in liquid effluents, samples shall be collected continuously in proportion to the rate of flow of the effluent stream. Prior to analyses, all samples taken for the composite shall be thoroughly mixed in order for the composite sample to be representative of the effluent release.

(d) A batch release exists when the discharge of liquid wastes is from a discrete volume. Prior to sampling for analyses, each batch shall be isolated, and then thoroughly mixed to assure representative sampling.

(e) A continuous release exists when the discharge of liquid wastes is from a non-discrete volume; e.g., from a volume of a system having an input flow during the continuous release. Releases from the Turbine Building Drains and the AFW Pump Bay Drain System and Chemical Waste Sump are considered continuous when the primary to secondary leak rate exceeds 0.1 gpm (142 gpd).

(f) The principal gamma emitters for which the LLD specification will apply are exclusively 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 detected and reported. Other peaks which are measurable and identifiable, together with the above nuclides, shall also be identified and reported. Nuclides which are below the LLD for the analyses should be reported as "less than" the nuclide's LLD, and should not be reported as being present at the LLD level for that nuclide. The "less than" values should not be used in the required dose calculations. When unusual circumstances result in LLD's higher than required, the reasons shall be documented in the Annual Radioactive Effluent Release Report.

(g) When radioactivity is identified in the secondary system, a RWDA-L should be prepared on a monthly basis to account for the radioactivity that will eventually be discharged to the Ohio River.

(h) Whenever the BV-2 Recirculation Drain Pump(s) are discharging to catch basin 16, sampling will be performed by means of a grab sample taken every 4 hours during pump operation.

ATTACHMENT H
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ODCM CONTROLS: LIQUID EFFLUENT DOSE

CONTROLS: LIQUID EFFLUENT DOSE

3.11.1.2 In accordance with BV-1 and BV-2 Technical Specification 6.8.6a, Items 4 and 5, the dose or dose commitment to MEMBER(S) OF THE PUBLIC from radioactive materials in liquid effluents released from the reactor unit (see 1/2-ODC-2.01 Figure 5-1) shall be limited:

a. During any calendar quarter to less than or equal to 1.5 mrem to the total body and to less than or equal to 5 mrem to any organ, and

b. During any calendar year to less than or equal to 3 mrem to the total body and to less than or equal to 10 mrem to any organ.

Applicability: At all times.

Action:

a. With the calculated dose from the release of radioactive materials in liquid effluents exceeding any of the above limits, prepare and submit to the Commission within 30 days, pursuant to 10 CFR 20.2203(a)(2)(v) and 10 CFR 50.4(b)(1), a Special Report which identifies the cause(s) for exceeding the limit(s) and defines the corrective actions to be taken to reduce the releases, and the proposed corrective actions to be taken to assure the subsequent releases will be within the above limits. (This Special Report shall also include (1) the results of radiological analyses of the drinking water source and (2) the radiological impact on finished drinking water supplies with regard to the requirements of 40 CFR 141, Safe Drinking Water Act).*

b. The provisions of ODCM CONTROL 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.1.2.1 Dose Calculations. Cumulative dose contributions from liquid effluents shall be determined in accordance with 1/2-ODC-2.01 at least once per 31 days.

* Applicable only if drinking water supply is taken from the receiving water body within three miles of the plant discharge (three miles downstream only).

ATTACHMENT I
Page 1 of 1
ODCM CONTROLS: LIQUID RADWASTE TREATMENT SYSTEM

CONTROLS: LIQUID RADWASTE TREATMENT SYSTEM

3.11.1.3 In accordance with BV-1 and BV-2 Technical Specification 6.8.6a, Item 6, the Liquid Radwaste Treatment System shall be used to reduce the radioactive materials in each liquid waste batch prior to its discharge when the projected doses due to liquid effluent releases from the reactor unit (see 1/2-ODC-2.01 Figure 5-1) when averaged over 31 days would exceed 0.06 mrem to the total body or 0.2 mrem to any organ.

Applicability: At all times.

Action:

a. With liquid waste being discharged without treatment and exceeding the limits specified, prepare and submit to the Commission within 30 days pursuant to 10 CFR 20.2203(a)(2)(v) and 10 CFR 50.4(b)(1) a Special Report which includes the following information:

   1. Identification of the inoperable equipment or subsystems and the reason for inoperability.

   2. Action(s) taken to restore the inoperable equipment to operational status, and

   3. Summary description of action(s) taken to prevent a recurrence.

b. The provisions of ODCM CONTROL 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.1.3.1 Doses due to liquid releases shall be projected at least once per 31 days, in accordance with 1/2-ODC-2.01.

ATTACHMENT J
Page 1 of 1
ODCM CONTROLS: LIQUID HOLDUP TANKS

CONTROLS: LIQUID HOLDUP TANKS

3.11.1.4 In accordance with BV-1 and BV-2 Technical Specification 6.8.6c, the quantity of radioactive material contained in each of the following tanks shall be limited to the values listed below, excluding tritium and dissolved or entrained noble gases.

a. ≤ 21 Curies: 1BR-TK-6A (Unit 1 Primary Water Storage Tank)
b. ≤ 21 Curies: 1BR-TK-6B (Unit 1 Primary Water Storage Tank)
c. ≤ 7 Curies: 1LW-TK-7A (Unit 1 Steam Generator Drain Tank)
d. ≤ 7 Curies: 1LW-TK-7B (Unit 1 Steam Generator Drain Tank)
e. ≤ 5 Curies: 1QS-TK-1 (Unit 1 Refueling Water Storage Tank-RWST)
f. ≤ 139 Curies: 2QSS-TK21 (Unit 2 Refueling Water Storage Tank-RWST)
g. ≤ 10 Curies: Unit 1 and 2 miscellaneous temporary outside radioactive liquid storage tanks.

APPLICABILITY: At all times.

ACTION:

a. With the quantity of radioactive material in the tank exceeding the limit, perform calculations to determine compliance to the limits of 10 CFR Part 20, Appendix B, Table 2, Column 2. These calculations shall be performed at the nearest potable water supply, and the nearest surface water supply in the unrestricted area (i.e.; at the entrance to the Midland Water Treatment Facility). IF the limits of 10 CFR Part 20 are determined to be exceeded, THEN immediately suspend all additions of radioactive material to the tank and within 48 hours reduce the tank contents to within the limits set forth in 10 CFR Part 20, and

b. Submit a Special Report in accordance with 10 CFR 50.4 (b) (1) within 30 days and include a schedule and a description of activities planned and/or taken to reduce the contents to within the limits set forth in 10 CFR Part 20.

c. The provisions ODCM Control 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.1.4.1 The quantity of radioactive material contained in each of the above listed tanks (except the Unit 1 and 2 RWST's) shall be determined to be within the above limit by analyzing a representative sample of the tank's contents at least once per 7 days when radioactive materials are being added to the tank.

4.11.1.4.2 SINCE additions of radioactive material to the Unit 1 and 2 RWST's are normally made at the end of a refueling outage (i.e.; drain down of the reactor cavity back to the RWST), THEN compliance to this limit shall be performed as follows:

The quantity of radioactive material contained in the Unit 1 and 2 RWST's shall be determined to be within the above limit by analyzing a representative sample of the tank's contents within 7 days after transfer of reactor cavity water to the respective Unit's RWST.

ATTACHMENT K
Page 1 of 5
ODCM CONTROLS: GASEOUS EFFLUENT DOSE RATE

CONTROLS: GASEOUS EFFLUENT DOSE RATE

3.11.2.1 In accordance with BV-1 and BV-2 Technical Specification 6.8.6a, Items 3 and 7, the dose rate in the unrestricted areas (see 1/2-ODC-2.02 Figure 5-1) due to radioactive materials released in gaseous effluents from the site shall be limited to the following values:

a. The dose rate limit for noble gases shall be ≤ 500 mrem/yr to the total body and ≤ 3000 mrem/yr to the skin*, and

b. The dose rate limit, inhalation pathway only, for I-131, tritium and all radionuclides in particulate form (excluding C-14) with half-lives greater than eight days shall be ≤ 1500 mrem/yr to any organ.

Applicability: At all times.

Action:

a. With the dose rate(s) exceeding the above limits, immediately decrease the release rate to comply with the above limits(s), and

b. Submit a Special Report to the Commission within 30 days pursuant to 10 CFR 20.2203(a)(2)(v) and 10 CFR 50.4(b)(1).

c. The provisions of ODCM CONTROL 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2.1.1 The dose rate due to noble gaseous effluents shall be determined to be within the above limits in accordance with 1/2-ODC-2.02.

4.11.2.1.2 The dose rate, inhalation pathway only, for I-131, tritium and all radionuclides in particulate form (excluding C-14) with half-lives greater than eight days in gaseous effluents, shall be determined to be within the above limits in accordance with the methods and procedures of the ODCM by obtaining representative samples and performing analyses in accordance with the sampling and analysis program specified in ODCM Control 3.11.2.1, Table 4.11-2.

*During containment purge the dose rate may be averaged over 960 minutes.

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ODCM CONTROLS: GASEOUS EFFLUENT DOSE RATE

TABLE 4.11-2

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

GASEOUS RELEASE TYPE	SAMPLING FREQUENCY	MINIMUM ANALYSIS FREQUENCY	TYPE OF ACTIVITY ANALYSIS	LOWER LIMIT OF DETECTION (LLD) (uCi/ml)(a)
A. Waste Gas Storage Tank	P Each Tank Grab Sample	P Each Tank	Principal Gamma Emitters(g)	1E-4
	Each Tank* Grab Sample	Each Tank*	H-3*	1E-6
B. Containment Purge	P Each Purge(b) Grab Sample	P Each Purge(b)	Principal Gamma Emitters(g)	1E-4
			H-3	1E-6
C. Ventilation Systems(h) VV-1 (U1 PAB/Ventilation Vent) CV-1 (U1 Rx Cont/SLCRS Vent) PV-1/2 (U1/2 GW/Process Vent) VV-2 (U2 SLCRS Unfiltered Path) CV-2 (U2 SLCRS Filtered Path) DV-2 (U2 Decon Bldg Vent) WV-2 (U2 Waste Gas Vault Vent) CB-2 (U2 Cond Pol Bldg Vent)	M(b)(c)(e) Grab Sample	M(b)	Principal Gamma Emitters(g)	1E-4
			H-3	1E-6

* The H-3 concentration shall be estimated prior to release and followed up with an H-3 grab sample from the Ventilation System during release.

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ODCM CONTROLS: GASEOUS EFFLUENT DOSE RATE

TABLE 4.11-2 (continued)

RADIOACTIVE GASEOUS WASTE SAMPLING AND ANALYSIS PROGRAM

GASEOUS RELEASE TYPE	SAMPLING FREQUENCY	MINIMUM ANALYSIS FREQUENCY	TYPE OF ACTIVITY ANALYSIS	LOWER LIMIT OF DETECTION (LLD) (uCi/ml)[a]
D. All Ventilation Systems Listed Above (in C.) Which Produce Continuous Release	Continuous[f]	W[d] Charcoal Sample	I-131	1E-12
			I-133	1E-10
	Continuous[f]	W[d] Particulate Sample	Principal Gamma Emitters[g] (I-131, Others)	1E-11
	Continuous[f]	M Composite Particulate Sample	Gross Alpha	1E-11
	Continuous[f]	Q Composite Particulate Sample	Sr-89, Sr-90	1E-11
	Continuous[f]	Noble Gas Monitor	Noble Gases Gross Beta And Gamma	1E-6

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ODCM CONTROLS: GASEOUS EFFLUENT DOSE RATE

TABLE 4.11-2 (continued)

TABLE NOTATION

(a) The Lower Limit of Detection (LLD) is defined in Table Notation (a) of ODCM Control 3.11.1.1, Table 4.11-1 for ODCM Surveillance Requirement 4.11.1.1.

(b) Samples (grab particulate, iodine & noble gas) and analysis shall also be performed following SHUTDOWN, STARTUP, or a THERMAL POWER change exceeding 15% of RATED THERMAL POWER within a 1 hour period. This requirement does not apply if (1) analysis shows that the Dose Equivalent I-131 concentration in the primary coolant has not increased more than a factor of 3; and (2) the noble gas monitor shows that effluent activity has not increased more than a factor of 3.

Clarification: All samples shall be obtained within 24 hours of reaching the intended steady state power level, and analyzed within 48 hours of reaching the intended steady state power level.

Applicability: Unit 1 Ventilation Systems (VV-1, CV-1 and/or PV-1/2), or Unit 2 Ventilation Systems (VV-2, CV-2 and/or PV-1/2), as appropriate. Specifically, sample the ventilation release path(s) that show a factor of 3 increase on the noble gas effluent monitor. [3.1.16] [3.1.18]

(c) Tritium grab samples shall be taken at least once per 24 hours (from the appropriate ventilation release path of the refueling canal area) when the containment refueling canal is flooded. Sampling may be terminated after completion of vessel defueling. Sampling shall resume upon commencement of vessel refueling.

Applicability - (Mode 6): Unit 1 Ventilation System (VV-1 or CV-1), or Unit 2 Ventilation System (VV-2 or CV-2), that is aligned to the Reactor Containment Building atmosphere. In lieu of sampling the ventilation release path, samples may be obtained from the Reactor Containment Building atmosphere. [3.1.11] [3.1.19]

(d) **Part 1:** Samples (continuous particulate & iodine) shall be changed at least once per 7 days and analyses shall be completed within 48 hours after changing, or after removal from sampler.

Applicability for Part 1: Unit 1 and Unit 2 Ventilation Systems (VV-1, CV-1, PV-1/2, VV-2, CV-2, DV-2, WV-2 & CB-2).

Part 2: Samples (continuous particulate & iodine) shall also be changed at least once per 24 hours for at least 7 days following each SHUTDOWN, STARTUP, or THERMAL POWER change exceeding 15% of RATED THERMAL POWER within a 1 hour period and analyses shall be completed within 48 hours of changing. When samples collected for 24 hours are analyzed, the corresponding LLDs may be increased by a factor of 10. This requirement does not apply if: (1) analysis shows that the DOSE EQUIVALENT I-131 concentration in the reactor coolant has not increased more than a factor of 3; and (2) the noble gas monitor shows that effluent activity has not increased more than a factor of 3.

Clarification: All samples shall be changed within 24 hours of reaching the intended steady state power level, and analyzed within 48 hours of reaching the intended steady state power level.

Applicability for Part 2: Unit 1 Ventilation Systems (VV-1, CV-1 and/or PV-1/2), or Unit 2 Ventilation Systems (VV-2, CV-2 and/or PV-1/2), as appropriate. Specifically, change out the continuous particulate, iodine samples for the ventilation release path(s) that show a factor of 3 increase on the noble gas effluent monitor. [3.1.16] [3.1.18]

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ODCM CONTROLS: GASEOUS EFFLUENT DOSE RATE

(e) Tritium grab samples shall be taken at least once per 7 days (from the appropriate ventilation release path of the spent fuel pool area) whenever spent fuel is in the spent fuel pool.

Applicability: Unit 1 Ventilation System (CV-1), or Unit 2 Ventilation System (CV-2) that is aligned to the Fuel Handling Building atmosphere. In lieu of sampling the ventilation release path, samples may be obtained from the Fuel Handling Building atmosphere. [3.1.11] [3.1.19]

(f) The average ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation made in accordance with ODCM CONTROLS 3.11.2.1, 3.11.2.2, and 3.11.2.3.

Clarification: The average ratio of the sample flow rate to the sampled stream flow rate can be determined, but it must not be used in dose and dose rate calculation. Specifically, use of this ratio would provide non-conservative dose calculations, and would compromise licensee response to NRC Unresolved Item 50-334/83-30-05. For information, a comprehensive three-year Radiation Monitor Particle Study was performed in response to the unresolved item's concern that the effluent monitors were not collecting representative samples per ANSI N13.1. The results of that study concluded that a correction factor (minimum CF of 2) must be applied to particulate sample volume calculations and subsequent dose and dose rate calculations. Specifically, the minimum CF of 2 must be utilized in-lieu of actual ratios of sample flow rate to the sampled stream flow rate. In summary, the minimum CF of 2 provides adequate compensation for any negative bias in particulate sample collection. [3.2.13]

Applicability: Unit 1 Ventilation Systems (VV-1, CV-1 & PV-1/2), and Unit 2 Ventilation Systems (VV-2 & CV-2).

(g) The principal gamma emitters for which the LLD specification will apply are exclusively 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 detected and reported. Other peaks which are measurable and identifiable, together with the above nuclides, shall also be identified and reported. Nuclides which are below the LLD for the analyses should not be reported as being present at the LLD level for that nuclide. When unusual circumstances result in LLD's higher than required, the reasons shall be documented in the Annual Radioactive Effluent Release Report.

(h) Only when this release path is in use.

Applicability: Unit 1 and Unit 2 Ventilation Systems (VV-1, CV-1, PV-1/2, VV-2, CV-2, DV-2, WV-2 & CB-2).

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ODCM CONTROLS: DOSE- NOBLE GASES

CONTROLS: DOSE-NOBLE GASES

3.11.2.2 In accordance with BV-1 and BV-2 Technical Specification 6.8.6a, Items 5 and 8, the air dose from the reactor unit in unrestricted areas (see 1/2-ODC-2.02 Figure 5-1) due to noble gases released in gaseous effluents shall be limited to the following:

a. During any calendar quarter, to ≤ 5 mrad for gamma radiation and ≤ 10 mrad for beta radiation.

b. During any calendar year, to ≤ 10 mrad for gamma radiation and ≤ 20 mrad for beta radiation.

Applicability: At all times.

Action:

a. With the calculated air dose from radioactive noble gases in gaseous effluents exceeding any of the above limits, prepare and submit to the Commission with in 30 days, pursuant to 10 CFR 20.2203(a)(2)(v) and 10 CFR 50.4(b)(1), a Special Report which identifies the cause(s) for exceeding the limit(s) and defines the corrective actions taken to reduce the releases and the proposed corrective actions to be taken to assure the subsequent releases will be within the above limits.

b. The provisions of ODCM CONTROL 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2.2.1 Dose Calculations. Cumulative dose contributions shall be determined in accordance with 1/2-ODC-2.02 at least once every 31 days.

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ODCM CONTROLS: DOSE - RADIOIODINES AND PARTICULATES

CONTROLS: DOSE-RADIOIODINES, RADIOACTIVE MATERIAL IN PARTICULATE FORM, AND RADIONUCLIDES OTHER THAN NOBLE GASES

3.11.2.3 In accordance with BV-1 and BV-2 Technical Specification 6.8.6a, Items 5 and 9, the dose to MEMBER(S) OF THE PUBLIC from radioiodines and radioactive materials in particular form (excluding C-14), and radionuclides (other than noble gases) with half-lives greater than eight days in gaseous effluents releases from the reactor unit (see 1/2-ODC-2.02 Figure 5-1) shall be limited to the following:

a. During any calendar quarter to ≤ 7.5 mrem to any organ, and

b. During any calendar year to ≤ 15 mrem to any organ.

Applicability: At all times.

Action:

a. With the calculated dose from the release of radioiodines, radioactive materials in particulate form, (excluding C-14), and radionuclides (other than noble gases) with half-lives greater than eight days, in gaseous effluents exceeding any of the above limits, prepare and submit to the Commission within 30 days, pursuant to 10 CFR 20.2203(a)(2)(v) and 10 CFR 50.4(b)(1), a Special Report, which identifies the cause(s) for exceeding the limit and defines the corrective actions taken to reduce the releases and the proposed corrective actions to be taken to assure the subsequent releases will be within the above limits.

b. The provisions of ODCM CONTROL 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2.3.1 Dose Calculations. Cumulative dose contributions shall be determined in accordance with 1/2-ODC-2.02 at least once every 31 days.

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ODCM CONTROLS: GASEOUS RADWASTE TREATMENT SYSTEM

CONTROLS: GASEOUS RADWASTE TREATMENT SYSTEM

3.11.2.4 In accordance with BV-1 and BV-2 Technical Specification 6.8.6a, Item 6, the Gaseous Radwaste Treatment System and the Ventilation Exhaust Treatment System shall be used to reduce radioactive materials in gaseous waste prior to their discharge when the projected gaseous effluent air doses due to gaseous effluent releases from the reactor unit (see 1/2-ODC-2.02 Figure 5-1), when averaged over 31 days, would exceed 0.2 mrad for gamma radiation and 0.4 mrad for beta radiation. The appropriate portions of the Ventilation Exhaust Treatment System shall be used to reduce radioactive materials in gaseous waste prior to their discharge when the projected doses due to gaseous effluent releases from the reactor unit (see 1/2-ODC-2.02 Figure 5-1) when averaged over 31 days would exceed 0.3 mrem to any organ.

Applicability: At all times.

Action:

a. With gaseous waste being discharged without treatment and in excess of the above limits, prepare and submit to the Commission within 30 days, pursuant to 10 CFR 20.2203(a)(2)(v) and 10 CFR 50.4(b)(1), a Special Report which includes the following information.

1. Identification of the inoperable equipment or subsystems and the reason for inoperability,

2. Action(s) taken to restore the inoperable equipment to operational status, and

3. Summary description of action(s) taken to prevent a recurrence.

b. The provisions of ODCM CONTROL 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2.4.1 Doses due to gaseous releases from the site shall be projected at least once per 31 days, in accordance with 1/2-ODC-2.02.

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ODCM CONTROLS: GAS STORAGE TANKS

CONTROLS: GAS STORAGE TANKS

3.11.2.5 In accordance with BV-1 and BV-2 Technical Specification 6.8.6c, the quantity of radioactivity contained in the following gas storage tanks(s) shall be limited to the noble gas values listed below (considered as Xe-133).

a. ≤52,000 Curies: Each BV-1 Waste Gas Decay Tank (1GW-TK-1A, or 1GW-TK-1B, or 1GW-TK-1C)

b. ≤19,000 Curies: Any connected group of BV-2 Gaseous Waste Storage Tanks (2GWS-TK25A thru 2GWS-TK25G)

APPLICABILITY: At all times.

ACTION:

a. With the quantity of radioactive material in any gas storage tank exceeding the above limit, immediately suspend all additions of radioactive material to the tank and within 48 hours reduce the tank contents to within the limit, and

b. Submit a Special Report in accordance with 10 CFR 50.4 (b)(1) within 30 days and include a schedule and a description of activities planned and/or taken to reduce the contents to within the specified limits.

c. The provisions of ODCM Control 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2.5.1 For BV-1 Waste Gas Decay Tanks: The quantity of radioactive material contained in each BV-1 Waste Gas Decay Tank shall be determined to be within the above limit at least once per 24 hours when radioactive materials are being added to the tank. Performance of this surveillance is required when the gross concentration of the primary coolant is greater than 100 uCi/ml.

For BV-2 Gaseous Waste Storage Tanks: The quantity of radioactive material contained in any connected group of BV-2 Gaseous Waste Storage Tanks shall be determined to be within the above limit at least once per 24 hours when radioactive materials are being added to the tanks.

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ODCM CONTROLS: TOTAL DOSE

CONTROLS: TOTAL DOSE

3.11.4.1 In accordance with BV-1 and BV-2 Technical Specification 6.8.6a, Item 10, the annual (calendar year) dose or dose commitment to any MEMBER OF THE PUBLIC due to releases of radioactivity and to radiation from uranium fuel cycle sources shall be limited to ≤ 25 mrems to the whole body or any organ, except the thyroid, which shall be limited to ≤ 75 mrems.

Applicability: At all times.

Action:

a. With the calculated doses from the release of radioactive materials in liquid or gaseous effluents exceeding twice the limits of ODCM CONTROL 3.11.1.2a, 3.11.1.2b, 3.11.2.2a, 3.11.2.2b, 3.11.2.3a, or 3.11.2.3b, calculations shall be made including direct radiation contributions from the units (including outside storage tanks, etc.) to determine whether the above limits of ODCM CONTROL 3.11.4.1 have been exceeded. If such is the case, prepare and submit to the Commission within 30 days, pursuant to 10 CFR 20.2203(a)(2)(v) and 10 CFR 50.4(b)(1), 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 20.405(c), 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.

b. The provisions of ODCM CONTROL 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.4.1.1 Cumulative dose contributions from liquid and gaseous effluents shall be determined in accordance with ODCM SURVEILLANCE REQUIREMENTS 4.11.1.2.1, 4.11.2.2.1, and 4.11.2.3.1.

4.11.4.1.2 Cumulative dose contributions from direct radiation from the units (including outside storage tanks, etc.) shall be determined in accordance with 1/2-ODC-2.04. This requirement is applicable only under conditions set forth in Action a. of ODCM CONTROL 3.11.4.1.

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ODCM CONTROLS: REMP-PROGRAM REQUIREMENTS

CONTROLS: RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

3.12.1 In accordance with BV-1 and BV-2 Technical Specification 6.8.6b, Item 1, the radiological environmental monitoring program shall be conducted as specified in ODCM Control 3.12.1, Table 3.12-1.

Applicability: At all times.

Action:

a. With the radiological environmental monitoring program not being conducted as specified in ODCM Control 3.12.1, Table 3.12-1, prepare and submit to the Commission, in the Annual Radiological Environmental Report, a description of the reasons for not conducting the program as required and the plans for preventing a recurrence. 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.

b. With the level of radioactivity in an environmental sampling medium at one or more of the locations specified in ODCM Control 3.12.1, Table 3.12.1 exceeding the limits of ODCM Control 3.12.1, Table 3.12-2 when averaged over any calendar quarter, prepare and submit to the Commission within 30 days from the end of affected calendar quarter a Special Report pursuant to 10 CFR 20.2203(a)(2)(v) and 10 CFR 50.4(b)(1) which includes an evaluation of any release conditions, environmental factors or other aspects which caused the limits of ODCM Control 3.12.1, Table 3.12-2 to be exceeded. This report is not required if the measured level of radioactive was not the result of plant effluents; however, in such an event, the condition shall be reported and described in the Annual Radiological Environmental Report.

   When more than one of the radionuclides in ODCM Control 3.12.1, Table 3.12-2 are detected in the sampling medium, this report shall be submitted if:

$$\frac{\text{Concentration (1)}}{\text{Limit Level (1)}} + \frac{\text{Concentration (2)}}{\text{Limit Level (2)}} + \ldots \geq 1.0$$

c. With milk or fresh leafy vegetable samples unavailable from the required number of locations selected in accordance with ODCM CONTROL 3.12.2 and listed in the ODCM, obtain replacement samples. The locations from which samples were unavailable may then be deleted from those required by ODCM Control 3.12.1, Table 3.12-1 and the ODCM provided the locations from which the replacement samples were obtained are added to the environmental monitoring program as replacement locations, if available.

d. The provisions of ODCM CONTROL 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.12.1.1 The radiological environmental monitoring samples shall be collected pursuant to ODCM Control 3.12.1, Table 3.12-1 from the locations given in the ODCM and shall be analyzed pursuant to be requirements of ODCM Control 3.12.1, Tables 3.12-1 and 4.12-1.

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ODCM CONTROLS: REMP-PROGRAM REQUIREMENTS

TABLE 3.12-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF SAMPLES AND LOCATIONS	SAMPLING AND COLLECTION FREQUENCY	TYPE AND FREQUENCY[a] OF ANALYSIS
1. AIRBORNE a. Radioiodine And Particulates	5 locations 1. One sample from a control location 10-20 miles distant and in the least prevalent wind direction 2. One sample from vicinity of community having the highest calculated annual average ground level D/Q.	Continuous operation of sampler with sample collection at least weekly.	Each radioiodine canister. Analyze for I-131; Particulate sampler. Analyze for gross beta weekly [b]; Perform gamma isotopic analysis on composite (by location) sample at least quarterly.
2. DIRECT RADIATION	40 locations ≥ 2 TLDs or a pres-surized ion chamber at each location.	Continuous measurement with collection at least quarterly.	Gamma dose, quarterly.

[a] Analysis frequency same as sampling frequency unless otherwise specified.

[b] Particulate samples are not counted for ≥ 24 hours after filter change. Perform gamma isotopic analysis on each sample when gross beta is >10 times the yearly mean of control samples.

**Sample locations are given on figures and tables in 1/2-ODC-2.03.

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ODCM CONTROLS: REMP-PROGRAM REQUIREMENTS

TABLE 3.12-1 (continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF SAMPLES AND LOCATIONS**	SAMPLING AND COLLECTION FREQUENCY	TYPE AND FREQUENCY[(a)] OF ANALYSIS
3. WATERBORNE a. Surface	2 locations. 1. One sample upstream. 2. One sample downstream.	Composite* sample collected over a period not to exceed 1 month.	Gamma isotopic analysis of composite sample by location monthly; Tritium analysis of composite sample at least quarterly.
b. Drinking	2 locations.	Composite* sample collected over a period not to exceed 2 weeks.	I-131 analysis of each composite sample; Gamma isotopic analysis of composite sample (by location) monthly; Tritium analysis of composite sample quarterly.
c. Groundwater	N/A - No wells in lower elevations between plant and river		
d. Sediment From Shoreline	1 location.	Semi-annually.	Gamma isotopic analysis semi-annually.

(a) Analysis frequency same as sampling frequency unless otherwise specified.

*Composite samples shall be collected by collecting an aliquot at intervals not exceeding two hours. For the upstream surface water location, a weekly grab sample, composited each month based on river flow at time of sampling, is also acceptable.

**Sample locations are given on figures and tables in 1/2-ODC-2.03.

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ODCM CONTROLS: REMP-PROGRAM REQUIREMENTS

TABLE 3.12-1 (continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

EXPOSURE PATHWAY AND/OR SAMPLE	NUMBER OF SAMPLES AND LOCATIONS**	SAMPLING AND COLLECTION FREQUENCY	TYPE AND FREQUENCY[a] OF ANALYSIS
4. INGESTION a. Milk	4 locations.[b] 1. Three samples selected on basis of highest potential thyroid dose using milch census data. 2. One local large dairy.	Atleast bi-weekly when animals are on pasture; at least monthly at other times.	Gamma isotopic and I-131 analysis of each sample.
b. Fish	2 locations.	Semi-annual. One sample of available species.	Gamma isotopic analysis on edible portions.
c. Food Products (Leafy Vegetables)	4 locations. 1. Three locations within 5 miles. 2. One control location.	Annually at time of harvest.	Gamma isotopic analysis and I-131 analysis on edible portion.

(a) Analysis frequency same as sampling frequency unless otherwise specified.

(b) Other dairies may be included as control station or for historical continuity. These would not be modified on basis of milch animal census.

**Sample locations are given on figures and tables in 1/2-ODC-2.03.

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ODCM CONTROLS: REMP-PROGRAM REQUIREMENTS

TABLE 3.12-2

REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

		REPORTING LEVELS			
ANALYSIS	WATER (pCi/l)	AIRBORNE PARTICULATE OR GASES (pCi/m^3)	FISH (pCi/kg, WET)	MILK (pCi/l	BROAD LEAF VEGETABLES (pCi/kg, WET)
H-3	2E+4[(a)]				
Mn-54	1E+3		3E+4		
Fe-59	4E+2		1E+4		
Co-58	1E+3		3E+4		
Co-60	3E+2		1E+4		
Zn-65	3E+2		2E+4		
Zr/Nb-95	4E+2				
I-131	2[(b)]	0.9		3	1E+2
Cs-134	30	10	1E+3	60	1E+3
Cs-137	50	20	2E+3	70	2E+3
Ba/La-140	2E+2			3E+2	

(a) For drinking water samples. This is a 40 CFR Part 141 value. If no drinking water pathway exists, a value of 3E+4 pCi/l may be used.

(b) If no drinking water pathway exists, a value of 20 pCi/l may be used.

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ODCM CONTROLS: REMP-PROGRAM REQUIREMENTS

TABLE 4.12-1

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

ANALYSIS	WATER (pCi/l)	AIRBORNE PARTICULATE OR GAS (pCi/m^3)	FISH (pCi/kg, WET)	MILK (pCi/l)	FOOD PRODUCTS (pCi/kg, WET)	SEDIMENT (pCi/kg, DRY)
Gross Beta	4	1E-2				
H-3	2000[d]					
Mn-54	15		130			
Fe-59	30		260			
Co-58,60	15		130			
Zn-65	30		260			
Zr-95	30[c]					
Nb-95	15[c]					
I-131	1[b]	7E-2		1	60	
Cs-134	15	5E-2	130	15	60	150
Cs-137	18	6E-2	150	18	80	180
Ba-140	60[c]			60		
La-140	15[c]			15		

TABLE 4.12-1 (continued)

TABLE NOTATION

(a) The LLD is the smallest concentration of radioactive material in a sample that will be detected with 95% probability with 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system (which may include radiochemical separation):

$$LLD = \frac{4.66\ Sb}{(E)(V)(2.22)(Y)\exp(-\lambda\Delta T)}$$

where:

LLD is the lower limit of detection as defined above (as pCi 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 transformation);

V is the sample size (in units of mass or volume);

2.22 is the number of transformations per minute per picocurie;

Y is the fractional radiochemical yield (when applicable);

λ is the radioactive decay constant for the particular radionuclide;

ΔT is the elapsed time between sample collection (or end of the sample collection period) and time of counting (for environmental samples, not plant effluent samples).

The value of S_b used in the calculation of the LLD for a detection system shall be based on the actual observed variance of the background counting rate or of the counting rate of the blank samples (as appropriate) rather than on an unverified theoretically predicted variance. In calculating the LLD for a radionuclide determined by gamma-ray spectrometry, the background shall include the typical contributions of other radionuclides normally present in the samples (e.g., potassium-40 in milk samples). Typical values of E, V, Y and ΔT should be used in the calculations.

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ODCM CONTROLS: REMP-PROGRAM REQUIREMENTS

TABLE 4.12-1 (continued)

TABLE NOTATION

The LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as a posteriori (after the fact) limit for a particular measurement. Analyses shall be performed in such a manner that the stated LLD's will be achieved under routine conditions. Occasionally, background fluctuations, unavoidable small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLD's unachievable. In such cases, the contributing factors shall be identified and described in the Annual Radiological Environmental Report.

(b) If no drinking water pathway exists, a value of 15 pCi/l may be used.

(c) If parent and daughter are totaled, the most restrictive LLD should be applied.

(d) If no drinking water pathway exists, a value of 3000 pCi/l may be used.

(e) This list does not mean that only these nuclides are to be detected and reported. Other peaks which are measurable and identifiable, together with the above nuclides, shall be identified in the Annual Radiological Environmental Report.

ATTACHMENT R
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ODCM CONTROLS: REMP - LAND USE CENSUS

CONTROLS: RADIOLOGICAL ENVIRONMENTAL MONITORING - LAND USE CENSUS

3.12.2 In accordance with BV-1 and BV-2 Technical Specification 6.8.6b, Item 2, a land use census shall be conducted and shall identify the location of the nearest milk animal, the nearest residence, and the nearest garden of greater than 500 square feet producing broad leaf vegetation in each of the 16 meteorological sectors within a distance of five miles. For elevated releases as defined in Regulatory Guide 1.111, (Rev. 1), July, 1977, the land use census shall also identify the locations of all milk animals and all gardens of greater than 500 square feet producing fresh leafy vegetables in each of the 16 meteorological sectors within a distance of three miles.

Applicability: At all times.

Action:

a. With a land use census identifying a location(s) which yields a calculated dose or dose commitment greater than the values currently being calculated in ODCM SURVEILLANCE REQUIREMENT 4.11.2.3.1, prepare and submit to the Commission within 30 days, pursuant to 10 CFR 20.2203(a)(2)(v) and 10 CFR 50.4(b)(1), a Special Report, which identifies the new location(s).

b. With a land use census identifying a milk animal location(s) which yields a calculated dose or dose commitment (via the same exposure pathway) 20% greater than at a location from which samples are currently being obtained in accordance with ODCM CONTROL 3.12.1 prepare and submit to the Commission within 30 days, pursuant to 10 CFR 20.2203(a)(2)(v) and 10 CFR 50.4(b)(1), a Special Report, which identifies the new location. The new location shall be added to the radiological environmental monitoring program within 30 days, if possible. The milk sampling program shall include samples from the three active milk animal locations, having the highest calculated dose or dose commitment. Any replaced location may be deleted from this monitoring program after October 31 of the year in which this land use census was conducted.

c. The provisions of ODCM CONTROL 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.12.2.1 The land use census shall be conducted at least once per 12 months between the dates of June 1 and October 1 using that information which will provide the best results, such as by a door-to-door survey*, aerial survey, or by consulting local agriculture authorities.

* Confirmation by telephone is equivalent to door-to-door.

ATTACHMENT S
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ODCM CONTROLS: REMP - INTERLABORATORY COMPARISON PROGRAM

CONTROLS: RADIOLOGICAL ENVIRONMENTAL MONITORING - INTERLABORATORY COMPARISON PROGRAM

3.12.3 In accordance with BV-1 and BV-2 Technical Specification 6.8.6b, Item 3, analyses shall be performed on radioactive materials supplied as part of an Interlaboratory Comparison Program.

Applicability:

At all times.

Action:

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 Report.

b. The provisions of ODCM CONTROL 3.0.3 are not applicable.

SURVEILLANCE REQUIREMENTS

4.12.3.1 The results of analyses performed as part of the above required Interlaboratory Comparison Program shall be included in the Annual Radiological Environmental Report.

ATTACHMENT T
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ODCM CONTROLS: ANNUAL REMP REPORT

CONTROLS: ANNUAL REMP REPORT

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT (3)

6.9.2 (old TS 6.9.1.10) The Annual Radiological Environmental Operating Report covering the operation of the unit during the previous calendar year shall be submitted before May 15 of each year. The report shall include summaries, interpretations, and analyses of trends of the results of the Radiological Environmental Monitoring Program for the reporting period. The material provided shall be consistent with the objectives outlined in the Offsite Dose Calculation Manual (ODCM) and in 10 CFR Part 50 Appendix I Sections IV.B.2, IV.B.3, and IV.C.

The annual radiological environmental reports shall include:

- Summaries, interpretations, and statistical evaluation of the results of the radiological environmental surveillance activities for the report period, including a comparison with pre-operational studies, operational controls (as appropriate), and previous environmental surveillance reports, and an assessment of the observed impacts of the plant operation on the environment.
- The results of the land use censuses required by ODCM CONTROL 3.12.2.
- If harmful effects or evidence of irreversible damage are detected by the monitoring, the report shall provide an analysis of the problem and a planned course of action to alleviate the problem.
- Summarized and tabulated results in the format of ODCM Control 6.9.1.10, Table 6.9-1 of all radiological environmental samples taken during the report period. In the event that some 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.
- A summary description of the radiological environmental monitoring program.
- A map of all sampling locations keyed to a table giving distances and directions from one reactor.
- The results of licensee participation in the Interlaboratory Comparison Program required by ODCM CONTROL 3.12.3.

(3) A single submittal may be made for a multiple unit site. The submittal should combine those sections that are common to all units at the station.

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ODCM CONTROLS: ANNUAL REMP REPORT

TABLE E:6.9-1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM SUMMARY

Name Of Facility ______________________ Docket No. __________

Location Of Facility ______________________ Reporting Period ________
(County, State)

MEDIUM OF PATHWAY SAMPLED (UNIT OF MEASUREMENT)	TYPE AND TOTAL NUMBER OF ANALYSES PERFORMED	LOWER LIMITS OF DETECTION[a] (LLD)	ALL INDICATOR LOCATIONS MEAN(F)[b] RANGE[b]	LOCATIONS WITH HIGHEST ANNUAL MEAN		CONTROL LOCATIONS MEAN(F)[b] RANGE[b]	NONROUTINE REPORTED MEASUREMENTS
				NAME DISTANCE AND DIRECTION	MEAN(F)[b] RANGE[b]		

[a] Nominal Lower limits of Detection (LLD) as defined in Table Notation [a] of Table 4.12-1 of ODCM CONTROL 3.11.1.1.
[b] Mean and range based upon detectable measurement only. Fraction of detectable measurement at specified locations is indicated in parenthesis (f).

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ODCM CONTROLS: ANNUAL RETS REPORTS

CONTROLS: ANNUAL RETS REPORT

ANNUAL RADIOACTIVE EFFLUENT RELEASE REPORT [(4)]

6.9.3 (old TS 6.9.1.11) The Annual Radioactive Effluent Release Report (ARERR) covering the operation of the unit during the previous year shall be submitted prior to May 1 of each year in accordance with 10 CFR 50.36a. The report shall include a summary of the quantities of radioactive liquid and gaseous effluents and solid waste released from the unit. The material provided shall be consistent with the objectives outlined in the ODCM and Process Control Program (PCP) and in conformance with 10 CFR 50.36a and 10 CFR Part 50, Appendix I Section IV.B.1.

This report is prepared and submitted in accordance with 1/2-ENV-01.05, and at a minimum, shall contain the following:

- A summary of the quantities of radioactive liquid and gaseous effluent and solid waste released from the unit as outlined in Regulatory Guide 1.21, Revision 1, June, 1974, "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," with data summarized on a quarterly basis following the format of Appendix B thereof.
- An assessment of radiation doses from the radioactive liquid and gaseous effluents released from the unit during each calendar quarter as outlined in Regulatory Guide 1.21. In addition, the unrestricted area boundary maximum noble gas gamma air and beta air doses shall be evaluated. The assessment of radiation doses shall be performed in accordance with this manual.
- Any licensee initiated changes to the ODCM made during the 12 month period.
- Any radioactive liquid or gaseous effluent monitoring instrumentation channels not returned to OPERABLE status within 30 days, and why the inoperability was not corrected in a timely manner. This applies to the liquid or gaseous effluent monitoring instrumentation channels required to be OPERABLE per ODCM CONTROLS 3.3.3.9 and 3.3.3.10.
- Any ODCM SURVEILLANCE REQUIREMENT deficiencies. This applies to monitoring, sampling and analysis and dose projection.
- The reasons when unusual circumstances result in LLD's higher than required by ODCM CONTROL 3.11.1.1, Table 4.11-1 and ODCM CONTROL 3.11.2.1, Table 4.11-2.

(4) A single submittal may be made for a multiple unit site. 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.

ATTACHMENT U
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ODCM CONTROLS: ANNUAL RETS REPORTS

CONTROLS: ANNUAL RETS REPORT (continued)

- The following information for each type of solid waste shipped offsite during the report period:

  - container volume
  - total curie quantity (determined by measurement or estimate)
  - principal radionuclides (determined by measurement or estimate)
  - type of waste (e.g., spent resin, compacted dry waste, evaporator bottoms)
  - type of container (e.g., LSA, Type A, Type B, Large Quantity)
  - solidification agent (e.g., cement)
  - classification and other requirements specified by 10 CFR Part 61

- 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 of wind speed, wind direction, atmospheric stability, and precipitation (if measured) on magnetic tape, or in the form of joint frequency distributions of wind speed, wind direction, and atmospheric stability.

- 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.

- An assessment of the radiation doses from radioactive effluents to MEMBER(S) OF THE PUBLIC due to their activities inside the site boundary see 1/2-ODC-2.01 Figure 5.1 and 1/2-ODC-2.02 Figure 5-1 during the report period. All assumptions used in making these assessments (e.g., specific activity, exposure time, and location) shall be included in these reports. The assessment of radiation doses shall be performed in accordance with 1/2-ODC-2.04.

- An assessment of radiation doses to the likely most exposed real individual from reactor releases for the previous calendar year to show conformance with 40 CFR 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. The SKYSHINE Code (available from Radiation Shielding Information Center, (ORNL)) is acceptable for calculating the dose contribution from direct radiation due to N-16.

- If quantities of radioactive materials released during the reporting period are significantly above design objectives, the report must cover this specifically.