

# Beaver Valley Power Station

## Unit 1/2

1/2-ODC-3.02

**ODCM: Bases For ODCM Controls**

Document Owner

**Manager, Nuclear Environmental and Chemistry**

Revision Number	3
Level Of Use	General Skill Reference
Safety Related Procedure	Yes
Effective Date	02/11/15

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<b>1.0    <u>PURPOSE</u></b>			
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) [ITS] and T.S. 5.5.2. <sup>(3.1.5, 3.2.10)</sup>			
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. <sup>(3.1.6, 3.2.11)</sup>			
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. <sup>(3.1.7, 3.2.11)</sup>			
<b>2.0    <u>SCOPE</u></b>			
2.1    This procedure is applicable to all station personnel that are qualified to perform activities as described and referenced in this procedure.			
<b>3.0    <u>REFERENCES AND COMMITMENTS</u></b>			
<b>3.1    <u>References</u></b>			
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			

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3.1.10 CR 05-01169, Chemistry Action Plan for Transition of RETS, REMP and ODCM. CA-20, Revise procedure 1/2-ODC-3.02 to change document owner from Manager, Radiation Protection to Manager, Nuclear Environmental and Chemistry. CR 05-03306, Incorporated Improved Technical Specifications (ITS).

3.1.11 [ITS] T.S. 5.5.2

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.

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4.2 <u>Forms</u>			
4.2.1 None			
<b>5.0 <u>PRECAUTIONS AND LIMITATIONS</u></b>			
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.			
5.2 This procedure includes Improved Technical Specifications ([ITS]) information that is NOT applicable to current Technical Specifications ([CTS]) and [CTS] information that is NOT applicable in [ITS]. The [CTS] information shall be used prior to the [ITS] effective date. The [ITS] information shall be used on or after the [ITS] effective date.			
<b>6.0 <u>ACCEPTANCE CRITERIA</u></b>			
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. <sup>(3.2.10)</sup>			
6.1.1 All changes to this procedure shall be prepared in accordance with 1/2-ADM-0100 <sup>(3.1.8)</sup> and 1/2-ADM-1640. <sup>(3.1.4)</sup>			
6.1.2 All changes to this procedure shall be reviewed and approved in accordance with 1/2-ADM-0101 <sup>(3.1.9)</sup> and 1/2-ADM-1640. <sup>(3.1.4)</sup>			
<b>7.0 <u>PREREQUISITES</u></b>			
7.1 The user of this procedure shall be familiar with ODCM structure and content.			
<b>8.0 <u>PROCEDURE</u></b>			
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.			

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<p>8.5 See ATTACHMENT E for a complete description of Bases for ODCM Controls associated with the Radiological Environmental Monitoring Program (REMP).</p> <p>-END-</p>			

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ATTACHMENT A

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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.<sup>(3.2.9)</sup>

  

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.<sup>(3.2.1, 3.2.2)</sup>

  

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.<sup>(3.2.1, 3.2.2)</sup>

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### 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 (20.1001-20-2402), 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.<sup>(3.2.1, 3.2.2)</sup>

#### 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 procedure 1/2-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.<sup>(3.1.1, 3.2.2, 3.2.3, 3.2.5, 3.2.7, 3.2.8)</sup>

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.

#### 3/4.11.1.3 LIQUID WASTE TREATMENT SYSTEM



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### BASES FOR ODCM CONTROLS: LIQUID EFFLUENTS

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.<sup>(3.2.2)</sup>

#### 3/4.11.1.4 LIQUID HOLDUP TANKS

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.

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### 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 2, 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 2 of 10 CFR Part 20 (10 CFR Part 20.1301). 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 dose limit in any unrestricted area from external sources, exclusive of the dose contributions from patients administered radioactive material and released in accordance with § 35.75, does not exceed 2 mrem in any one hour.

Previous 10 CFR Part 20.106(b) was incorporated into the Improved Standard Technical Specification, section 5.5.2 and still requires compliance. 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  $\leq 500$  mrem/year to the total body or to  $\leq 3,000$  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  $\leq 1,500$  mrem/year.<sup>(3.2.1)</sup>

#### 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

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## BASES FOR ODCM CONTROLS: GASEOUS EFFLUENTS

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.<sup>(3.1.2, 3.2.2, 3.2.5, 3.2.6, 3.2.8)</sup>

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.<sup>(3.2.2)</sup>

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.<sup>(3.1.2, 3.2.2, 3.2.6, 3.2.7)</sup>

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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.<sup>(3.1.2, 3.2.2)</sup>

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.

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#### 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 mrem to the whole body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrem. For sites containing up to 4 reactors, it is highly unlikely 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)

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### 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.<sup>(3.1.3, 3.2.3)</sup>

#### 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.<sup>(3.1.3, 3.2.2)</sup>

#### 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.<sup>(3.1.3)</sup>