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OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
ANALYSIS/MODEL COVER SHEET

1. QA: QA
Page: 1 of 45

Complete Only Applicable Items

2. Analysis Engineering
 Performance Assessment
 Scientific

3. Model Conceptual Model Documentation
 Model Documentation
 Model Validation Documentation

4. Title:
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OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
ANALYSIS/MODEL REVISION RECORD

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Rev. 00

Initial issue.

EXECUTIVE SUMMARY

The objective of this analysis and model report (AMR) is to develop the Biosphere Dose Conversion Factors (BDCFs) for non-disruptive performance after permanent closure of the potential repository. It is part of the efforts for the development of biosphere Process Model Report (PMR), and the output of this analysis, i.e. the BDCFs, will be used in the Total System Performance Assessment (TSPA) to determine the potential radiation dose from the proposed repository to humans.

The analysis takes the input data from other supporting AMRs and uses qualified software, GENII-S, to generate the BDCFs. The BDCFs are calculated for two categories: the Reasonable Representation and the Bounding Representation. For the Reasonable Representation analysis, stochastic runs are performed to propagate the uncertainties of input parameters into the output BDCFs, whereas for the Bounding Representation analysis, the conservative bounding values are used as input to generate the BDCFs as deterministic values.

A CD-ROM containing input and output files is part of this document as an attachment.

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1. PURPOSE

The purpose of this analysis and model report (AMR) is to develop the Biosphere Dose Conversion Factors (BDCFs) for Non-disruptive performance after permanent closure of the potential repository. It is part of the efforts for the development of biosphere Process Model Report (PMR), and the output of this analysis, i.e. the BDCFs, will be used in the Total System Performance Assessment (TSPA) to determine the potential radiation dose from the proposed repository to humans.

The scope of this activity is to assess how radionuclides released from the proposed repository will be transported through a variety of environmental media, called pathways, to man resulting in a radiation exposure. Radionuclides in the repository will eventually break through the engineered and natural barriers and migrate through groundwater to the accessible environment, i.e., groundwater well heads. Once the radionuclides enter the accessible environment, they may be further transported through various pathways to man, and consequently cause radiation dose to man by inhalation, ingestion, or direct exposure. The release mechanism for the non-disruptive performance assessment is through the usage of contaminated groundwater. For each of the radionuclides of interest, the Total Effective Dose Equivalent (TEDE) from unit radionuclide concentration in groundwater (i.e., pCi/L) will be calculated using GENII-S software.

This analysis is conducted in accordance with Office of Civilian Radioactive Waste Management (OCRWM) Procedure AP-3.10Q, Revision 1, ICN 0, *Analyses and Models*, and an approved development plan (CRWMS M&O 1999a). The validity of the analysis results is limited by the validity of the software and input parameters used for the analysis. Section 3 documents the use of software in the analysis, and Section 4 provides detailed information on the input parameters.

2. QUALITY ASSURANCE

The analyses in this AMR have been determined to be Quality Affecting in accordance with CRWM M&O procedure QAP-2-0, *Conduct of Activities*, because the information will be used to support the Total System Performance Assessment (TSPA) and other quality-affecting activities. Therefore, this AMR is subject to the requirements of the *Quality Assurance Requirements and Description* (QARD) document (DOE 1998). This AMR is covered by the Activity Evaluation for *Scientific Investigation of Radiological Doses in the Biosphere* (CRWMS M&O 1999b).

The primary implementing procedure for this work is OCRWMS procedure AP-3.10Q, *Analyses and Models*. To perform this work, several other procedures are invoked by AP-3.10Q. These include the following:

AP-2.13Q, *Technical Product Development Planning*
AP-2.14Q, *Review of Technical Products*
AP-3.4Q, *Level 3 Change Control*
AP-3.14Q, *Transmittal of Input*
AP-3.15Q, *Managing Document Inputs*
AP-6.1Q, *Controlled Documents*
AP-17.1Q, *Record Source Responsibilities for Inclusionary Records*
AP-SI.1Q, *Software Management*
AP-SIII.2Q, *Qualification of Unqualified Data and the Documentation of Rationale for Accepted Data*
AP-SIII.3Q, *Submittal and Incorporation of Data to the Technical Data Management System*
AP-SIII.4Q, *Development, Review, Online Placement, and Maintenance of Individual Reference Information Base Data Items.*
YAP-SV.1Q, *Control of the Electronic Management of Data.*

Personnel performing work on this analysis were trained and qualified according to OCRWM procedures AP-2.1Q, *Indoctrination and Training of Personnel*, and AP-2.2Q, *Establishment and Verification of Required Education and Experience of Personnel*. Preparation of this analysis did not require the classification of items in accordance with CRWMS M&O procedure QAP-2-3, *Classification of Permanent Items*. This analysis is not a field activity. Therefore, a *Determination of Importance Evaluation* in accordance with CRWMS M&O procedure NLP-2-0 was not required.

No other procedures need to be created to perform this work scope.

3. COMPUTER SOFTWARE AND MODEL USAGE

The software used to perform this work is GENII-S version 1.485 (Leigh et al. 1993). GENII-S is a code for statistical and deterministic calculations of radiation doses to humans from radionuclides in the environment. The software is a qualified software (CSCI: 30034 V1.4.8.5) (CRWMS M&O 1998) and is appropriate for the calculations of the BDCFs to support the TSPA. The usage of the software is within the range of the validation in accordance with AP-SI.1Q. Validation of the biosphere model used by GENII-S will be performed as a separate effort. Until it is validated, the model is designated as TBV (TBV-3955).

GENII-S is controlled under the Configuration Management (CSCI: 30034 V1.4.8.5). The copy of GENII-S software used for this analysis was obtained from the Configuration Management and installed on an IBM compatible PC (CPU # 111210). The analysis was performed on this PC.

In addition to GENII-S software, industrial standard word processing software was used in this work. The word processing software is exempted from the requirements in AP-SI.1Q, *Software Management*. No software routines and macros were developed or used for this analysis.

4. INPUTS

4.1 DATA AND PARAMETERS

The calculation of the BDCFs relies on the outputs of other AMRs. Seven upstream AMRs were developed to provide input data for this analysis. Each of these AMRs provides a suite of related input data for the use of GENII-S input parameters. The outputs of these AMRs are available in the Technical Data Management System (TDMS). The following is a list of these input data with Data Tracking Numbers (DTNs):

- MO9911RIB00064.000. Environmental Transport Parameter Values for Dose Assessment. Submittal date: 11/12/1999.
- MO9911RIB00065.000. Parameter Values for Transfer Coefficients. Submittal date: 11/12/1999.
- MO9901RIB00061.000. Input Parameter Values for External and Inhalation Radiation Exposure Analysis. Submittal date: 10/07/1999. ACC: MOL19991110.0266.
- MO9912RIB00066.000. Parameter Values for Internal and External Dose Conversion Factors. Submittal date: 12/03/1999.
- MO9912SPAING06.033. Ingestion Exposure Pathway Parameters. Submittal date: 12/22/1999.
- MO9912SPACON05.001. Recommended Distribution-based and Fixed (Mean) Consumption Parameters for Locally Produced Food by Type and Tap Water. Submittal date: 12/13/1999.
- SN9912T0512299.001. Leaching Coefficients for GENII-S Code. Submittal date: 12/06/1999.

Input data from the upstream AMRs are provided in two categories: the Reasonable Representation and the Bounding Representation. The Reasonable Representation data are realistic values, whereas the Bounding Representation data are conservative bounding values. The two data sets will be used separately for calculating the BDCFs for the Reasonable Representation and the Bounding Representation, respectively.

4.1.1 Input Data for Reasonable Representation BDCFs

Two methods are available for inputting data into GENII-S software. The first one is through a series of interactive data input screens, and the second one is to modify input data files located in GENII-S directory. Table 1 lists all the input data that must be entered into GENII-S through the data input screens. The table is constructed in a way such that it closely represents the actual data input screens in the software. All of the input data used for the BDCF computations are identified either by the Data Tracking Number (DTN) or as criteria, which are documented in Subsection 4.2 of this document. Other data, even not used or not applicable for the analysis, are also listed in the Table with a brief explanation in the comment column so that an independent,

Table 1. GENII-S Input Parameters For Reasonable Representation BDCF Calculations

Parameter	Min. Value	Best Estimate	Max. Value	Distribution	Data Tracking Number / Comments
Fixed Data Group 1: Population/Soil/Scenario Data					
Total Population (0=Use POP.IN)		1			Criteria ¹
Population Scale Factor		1			Criteria
Dose Commitment Period (yr)		50			Criteria
Surface Soil Depth (cm)		15			Not used for stochastic runs
Surface Soil Density (kg/m ²)		225			Not used for stochastic runs
Deep Soil Density (kg/m ³)		1500			N/A ²
Roots in Upper Soil (Fraction)		1			Not used for stochastic runs
Roots in Deep Soil (Fraction)		0			Not used for stochastic runs
Air Rel Time Before Intake yr		0			N/A
H2O Rel Time Before Intake yr		Varies			Varies for each run. See Criteria
Fixed Data Group 2: Biotic Trans./Near Field Data					
					This data group is N/A
Fixed Data Group 3: External/Inhalation Exposure					
Chronic Plume Exposure (hr)		0			N/A
Acute Plume Exposure (hr/phr)		0			N/A
Inhalation Exposure (hr/yr)		0			Not used for stochastic runs
Resuspension Model Flag (0-2)		1			1 = Mass Loading Method
Mass Load(g/m3);Soil Depth(cm)		0			Not used for stochastic runs
Transit Time to Rec. Site (hr)		0			N/A
Swimming Exposure Time (hr)		0			N/A
Boating Exposure Time (hr)		0			N/A
Shoreline Exposure Time (hr)		0			N/A
Type of Shoreline Index (1-4)		1			N/A
H2O/Sed. Transfer (l/m2/yr)		0			N/A
Soil Exposure Time (hr)		0			Not used for stochastic runs
Home Irrigation Flag (0/1=N/Y)		1			Criteria
Irrigation Water Index (1-2)		1			1 = ground water. Criteria
Home Irrigation Rate (in/yr)		0			Not used for stochastic runs
Home Irriga. Duration (mo/yr)		12			Not used for stochastic runs

Parameter	Min. Value	Best Estimate	Max. Value	Distribution	Data Tracking Number / Comments
Fixed Data Group 4: Ingestion Exposure					
Food Production Option (0-3)		0			N/A
Food-Weighted Chi/Q (kg-s/m3)		0			N/A
Crop Resuspension Factor(1/m)		0			Not used for stochastic runs
Crop Deposition Velocity (m/s)		0.001			Not used for stochastic runs
Crop Interception Fraction (-)		0			Not used for stochastic runs
Exported Food Dose (0/1=N/Y)		0			N/A
Soil Ingestion Rate (mg/day)		50			Not used for stochastic runs
Swim H2O Ingestion Rate (l/hr)		0			N/A
Popul. Ingesting Aquatic Food		1			Criteria
Bioaccumulation Flag (0/1=N/Y)		0			0 = fresh water. Criteria
Popul. Drinking Contam Water		1			Criteria
Drink Water Source Index (0-3)		1			1 = ground water. Criteria
Drink Water Treated (0/1=N/Y)		0			Criteria
Drink Water Holdup Time (days)		0			Criteria
Drink Water Consumption (l/yr)		0			Not used for stochastic runs
Array Number 1: Aquatic Food Ingestion					
Fish Transit Time (hr)		0			N/A
Mollusc Transit Time (hr)		0			N/A
Crustacea Transit Time (hr)		0			N/A
Plants Transit Time (hr)		0			N/A
Fish Production (kg/yr)		0			N/A
Mollusc Production (kg/yr)		0			N/A
Crustacea Production (kg/yr)		0			N/A
Plants Production (kg/yr)		0			N/A
Fish Holdup (days)		0			N/A
Mollusc Holdup (days)		0			N/A
Crustacea Holdup (days)		0			N/A
Plants Holdup (days)		0			N/A
Fish Consumption (kg/yr)		0			Not used for stochastic runs
Mollusc Consumption (kg/yr)		0			N/A
Crustacea Consumption (kg/yr)		0			N/A
Plants Consumption (kg/yr)		0			N/A
Array Number 2: Terrestrial Food Ingestion					
Water Source Flag (0-2)		1			1 = ground water. Criteria

Parameter	Min. Value	Best Estimate	Max. Value	Distribution	Data Tracking Number / Comments
Leaf Vegetables Grow Time (days)		0			Not used for stochastic runs
Root Vegetables Grow Time (days)		0			Not used for stochastic runs
Fruit Grow Time (days)		0			Not used for stochastic runs
Grain Grow Time (days)		0			Not used for stochastic runs
Leaf Vegetables Irrn Rate (in/yr)		0			Not used for stochastic runs
Root Vegetables Irrn Rate (in/yr)		0			Not used for stochastic runs
Fruit Irrigation Rate (in/yr)		0			Not used for stochastic runs
Grain Irrigation Rate (in/yr)		0			Not used for stochastic runs
Leaf Vegetables Irrn Time (mo/yr)		0			Not used for stochastic runs
Root Vegetables Irrn Time (mo/yr)		0			Not used for stochastic runs
Fruit Irrigation Time (mo/yr)		0			Not used for stochastic runs
Grain Irrigation Time (mo/yr)		0			Not used for stochastic runs
Leaf Vegetables Yield (kg/m ²)		0			Not used for stochastic runs
Root Vegetables Yield (kg/m ²)		0			Not used for stochastic runs
Fruit Yield (kg/m ²)		0			Not used for stochastic runs
Grain Yield (kg/m ²)		0			Not used for stochastic runs
Leaf Veg Production (kg/yr)		0			N/A
Root Veg Production (kg/yr)		0			N/A
Fruit Production (kg/yr)		0			N/A
Grain Production (kg/yr)		0			N/A
Leaf Vegetables Holdup (days)		1			Not used for stochastic runs
Root Vegetables Holdup (days)		14			Not used for stochastic runs
Fruit Holdup (days)		14			Not used for stochastic runs
Grain Holdup (days)		14			Not used for stochastic runs
Leaf Veg. Consumption (kg/yr)		0			Not used for stochastic runs
Root Veg Consumption (kg/yr)		0			Not used for stochastic runs
Fruit Consumption (kg/yr)		0			Not used for stochastic runs
Grain Consumption (kg/yr)		0			Not used for stochastic runs
Array Number 3: Animal Products (Stored Feed)					
Water Source Flag (0-2)		1			1 = ground water. Criteria
Beef Consumption Rate (kg/yr)		0			Not used for stochastic runs
Poultry Consumption Rate (kg/yr)		0			Not used for stochastic runs
Milk Consumption Rate (l/yr)		0			Not used for stochastic runs
Eggs Consumption Rate (kg/yr)		0			Not used for stochastic runs
Beef Holdup (days)		20			Not used for stochastic runs
Poultry Holdup (days)		1			Not used for stochastic runs

Parameter	Min. Value	Best Estimate	Max. Value	Distribution	Data Tracking Number / Comments
Milk Holdup (days)		1			Not used for stochastic runs
Eggs Holdup (days)		1			Not used for stochastic runs
Beef Production (kg/yr)		0			N/A
Poultry Production (kg/yr)		0			N/A
Milk Production (kg/yr)		0			N/A
Eggs Production (kg/yr)		0			N/A
Beef - Water Fraction		1			100% contaminated water. Criteria
Poultry - Water Fraction		1			100% contaminated water. Criteria
Milk - Water Fraction		1			100% contaminated water. Criteria
Eggs - Water Fraction		1			100% contaminated water. Criteria
Beef Diet Fraction		0			Not used for stochastic runs
Poultry Diet Fraction		1			Not used for stochastic runs
Milk Diet Fraction		0			Not used for stochastic runs
Eggs Diet Fraction		1			Not used for stochastic runs
Beef - Grow Time (days)		0			N/A
Poultry - Grow Time (days)		75			Not used for stochastic runs
Milk - Grow Time (days)		0			N/A
Eggs - Grow Time (days)		75			Not used for stochastic runs
Beef - Irrigation Rate (in/yr)		0			N/A
Poultry - Irrigation Rate (in/yr)		80.37			Not used for stochastic runs
Milk - Irrigation Rate (in/yr)		0			N/A
Eggs - Irrigation Rate (in/yr)		80.37			Not used for stochastic runs
Beef - Irrigation Time (mo/yr)		0			N/A
Poultry - Irrigation Time (mo/yr)		4.9			Not used for stochastic runs
Milk - Irrigation Time (mo/yr)		0			N/A
Eggs - Irrigation Time (mo/yr)		4.9			Not used for stochastic runs
Beef - Feed Yield (kg/m3)		0			N/A
Poultry - Feed Yield (kg/m3)		0			Not used for stochastic runs
Milk - Feed Yield (kg/m3)		0			N/A
Eggs - Feed Yield (kg/m3)		0			Not used for stochastic runs
Beef - Storage (days)		0			N/A
Poultry - Storage (days)		14			Not used for stochastic runs
Milk - Storage (days)		0			N/A
Eggs - Storage (days)		14			Not used for stochastic runs
Array Number 4: Animal Products (Fresh Forage)					
Water Source Flag (0-2)		1			1 = ground water. Criteria
Beef - Dietary Fraction		1			Not used for stochastic runs
Milk - Dietary Fraction		1			Not used for stochastic runs
Beef - Grow Time (days)		0			Not used for stochastic runs
Milk - Grow Time (days)		0			Not used for stochastic runs
Beef - Irrigation Rate (in/yr)		94.66			Not used for stochastic runs

Parameter	Min. Value	Best Estimate	Max. Value	Distribution	Data Tracking Number / Comments
Milk – Irrigation Rate (in/yr)		94.66			Not used for stochastic runs
Beef – Irrigation Time (mo/yr)		12			Not used for stochastic runs
Milk – Irrigation Time (mo/yr)		12			Not used for stochastic runs
Beef – Feed Yield (kg/m ²)		0			Not used for stochastic runs
Milk – Feed Yield (kg/m ²)		0			Not used for stochastic runs
Beef – Feed Storage Time (days)		0			N/A
Milk – Feed Storage Time (days)		0			N/A
Array Number 5: Inventory –Basic Concs.					
Radionuclides					Varies for each run
Air (/l)		0			N/A
Surf. Soil (/unit)		0			N/A
Deep Soil (/unit)		0			N/A
Ground Water (/l)		1			Not used for stochastic runs
Surface Water (/l)		0			N/A
Variable Group 1: Population/Soil/Scenario Data					
Population Scale Factor		1			Criteria
Soil/Plant Transfer Scale Fac.	2.75E-02		3.64E+01	LogNormal ³	MO9911RIB00065.000
Animal Uptake Scale Factor	1.17E-01		8.51E+00	LogNormal	MO9911RIB00065.000
Human Dose Fac. Scale Factor		1		Fixed	Criteria
Surface Soil Depth (cm)		15		Fixed	MO9911RIB00064.000
Surface Soil Density (kg/m ²)		225		Fixed	MO9911RIB00064.000
Deep Soil Density (kg/m ³)		1500			N/A
Roots in Upper Soil (Fraction)		1		Fixed	MO9911RIB00064.000
Roots in Deep Soil (Fraction)		0		Fixed	MO9911RIB00064.000
Variable Group 2: Biotic Trans./Near Field Data					
					This data group is N/A
Variable Group 3: External/Inhalation Exposure					
Chronic Plume Exposure (hr)		0			N/A
Acute Plume Exposure (hr/phr)		0			N/A
Inhalation Exposure (hr/yr)		3918.5		Fixed	MO9910RIB00061.000
Mass Load(g/m3);Soil Depth(cm)	7.4E-07		6.4E-05	LogNormal	MO9910RIB00061.000
Transit Time to Rec. Site (hr)		0			N/A
Swimming Exposure Time (hr)		0			N/A
Boating Exposure Time (hr)		0			N/A
Shoreline Exposure Time (hr)		0			N/A

Parameter	Min. Value	Best Estimate	Max. Value	Distribution	Data Tracking Number / Comments
Type of Shoreline Index (1-4)		1			N/A
H2O/Sed. Transfer (l/m2/yr)		0			N/A
Soil Exposure Time (hr)		827		Fixed	MO9910RIB00061.000
Home Irrigation Rate (in/yr)	52		87	Uniform	MO9910RIB00061.000
Home Irriga. Duration (mo/yr)		12		Fixed	MO9910RIB00061.000
Variable Group 4: Ingestion Exposure					
Food-Weighted Chi/Q (kg-s/m3)		0			N/A
Crop Resuspension Factor(1/m)	9.6E-12		7.2E-10	LogNormal	MO9911RIB00064.000
Crop Deposition Velocity (m/s)		0.001		Fixed	MO9911RIB00064.000
Crop Interception Fraction (-)	0.044		0.474	Normal ⁴	MO9912SPAING06.033
Soil Ingestion Rate (mg/day)		50		Fixed	MO9911RIB00064.000
Swim H2O Ingestion Rate (l/hr)		0			N/A
Drink Water Holdup Time (days)		0			Criteria
Drink Water Consumption (l/yr)		752.8		Fixed	MO9912SPACON05.001
Variable Group 5: Aquatic Food Ingestion					
Fish Transit Time (hr)		0			N/A
Mollusc Transit Time (hr)		0			N/A
Crustacea Transit Time (hr)		0			N/A
Plants Transit Time (hr) -		0			N/A
Fish Production (kg/yr)		0			N/A
Mollusc Production (kg/yr)		0			N/A
Crustacea Production (kg/yr)		0			N/A
Plants Production (kg/yr)		0			N/A
Fish Holdup (days)		0			N/A
Mollusc Holdup (days)		0			N/A
Crustacea Holdup (days)		0			N/A
Plants Holdup (days)		0			N/A
Fish Consumption (kg/yr)		0.47		Fixed	
Mollusc Consumption (kg/yr)		0			N/A
Crustacea Consumption (kg/yr)		0			N/A
Plants Consumption (kg/yr)		0			N/A
Variable Group 6: Terrestrial Food Ingestion					
Leaf Vegetables Grow Time (days)	45	64.5	75	Triangular	MO9912SPAING06.033
Root Vegetables Grow Time (days)	70		98	Uniform	MO9912SPAING06.033
Fruit Grow Time (days)	88		184	Uniform	MO9912SPAING06.033

Parameter	Min. Value	Best Estimate	Max. Value	Distribution	Data Tracking Number / Comments
Grain Grow Time (days)	75		244	Uniform	MO9912SPAING06.033
Leaf Vegetables Irr Rate (in/yr)	28.17	42.11	80.37	Triangular	MO9912SPAING06.033
Root Vegetables Irr Rate (in/yr)	47.34		51.58	Uniform	MO9912SPAING06.033
Fruit Irrigation Rate (in/yr)	30		45.37	Uniform	MO9912SPAING06.033
Grain Irrigation Rate (in/yr)	55.85		80.37	Uniform	MO9912SPAING06.033
Leaf Vegetables Irr Time (mo/yr)	2	3.2	4.9	Triangular	MO9912SPAING06.033
Root Vegetables Irr Time (mo/yr)	3.2		4.6	Uniform	MO9912SPAING06.033
Fruit Irrigation Time (mo/yr)	2.9		6.0	Uniform	MO9912SPAING06.033
Grain Irrigation Time (mo/yr)	4.9		8.0	Uniform	MO9912SPAING06.033
Leaf Vegetables Yield (kg/m ²)	0.59	1.82	4.1	Triangular	MO9912SPAING06.033
Root Vegetables Yield (kg/m ²)	1.73	4.32	5.86	Triangular	MO9912SPAING06.033
Fruit Yield (kg/m ²)	1.57		2.25	Uniform	MO9912SPAING06.033
Grain Yield (kg/m ²)	0.33		0.78	Uniform	MO9912SPAING06.033
Leaf Veg Production (kg/yr)		0			N/A
Root Veg Production (kg/yr)		0			N/A
Fruit Production (kg/yr)		0			N/A
Grain Production (kg/yr)		0			N/A
Leaf Vegetables Holdup (days)		1		Fixed	MO9912SPAING06.033
Root Vegetables Holdup (days)		14		Fixed	MO9912SPAING06.033
Fruit Holdup (days)		14		Fixed	MO9912SPAING06.033
Grain Holdup (days)		14		Fixed	MO9912SPAING06.033
Leaf Veg. Consumption (kg/yr)		15.14		Fixed	MO9912SPACON05.001
Root Veg Consumption (kg/yr)		7.81		Fixed	MO9912SPACON05.001
Fruit Consumption (kg/yr)		15.57		Fixed	MO9912SPACON05.001
Grain Consumption (kg/yr)		0.48		Fixed	MO9912SPACON05.001
Variable Group 7: Animal Product Consumption					
Beef Consumption Rate (kg/yr)		2.93		Fixed	MO9912SPACON05.001
Poultry Consumption Rate (kg/yr)		0.8		Fixed	MO9912SPACON05.001
Milk Consumption Rate (l/yr)		4.14		Fixed	MO9912SPACON05.001
Eggs Consumption Rate (kg/yr)		6.68		Fixed	MO9912SPACON05.001
Beef Holdup (days)		20		Fixed	MO9912SPAING06.033
Poultry Holdup (days)		1		Fixed	MO9912SPAING06.033
Milk Holdup (days)		1		Fixed	MO9912SPAING06.033
Eggs Holdup (days)		1		Fixed	MO9912SPAING06.033
Beef Production (kg/yr)		0			N/A
Poultry Production (kg/yr)		0			N/A
Milk Production (kg/yr)		0			N/A
Eggs Production (kg/yr)		0			N/A

Parameter	Min. Value	Best Estimate	Max. Value	Distribution	Data Tracking Number / Comments
Beef Contam. Water (Fract.)		1			100% contaminated water. Criteria
Poultry Contam. Water (Fract.)		1			100% contaminated water. Criteria
Milk Contam. Water (Fract.)		1			100% contaminated water. Criteria
Eggs Contam. Water (Fract.)		1			100% contaminated water. Criteria
Variable Group 8: Stored Feed Data					
Beef Diet Fraction		0			N/A
Poultry Diet Fraction		1		Fixed	MO9912SPAING06.033
Milk Diet Fraction		0			N/A
Eggs Diet Fraction		1		Fixed	MO9912SPAING06.033
Beef – Grow Time (days)		0			N/A
Poultry – Grow Time (days)		75		Fixed	MO9912SPAING06.033
Milk – Grow Time (days)		0			N/A
Eggs – Grow Time (days)		75		Fixed	MO9912SPAING06.033
Beef – Irrigation Rate (in/yr)		0			N/A
Poultry – Irrigation Rate (in/yr)		80.37		Fixed	MO9912SPAING06.033
Milk – Irrigation Rate (in/yr)		0			N/A
Eggs – Irrigation Rate (in/yr)		80.37		Fixed	MO9912SPAING06.033
Beef – Irrigation Time (mo/yr)		0			N/A
Poultry – Irrigation Time (mo/yr)		4.9		Fixed	MO9912SPAING06.033
Milk – Irrigation Time (mo/yr)		0			N/A
Eggs – Irrigation Time (mo/yr)		4.9		Fixed	MO9912SPAING06.033
Beef – Feed Yield (kg/m3)		0			N/A
Poultry – Feed Yield (kg/m3)	0.59		0.78	Uniform	MO9912SPAING06.033
Milk – Feed Yield (kg/m3)		0			N/A
Eggs – Feed Yield (kg/m3)	0.59		0.78	Uniform	MO9912SPAING06.033
Beef – Storage (days)		0			N/A
Poultry – Storage (days)		14		Fixed	MO9912SPAING06.033
Milk – Storage (days)		0			N/A
Eggs – Storage (days)		14		Fixed	MO9912SPAING06.033
Variable Group 9: Fresh Forage Data					
Beef – Dietary Fraction		1		Fixed	MO9912SPAING06.033
Milk – Dietary Fraction		1		Fixed	MO9912SPAING06.033
Beef – Grow Time (days)	46	47	135	Triangular	MO9912SPAING06.033
Milk – Grow Time (days)	46	47	135	Triangular	MO9912SPAING06.033
Beef – Irrigation Rate (in/yr)		94.66		Fixed	MO9912SPAING06.033
Milk – Irrigation Rate (in/yr)		94.66		Fixed	MO9912SPAING06.033
Beef – Irrigation Time (mo/yr)		12		Fixed	MO9912SPAING06.033
Milk – Irrigation Time (mo/yr)		12		Fixed	MO9912SPAING06.033

Parameter	Min. Value	Best Estimate	Max. Value	Distribution	Data Tracking Number / Comments
(mo/yr)					
Beef – Feed Yield (kg/m ²)	0.25		1.15	Uniform	MO9912SPAING06.033
Milk – Feed Yield (kg/m ²)	0.25		1.15	Uniform	MO9912SPAING06.033
Beef – Feed Storage Time (days)		0			N/A
Milk – Feed Storage Time (days)		0			N/A
Variable Group 10 – 14: Basic Concs.					
Radionuclides					Varies for each run. See Criteria
Air (l)					N/A
Surf. Soil (/unit)					N/A
Deep Soil (/unit)					N/A
Ground Water (l)		1		Fixed	Criteria
Surface Water (l)					N/A

- Note:
1. See Section 4.2, Criteria.
 2. N/A = Not applicable for the scenario in this analysis.
 3. For LogNormal distribution, Min.=0.1 percentile, Max.=99.9 percentile.
 4. For Normal distribution, Min.=0.1 percentile, Max.=99.9 percentile.

qualified person can use the table to navigate through the software's data input screens to reproduce the analysis.

In addition to the interactive data input, four data files in GENII-S directory are modified to accommodate the results of the site-specific studies in GENII-S input parameters. The original names for these four files are BIOAC1.DAT, DEFAULT.IN, FTRANS.DAT, and GRDF.DAT, and they are renamed, as indicated below, after the modifications.

BIOAC1.DAT is a bioaccumulation library file. It contains the factors used to relate the concentrations of radionuclides in aquatic biota to the concentrations of radionuclides in water. Figure 1 lists the modified BIOAC1.DAT, which is renamed as BIOAC_RR.TXT, for the Reasonable Representation BDCF calculations. The data that are relevant for this analysis are listed on the 6th column, fresh water fish, and are compiled from the AMR, Transfer Coefficient Analysis (ANL-MGR-MD-000008) (CRWMS M&O 1999f).

DEFAULT.IN is a file containing default values for various parameters needed in a GENII-S calculation. This file is always required to run GENII-S. The default values in this file can be changed by using an external text editor. Figure 2 lists the modified DEFAULT.IN, which is renamed as DEF_RR.TXT, for the Reasonable Representation BDCF calculations. The data that are relevant for this analysis are compiled from three AMRs, Environmental Transport Parameters Analysis (ANL-MGR-MD-000007) (CRWMS M&O 1999g), Input Parameter Values for External and Inhalation Radiation Exposure Analysis (ANL-MGR-MD-000001) (CRWMS M&O 1999e), and the AP-3.14Q Input Transmittal, Ingestion Exposure Pathway Parameters (MO9912SPAING06.033, submittal date: 12/22/1999).

FTRANS.DAT is the food transfer and soil leaching factor library. The food transfer factors relate concentrations of elements in soil to concentrations in farm products grown in that soil and concentrations in animal feed to concentrations in animal products. These data are compiled from the AMR, Transfer Coefficient Analysis (ANL-MGR-MD-000008) (CRWMS M&O 1999f). The soil leaching factors, compiled from the AP-3.14Q Input Transmittal, Leaching coefficients for GENII-S Code (SN9912T0512299.001, submittal date: 12/06/1999), are important parameters for determining radionuclide buildup in soil. Figure 3 lists the modified FTRANS.DAT, which is renamed as FTRANRR.TXT, for the Reasonable Representation BDCF calculations.

Bioaccumulation Factor Library for Reasonable Representation - (30-Aug-99)

Salt:	Fish	Crustacea	Molluscs	Plants	Fr:Fish	Crustacea	Molluscs	Plants	Cleanup
AC	30.0	1000.0	1000.0	1000.0	25.0	1000.0	1000.0	10000.0	0.7
AM	2500.0	360.0	290.0	2900.0	30.0	100.0	100.0	3000.0	0.7
C	20000.0	20000.0	20000.0	1800.0	50000.0	9000.0	9000.0	4500.0	1.0
CS	100.0	30.0	30.0	700.0	2000.0	500.0	500.0	1000.0	0.9
I	10.0	50.0	50.0	1500.0	40.0	100.0	100.0	300.0	0.8
MO	40.0	20.0	20.0	100.0	10.0	100.0	100.0	1000.0	0.9
NI	100.0	500.0	500.0	3000.0	100.0	500.0	500.0	500.0	0.2
NP	2500.0	10.0	150.0	6.0	30.0	30.0	30.0	300.0	0.7
PA	300.0	10.0	10.0	50.0	11.0	30.0	30.0	300.0	0.7
PU	1000.0	300.0	3000.0	3600.0	30.0	100.0	100.0	890.0	0.7
RA	950.0	100.0	100.0	1000.0	50.0	1000.0	1000.0	30000.0	0.7
SR	4.0	1.0	40.0	300.0	60.0	100.0	100.0	3000.0	0.2
TC	30.0	10.0	20.0	5000.0	20.0	100.0	100.0	5000.0	0.7
TH	600.0	1000.0	1000.0	2000.0	100.0	100.0	100.0	3000.0	0.7
U	50.0	10.0	30.0	1000.0	10.0	100.0	100.0	900.0	0.7
Y	20.0	1000.0	1000.0	300.0	30.0	1000.0	1000.0	5000.0	0.2

Figure 1. Listing of BIOAC_RR.TXT File

GENII Default Parameters for Reasonable Representation Cases (30-Aug-99)

```

INVENTORY PARAMETERS-----
0.037, 3.7E4, 3.7E7, 3.7E10, 1.0      NVU      Source input conversion
1.0, 0.15, 225.0                       SVU      Soil source conversion
ENVIRONMENTAL PARAMETERS-----
0.008                                    ABSHUM   Absolute humidity (kg/m3)
2                                          PRCNTI  Air dispersion conserv. flag
0.001                                    DPVRES  Deposition vel./resuspension
8.3E-11                                  LEAFRS  Leaf resuspension factor
2.0,2.0,3.0,0.8,0.8,0.8,1.0,0.8,1.0,1.5 BIOMAS  BIOMA2 Biomass (kg/m2)
0.259                                    DEFFR2  Interception frac./irrigate
15.0                                       SURCM   Depth of surface soil (cm)
225.0                                    SLDN    Surface soil density (kg/m2)
1.5E3                                    SSLDN   Soil density (kg/m3)
True                                       HARVST  Harvest removal considered?
50.0                                       SOLING  Soil ingested (mg/da)
14.0                                       WTIM    Weathering time (da)
1.0, 0.1, 0.1, 0.1                       TRANS  Translocation, plants
0.1, 0.1, 0.1, 0.1, 1.0, 1.0            TRANSA  Translocation, animal food
68.0, 0.12, 55.0, 0.12, 68.0, 55.0     CONSUM  Animal Consumption (kg/da)
50.0, 0.3, 60., 0.3                     DWATER  Animal drinking water (L/da)
0.0, 0.8, 1.0, 0.8                       FRACUT  Acute fresh forage by season
0.2, 0.3, 0.5, 1.0                       SHORWI  Shore width factors
0.02                                       INGWAT  Swim water ingested (L/hr)
25295.0                                    TCWS    H2O/sed. transfer (L/m2/yr)
0.4, 5.0, 4.0                             YELDET  BIOT: Veg. prod. (kg/m2/yr)
9.41E-4, 2*7.48E-4                       TOTEXC  BIOT: Excavation (m2/m3-yr)
1.0, 0.81, 0.19, 0.02, 0.008, 0.002,    EXCAV   BIOT: Frac. soil brought to
1.0, 0.9, 0.096, 0.006, 0.0005, 0.0005, surface from within the
1.0, 0.9, 0.096, 0.006, 0.0005, 0.0005 waste by animal excavation
266.2                                       RINH    Chronic breathing (cm3/sec)
330.0                                       RINHA   Acute breathing (cm3/sec)
10                                          NDIST   Number of distances
805.0, 2414.0, 4023.0, 5632.0, 7241.0,
12068.0, 24135.0, 40255.0, 56315.0,
72405.0                                    X        JF/chi/Q/pop grid dist. (m)
0.1, 0.25, 0.18, 0.91, 0.18, 0.91, 0.18, DRYFAC, DRYFA2 dry/wet ratio
0.91, 2*0.2
METABOLIC PARAMETERS-----
0.5, 50.0, 500.0                                    XDIV
0.5, 0.5, 0.95, 0.05, 0.8, 0.0, 0.0, 0.2, 0.0, ADJ
0.1, 0.9, 0.5, 0.5, 0.15, 0.4, 0.4, 0.05, 0.0,
0.01, 0.99, 0.01, 0.99, 0.05, 0.4, 0.4, 0.135, 0.015
DOSE PARAMETERS-----
0.25, 0.15, 0.12, 0.12, 0.03, 0.03, 5*0.06 WT Weighting factors
2.0                                       SI2I    Semi-infinite/inf

```

Figure 2. Listing of DEF_RR.TXT File

Food Transfer Factors for Reasonable Representation (8/30/99)										
Element	Dep Vel	Leafy	Root	Fruit	Grain	Beef	Poultry	Milk	Egg	Leaching
men	m/sec	Ueg	Ueg	--	--	day/kg	day/kg	day/L	day/kg	Factor
AC	1.0E-3	3.5E-3	3.5E-4	3.5E-4	3.5E-4	2.5E-5	4.0E-3	2.0E-5	2.0E-3	1.5E-03
AM	1.0E-3	2.0E-3	4.7E-4	4.1E-4	9.0E-5	2.0E-5	6.0E-3	2.0E-6	4.0E-3	3.6E-04
C	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	2.4E-04
CS	1.0E-3	1.3E-1	4.9E-2	2.2E-1	2.6E-2	5.0E-2	4.4E+0	8.0E-3	4.0E-1	2.4E-04
I	1.0E-2	3.4E-3	5.0E-2	5.0E-2	5.0E-2	7.0E-3	1.8E-2	1.0E-2	3.0E+0	5.9E-01
MO	1.0E-3	2.5E-1	6.0E-2	6.0E-2	6.0E-2	1.0E-3	1.9E-1	1.5E-3	9.0E-1	6.7E-02
NI	1.0E-3	2.8E-1	6.0E-2	6.0E-2	3.0E-2	5.0E-3	1.0E-3	1.6E-2	1.0E-1	1.7E-03
NP	1.0E-3	3.7E-2	1.7E-2	1.7E-2	2.7E-3	1.0E-3	4.0E-3	5.0E-6	2.0E-3	1.3E-01
PA	1.0E-3	2.5E-3	2.5E-4	2.5E-4	2.5E-4	5.0E-5	4.0E-3	5.0E-6	2.0E-3	1.1E-01
PU	1.0E-3	4.0E-4	2.0E-4	1.9E-4	2.6E-5	1.0E-5	3.0E-3	1.1E-6	8.0E-3	1.2E-03
RA	1.0E-3	8.0E-2	1.3E-2	6.1E-3	1.2E-3	9.0E-4	3.0E-2	1.3E-3	2.0E-5	1.4E-03
SR	1.0E-3	2.0E+0	1.2E+0	2.0E-1	2.0E-1	8.0E-3	8.0E-2	1.5E-3	3.0E-1	3.4E-02
TC	1.0E-3	4.0E+1	1.5E+0	1.5E+0	7.3E-1	1.0E-4	3.0E-2	1.0E-2	3.0E+0	2.8E+00
TH	1.0E-3	4.0E-3	3.0E-4	2.1E-4	3.4E-5	1.0E-4	4.0E-3	5.0E-6	2.0E-3	2.1E-04
U	1.0E-3	8.5E-3	1.4E-2	4.0E-3	1.3E-3	3.0E-4	1.2E+0	6.0E-4	1.0E+0	1.9E-02
Y	1.0E-3	1.5E-2	6.0E-3	6.0E-3	6.0E-3	1.0E-3	1.0E-2	2.0E-5	2.0E-3	4.0E-03

Figure 3. Listing of FTRANRR.TXT File

External dose factors for air submersion, water surface, soil surface, deep soil, and buried waste for different radionuclides are given in GRDF.DAT. This file is replaced by GRDFNEW.DAT, which is the output of the AMR, Dose Conversion Factor Analysis (ANL-MGR-MD-000002) (CRWMS M&O 1999h). The file GRDFNEW.DAT is listed in Figure 4.

n	FGR12 air,water,soil(15 CM) DCFs (Sv/yr per Bq/n) (25 Jul 99 MAW)					
	Air Submersion m3	Water Surface l	Soil 15 cm "m3"	Buried 0.15 m m3	Buried 0.5 m m3	Buried 1.0m m3
C 14	7.06E-12	0.00E+00	2.27E-15	0.00E+00	0.00E+00	0.00E+00
NI63	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR90	2.37E-10	0.00E+00	1.17E-13	0.00E+00	0.00E+00	0.00E+00
Y 90	5.99E-09	0.00E+00	3.78E-12	0.00E+00	0.00E+00	0.00E+00
MO93	7.95E-10	0.00E+00	9.97E-14	0.00E+00	0.00E+00	0.00E+00
NB93M	1.40E-10	0.00E+00	1.76E-14	0.00E+00	0.00E+00	0.00E+00
TC99	5.11E-11	0.00E+00	2.11E-14	0.00E+00	0.00E+00	0.00E+00
I 129	1.20E-08	0.00E+00	2.19E-12	0.00E+00	0.00E+00	0.00E+00
CS137	9.08E-07	0.00E+00	5.39E-10	0.00E+00	0.00E+00	0.00E+00
U 232	4.48E-10	0.00E+00	1.50E-13	0.00E+00	0.00E+00	0.00E+00
TH228	2.90E-09	0.00E+00	1.32E-12	0.00E+00	0.00E+00	0.00E+00
RA224	1.55E-08	0.00E+00	8.62E-12	0.00E+00	0.00E+00	0.00E+00
PB212	2.17E-07	0.00E+00	1.14E-10	0.00E+00	0.00E+00	0.00E+00
BI212	2.30E-06	0.00E+00	1.27E-09	0.00E+00	0.00E+00	0.00E+00
U 234	2.41E-10	0.00E+00	6.75E-14	0.00E+00	0.00E+00	0.00E+00
U 236	1.58E-10	0.00E+00	3.60E-14	0.00E+00	0.00E+00	0.00E+00
PA231	5.42E-08	0.00E+00	3.03E-11	0.00E+00	0.00E+00	0.00E+00
AC227	1.84E-10	0.00E+00	8.26E-14	0.00E+00	0.00E+00	0.00E+00
TH227	1.54E-07	0.00E+00	8.36E-11	0.00E+00	0.00E+00	0.00E+00
FR223	7.22E-08	0.00E+00	3.19E-11	0.00E+00	0.00E+00	0.00E+00
RA223	4.30E-07	0.00E+00	2.36E-10	0.00E+00	0.00E+00	0.00E+00
NP237	3.25E-08	0.00E+00	1.31E-11	0.00E+00	0.00E+00	0.00E+00
PA233	2.95E-07	0.00E+00	1.63E-10	0.00E+00	0.00E+00	0.00E+00
U 233	5.14E-10	0.00E+00	2.28E-13	0.00E+00	0.00E+00	0.00E+00
TH229	1.21E-07	0.00E+00	5.36E-11	0.00E+00	0.00E+00	0.00E+00
RA225	8.80E-09	0.00E+00	1.86E-12	0.00E+00	0.00E+00	0.00E+00
AC225	3.40E-07	0.00E+00	1.94E-10	0.00E+00	0.00E+00	0.00E+00
U 238	1.08E-10	0.00E+00	1.74E-14	0.00E+00	0.00E+00	0.00E+00
TH234	3.33E-08	0.00E+00	1.73E-11	0.00E+00	0.00E+00	0.00E+00
PA234	2.95E-06	0.00E+00	1.70E-09	0.00E+00	0.00E+00	0.00E+00
PU238	1.54E-10	0.00E+00	2.54E-14	0.00E+00	0.00E+00	0.00E+00
PU240	1.50E-10	0.00E+00	2.47E-14	0.00E+00	0.00E+00	0.00E+00
AM241	2.58E-08	0.00E+00	7.38E-12	0.00E+00	0.00E+00	0.00E+00
AM243	6.87E-08	0.00E+00	2.40E-11	0.00E+00	0.00E+00	0.00E+00
NP239	2.43E-07	0.00E+00	1.23E-10	0.00E+00	0.00E+00	0.00E+00
PU239	1.34E-10	0.00E+00	4.79E-14	0.00E+00	0.00E+00	0.00E+00

Figure 4. Listing of GRDFNEW.DAT File

4.1.2 Input Data for Bounding Representation BDCFs

The Bounding Representation analysis has similar input data requirements as the Reasonable Representation analysis. The data required for GENII-S software (through the interactive input screens) are given in Table 2.

Like the Reasonable Representation analysis, some files in GENII-S directory need to be modified to accommodate the results of the site-specific studies in GENII-S input parameters. The original names for these four files are BIOAC1.DAT, DEFAULT.IN, FTRANS.DAT, and GRDF.DAT. After modification, each of them is renamed as a different file, as indicated below.

BIOAC1.DAT is a bioaccumulation library file. It contains the factors used to relate the concentrations of radionuclides in aquatic biota to the concentrations of radionuclides in water. Figure 5 lists the modified BIOAC1.DAT, which is renamed as BIOAC_SC.TXT, for the Bounding Representation BDCF calculations. The data that are relevant for this analysis are listed on the 6th column, fresh water fish, and are compiled from the AMR, Transfer Coefficient Analysis (ANL-MGR-MD-000008) (CRWMS M&O 1999f).

Bioaccumulation Factor Library for Safety Cases - (30-Aug-99)

Salt:	Fish	Crustacea	Molluscs	Plants	Fr:Fish	Crustacea	Molluscs	Plants	Cleanup
AC	30.0	1000.0	1000.0	1000.0	330.0	1000.0	1000.0	10000.0	0.7
AM	2500.0	360.0	290.0	2900.0	250.0	100.0	100.0	3000.0	0.7
C	20000.0	20000.0	20000.0	1800.0	50000.0	9000.0	9000.0	4500.0	1.0
CS	100.0	30.0	30.0	700.0	15000.0	500.0	500.0	1000.0	0.9
I	10.0	50.0	50.0	1500.0	500.0	100.0	100.0	300.0	0.8
MO	40.0	20.0	20.0	100.0	10.0	100.0	100.0	1000.0	0.9
NI	100.0	500.0	500.0	3000.0	100.0	500.0	500.0	500.0	0.2
NP	2500.0	10.0	150.0	6.0	2500.0	30.0	30.0	300.0	0.7
PA	300.0	10.0	10.0	50.0	30.0	30.0	30.0	300.0	0.7
PU	1000.0	300.0	3000.0	3600.0	250.0	100.0	100.0	890.0	0.7
RA	950.0	100.0	100.0	1000.0	520.0	1000.0	1000.0	30000.0	0.7
SR	4.0	1.0	40.0	300.0	100.0	100.0	100.0	3000.0	0.2
TC	30.0	10.0	20.0	5000.0	78.0	100.0	100.0	5000.0	0.7
TH	600.0	1000.0	1000.0	2000.0	1000.0	100.0	100.0	3000.0	0.7
U	50.0	10.0	30.0	1000.0	50.0	100.0	100.0	900.0	0.7
Y	20.0	1000.0	1000.0	300.0	100.0	1000.0	1000.0	5000.0	0.2

Figure 5. Listing of BIOAC_SC.TXT File

DEFAULT.IN is a file containing default values for various parameters needed in a GENII-S calculation. This file is always required to run GENII-S. The default values in this file can be changed by using an external text editor. Figure 6 lists the modified DEFAULT.IN, which is renamed as DEF_SC.TXT, for the Bounding Representation BDCF calculations. The data that are relevant for this analysis are compiled from three AMRs, Environmental Transport Parameters Analysis (ANL-MGR-MD-000007) (CRWMS M&O 1999g), Input Parameter Values for External and Inhalation Radiation Exposure Analysis (ANL-MGR-MD-000001) (CRWMS M&O 1999e), and the AP-3.14Q Input Transmittal, Ingestion Exposure Pathway Parameters (MO9912SPAING06.033, submittal date: 12/22/1999).

Table 2. GENII-S Input Parameters For Bounding Representation BDCF Calculations

Parameter	Bounding Values	Data Tracking/Comments
Fixed Data Group 1: Population/Soil/Scenario Data		
Total Population(0=Use POP.IN)	1	Criteria ¹
Population Scale Factor	1	Criteria
Dose Commitment Period (yr)	50	Criteria
Surface Soil Depth (cm)	15	MO9911RIB00064.000
Surface Soil Density (kg/m ³)	180	MO9911RIB00064.000
Deep Soil Density (kg/m ³)	1500	N/A ²
Roots in Upper Soil (Fraction)	1	MO9911RIB00064.000
Roots in Deep Soil (Fraction)	0	MO9911RIB00064.000
Air Rel Time Before Intake yr	0	N/A
H2O Rel Time Before Intake yr	Varies	Varies for each run. See Criteria
Fixed Data Group 2: Biotic Trans./Near Field Data		
		This Data Group is N/A
Fixed Data Group 3: External/Inhalation Exposure		
Chronic Plume Exposure (hr)	0	N/A
Acute Plume Exposure (hr/phr)	0	N/A
Inhalation Exposure (hr/yr)	6353.5	MO9910RIB00061.000
Resuspension Model Flag (0-2)	1	1 = Mass Loading Method
Mass Load(g/m3);Soil Depth(cm)	6.4E-05	MO9910RIB00061.000
Transit Time to Rec. Site (hr)	0	N/A
Swimming Exposure Time (hr)	0	N/A
Boating Exposure Time (hr)	0	N/A
Shoreline Exposure Time (hr)	0	N/A
Type of Shoreline Index (1-4)	1	N/A
H2O/Sed. Transfer (l/m2/yr)	0	N/A
Soil Exposure Time (hr)	3947	MO9910RIB00061.000
Home Irrigation Flag (0/1=N/Y)	1	Criteria
Irrigation Water Index (1-2)	1	1 = ground water. Criteria
Home Irrigation Rate (in/yr)	109	MO9910RIB00061.000
Home Irriga. Duration (mo/yr)	12	MO9910RIB00061.000
Fixed Data Group 4: Ingestion Exposure		
Food Production Option (0-3)	0	N/A
Food-Weighted Chi/Q (kg-s/m3)	0	N/A
Crop Resuspension Factor(1/m)	1.4E-09	MO9911RIB00064.000
Crop Deposition Velocity (m/s)	0.1	MO9911RIB00064.000
Crop Interception Fraction (-)	0.474	MO9912SPAING06.033
Exported Food Dose (0/1=N/Y)	0	N/A
Soil Ingestion Rate (mg/day)	410	MO9911RIB00064.000
Swim H2O Ingestion Rate (l/hr)	0	N/A
Popul. Ingesting Aquatic Food	1	Criteria
Bioaccumulation Flag (0/1=N/Y)	0	0 = fresh water. Criteria
Popul. Drinking Contam Water	1	Criteria
Drink Water Source Index (0-3)	1	1 = ground water. Criteria
Drink Water Treated (0/1=N/Y)	0	Criteria
Drink Water Holdup Time (days)	0	Criteria
Drink Water Consumption (l/yr)	1487.45	MO9912SPACON05.001
Array Number 1: Aquatic Food Ingestion		
Fish Transit Time (hr)	0	N/A
Mollusc Transit Time (hr)	0	N/A
Crustacea Transit Time (hr)	0	N/A
Plants Transit Time (hr)	0	N/A

Parameter	Bounding Values	Data Tracking/Comments
Fish Production (kg/yr)	0	N/A
Mollusc Production (kg/yr)	0	N/A
Crustacea Production (kg/yr)	0	N/A
Plants Production (kg/yr)	0	N/A
Fish Holdup (days)	0	N/A
Mollusc Holdup (days)	0	N/A
Crustacea Holdup (days)	0	N/A
Plants Holdup (days)	0	N/A
Fish Consumption (kg/yr)	8.79	MO9912SPACON05.001
Mollusc Consumption (kg/yr)	0	N/A
Crustacea Consumption (kg/yr)	0	N/A
Plants Consumption (kg/yr)	0	N/A
Array Number 2: Terrestrial Food Ingestion		
Water Source Flag (0-2)	1	1 = ground water. Criteria
Leaf Vegetables Grow Time (days)	75	MO9912SPAING06.033
Root Vegetables Grow Time (days)	98	MO9912SPAING06.033
Fruit Grow Time (days)	184	MO9912SPAING06.033
Grain Grow Time (days)	244	MO9912SPAING06.033
Leaf Vegetables Irr Rate (in/yr)	80.37	MO9912SPAING06.033
Root Vegetables Irr Rate (in/yr)	51.58	MO9912SPAING06.033
Fruit Irrigation Rate (in/yr)	45.37	MO9912SPAING06.033
Grain Irrigation Rate (in/yr)	80.37	MO9912SPAING06.033
Leaf Vegetables Irr Time (mo/yr)	2.0	MO9912SPAING06.033
Root Vegetables Irr Time (mo/yr)	3.2	MO9912SPAING06.033
Fruit Irrigation Time (mo/yr)	2.9	MO9912SPAING06.033
Grain Irrigation Time (mo/yr)	4.9	MO9912SPAING06.033
Leaf Vegetables Yield (kg/m ²)	0.59	MO9912SPAING06.033
Root Vegetables Yield (kg/m ²)	1.73	MO9912SPAING06.033
Fruit Yield (kg/m ²)	1.57	MO9912SPAING06.033
Grain Yield (kg/m ²)	0.33	MO9912SPAING06.033
Leaf Veg Production (kg/yr)	0	N/A
Root Veg Production (kg/yr)	0	N/A
Fruit Production (kg/yr)	0	N/A
Grain Production (kg/yr)	0	N/A
Leaf Vegetables Holdup (days)	1	MO9912SPAING06.033
Root Vegetables Holdup (days)	14	MO9912SPAING06.033
Fruit Holdup (days)	14	MO9912SPAING06.033
Grain Holdup (days)	14	MO9912SPAING06.033
Leaf Veg. Consumption (kg/yr)	59.68	MO9912SPACON05.001
Root Veg Consumption (kg/yr)	29.86	MO9912SPACON05.001
Fruit Consumption (kg/yr)	97.69	MO9912SPACON05.001
Grain Consumption (kg/yr)	12.33	MO9912SPACON05.001
Array Number 3: Animal Products (Stored Feed)		
Water Source Flag (0-2)	1	1 = ground water. Criteria
Beef Consumption Rate (kg/yr)	53.11	MO9912SPACON05.001
Poultry Consumption Rate (kg/yr)	10.50	MO9912SPACON05.001
Milk Consumption Rate (l/yr)	100.36	MO9912SPACON05.001
Eggs Consumption Rate (kg/yr)	33.34	MO9912SPACON05.001
Beef Holdup (days)	20	MO9912SPAING06.033
Poultry Holdup (days)	1	MO9912SPAING06.033
Milk Holdup (days)	1	MO9912SPAING06.033
Eggs Holdup (days)	1	MO9912SPAING06.033
Beef Production (kg/yr)	0	N/A
Poultry Production (kg/yr)	0	N/A
Milk Production (kg/yr)	0	N/A

Parameter	Bounding Values	Data Tracking/Comments
Eggs Production (kg/yr)	0	N/A
Beef - Water Fraction	1	MO9912SPAING06.033
Poultry - Water Fraction	1	MO9912SPAING06.033
Milk - Water Fraction	1	MO9912SPAING06.033
Eggs - Water Fraction	1	MO9912SPAING06.033
Beef Diet Fraction	0	MO9912SPAING06.033
Poultry Diet Fraction	1	MO9912SPAING06.033
Milk Diet Fraction	0	MO9912SPAING06.033
Eggs Diet Fraction	1	MO9912SPAING06.033
Beef - Grow Time (days)	0	N/A
Poultry - Grow Time (days)	75	MO9912SPAING06.033
Milk - Grow Time (days)	0	N/A
Eggs - Grow Time (days)	75	MO9912SPAING06.033
Beef - Irrigation Rate (in/yr)	0	N/A
Poultry - Irrigation Rate (in/yr)	80.37	MO9912SPAING06.033
Milk - Irrigation Rate (in/yr)	0	N/A
Eggs - Irrigation Rate (in/yr)	80.37	MO9912SPAING06.033
Beef - Irrigation Time (mo/yr)	0	N/A
Poultry - Irrigation Time (mo/yr)	4.9	MO9912SPAING06.033
Milk - Irrigation Time (mo/yr)	0	N/A
Eggs - Irrigation Time (mo/yr)	4.9	MO9912SPAING06.033
Beef - Feed Yield (kg/m ³)	0	N/A
Poultry - Feed Yield (kg/m ³)	0.59	MO9912SPAING06.033
Milk - Feed Yield (kg/m ³)	0	N/A
Eggs - Feed Yield (kg/m ³)	0.59	MO9912SPAING06.033
Beef - Storage (days)	0	N/A
Poultry - Storage (days)	14	MO9912SPAING06.033
Milk - Storage (days)	0	N/A
Eggs - Storage (days)	14	MO9912SPAING06.033
Array Number 4: Animal Products (Fresh Forage)		
Water Source Flag (0-2)	1	1 = ground water. Criteria
Beef - Dietary Fraction	1	MO9912SPAING06.033
Milk - Dietary Fraction	1	MO9912SPAING06.033
Beef - Grow Time (days)	135	MO9912SPAING06.033
Milk - Grow Time (days)	135	MO9912SPAING06.033
Beef - Irrigation Rate (in/yr)	94.66	MO9912SPAING06.033
Milk - Irrigation Rate (in/yr)	94.66	MO9912SPAING06.033
Beef - Irrigation Time (mo/yr)	12	MO9912SPAING06.033
Milk - Irrigation Time (mo/yr)	12	MO9912SPAING06.033
Beef - Feed Yield (kg/m ²)	0.25	MO9912SPAING06.033
Milk - Feed Yield (kg/m ²)	0.25	MO9912SPAING06.033
Beef - Feed Storage Time (days)	0	N/A
Milk - Feed Storage Time (days)	0	N/A
Array Number 5: Inventory -Basic Concs.		
Radionuclides		Varies for each run
Air (l)	0	N/A
Surf. Soil (/unit)	0	N/A
Deep Soil (/unit)	0	N/A
Ground Water (l)	1	Criteria
Surface Water (l)	0	N/A

Note: 1. See Subsection 4.2, Criteria.
2. N/A = Not applicable for the scenario in this analysis.

GENII Default Parameters for Safety Cases (30-Aug-99)

```

INVENTORY PARAMETERS-----
0.037, 3.7E4, 3.7E7, 3.7E10, 1.0      NVU   Source input conversion
1.0, 0.15, 225.0                      SVU   Soil source conversion
ENVIRONMENTAL PARAMETERS-----
0.008                                  ABSHUM Absolute humidity (kg/m3)
2                                       PRCNTI Air dispersion conserv. flag
0.1                                    DPVRES Deposition vel./resuspension
1.4E-9                                 LEAFRS Leaf resuspension factor
1.5,2.0,0.7,0.4,0.8,0.8,0.8,0.8,0.7,0.7 BIOMAS BIOMA2 Biomass (kg/m2)
0.477                                  DEPF2  Interception frac./irrigate
15.0                                   SURCM  Depth of surface soil (cm)
180.0                                  SLDN   Surface soil density (kg/m2)
1.5E3                                  SSLDN  Soil density (kg/m3)
True                                     HARVST Harvest removal considered?
410.0                                  SOLING Soil ingested (mg/da)
14.0                                    WTIM   Weathering time (da)
1.0, 0.1, 0.1, 0.1                    TRANS  Translocation, plants
0.1, 0.1, 0.1, 0.1, 1.0, 1.0         TRANSA Translocation, animal food
68.0, 0.4, 73.0, 0.4, 68.0, 73.0     CONSUM Animal Consumption (kg/da)
75.0, 0.5, 160., 0.5                 DWATER Animal drinking water (L/da)
0.0, 0.8, 1.0, 0.8                   FRACUT Acute fresh forage by season
0.2, 0.3, 0.5, 1.0                   SHORWI Shore width factors
0.02                                    INGWAT Swim water ingested (L/hr)
25295.0                                TCWS   H2O/sed. transfer (L/m2/yr)
0.4, 5.0, 4.0                         YELDBT BIOT: Veg. prod. (kg/m2/yr)
9.41E-4, 2*7.48E-4                    TUTEXC BIOT: Excavation (m2/m3-yr)
1.0, 0.81, 0.19, 0.02, 0.008, 0.002, EXCAV  BIOT: Frac. soil brought to
1.0, 0.9, 0.096, 0.006, 0.0005, 0.0005 surface from within the
1.0, 0.9, 0.096, 0.006, 0.0005, 0.0005 waste by animal excavation
358.8                                   RINH   Chronic breathing (cm3/sec)
330.0                                   RINHA  Acute breathing (cm3/sec)
10                                       NDIST  Number of distances
805.0, 2414.0, 4023.0, 5632.0, 7241.0, X      JF/chi/Q/pop grid dist. (m)
12068.0, 24135.0, 40255.0, 56315.0,
72405.0
0.2, 0.38, 0.24, 0.93, 0.22, 0.93, 0.22, DRYFAC, DRYFA2 dry/wet ratio
0.93, 2*0.22
METABOLIC PARAMETERS-----
0.5, 50.0, 500.0                      XDIV
0.5, 0.5, 0.95, 0.05, 0.8, 0.0, 0.0, 0.2, 0.0, ADJ
0.1, 0.9, 0.5, 0.5, 0.15, 0.4, 0.4, 0.05, 0.0,
0.01, 0.99, 0.01, 0.99, 0.05, 0.4, 0.4, 0.135, 0.015
DOSE PARAMETERS-----
0.25, 0.15, 0.12, 0.12, 0.03, 0.03, 5*0.06 WT   Weighting factors
2.0                                       SIZI  Semi-infinite/inf

```

Figure 6. Listing of DEF_SC.TXT File

FTRANS.DAT is the food transfer and soil leaching factor library. The food transfer factors relate concentrations of elements in soil to concentrations in farm products grown in that soil and concentrations in animal feed to concentrations in animal products. These data are compiled from the AMR, Transfer Coefficient Analysis (ANL-MGR-MD-000008) (CRWMS M&O 1999f). The soil leaching factors, compiled from the AP-3.14Q Input Transmittal, Leaching Coefficients for GENII-S Code (SN9912T0512299.001, submittal date: 12/06/1999), are important parameters for determining radionuclide buildup in soil. Figure 7 lists the modified FTRANS.DAT, which is renamed as FTRANS.C.TXT, for the Bounding Representation BDCF calculations.

Food Transfer Factors for Safety Case (8/30/99)

Element	Dep Uel	Leafy Veg	Root Veg	Fruit	Grain	Beef	Poultry	Milk	Egg	Leaching
	m/sec			--	--	day/kg	day/kg	day/L	day/kg	Factor
AC	1.0E-3	3.5E-2	3.5E-3	3.5E-3	3.5E-3	1.0E-4	1.6E-2	8.0E-5	8.0E-3	1.5E-03
AM	1.0E-3	2.0E-2	4.7E-3	4.1E-3	9.0E-4	8.0E-5	2.4E-2	8.0E-6	1.6E-2	2.3E-06
C	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	0.0E+0	6.8E-05
CS	1.0E-3	1.3E+0	4.9E-1	2.2E+0	2.6E-1	2.0E-1	1.8E+1	3.2E-2	1.6E+0	6.8E-05
I	1.0E-2	3.4E-2	5.0E-1	5.0E-1	5.0E-1	2.8E-2	7.2E-2	4.0E-2	1.2E+1	8.4E-03
MO	1.0E-3	2.5E+0	6.0E-1	6.0E-1	6.0E-1	4.0E-3	7.6E-1	6.0E-3	3.6E+0	1.3E-02
NI	1.0E-3	2.8E+0	6.0E-1	6.0E-1	3.0E-1	2.0E-2	4.0E-3	6.4E-2	4.0E-1	1.9E-04
NP	1.0E-3	3.7E-1	1.7E-1	1.7E-1	2.7E-2	4.0E-3	1.6E-2	2.0E-5	8.0E-3	1.7E-03
PA	1.0E-3	2.5E-2	2.5E-3	2.5E-3	2.5E-3	2.0E-4	1.6E-2	2.0E-5	8.0E-3	1.1E-01
PU	1.0E-3	4.0E-3	2.0E-3	1.9E-3	2.6E-4	4.0E-5	1.2E-2	4.4E-6	3.2E-2	1.9E-05
RA	1.0E-3	8.0E-1	1.3E-1	6.1E-2	1.2E-2	3.6E-3	1.2E-1	5.2E-3	8.0E-5	3.2E-05
SR	1.0E-3	2.0E+1	1.2E+1	2.0E+0	2.0E+0	3.2E-2	3.2E-1	6.0E-3	1.2E+0	3.6E-03
TC	1.0E-3	4.0E+2	1.5E+1	1.5E+1	7.3E+0	4.0E-4	1.2E-1	4.0E-2	1.2E+1	4.2E-02
TH	1.0E-3	4.0E-2	3.0E-3	2.1E-3	3.4E-4	4.0E-4	1.6E-2	2.0E-5	8.0E-3	4.5E-06
U	1.0E-3	8.5E-2	1.4E-1	4.0E-2	1.3E-2	1.2E-3	4.8E+0	2.4E-3	4.0E+0	3.1E-04
Y	1.0E-3	1.5E-1	6.0E-2	6.0E-2	6.0E-2	4.0E-3	4.0E-2	8.0E-5	8.0E-3	4.0E-03

Figure 7. Listing of FTRANS.C.TXT File

External dose factors for air submersion, water surface, soil surface, deep soil, and buried waste for different radionuclides are given in GRDF.DAT. This file is replaced by GRDFNEW.DAT, which is the output of the AMR, Dose Conversion Factor Analysis (ANL-MGR-MD-000002) (CRWMS M&O 1999h). The file GRDFNEW.DAT, as listed in Figure 4 in Section 4.1.1, is used for both the Reasonable Representation and the Bounding Representation analyses.

4.2 CRITERIA

4.2.1 Assessment Scenario

The BDCFs developed in this analysis will be used in the TSPA for calculating the potential radiation dose to an individual who lives in the vicinity of Yucca Mountain. The assessment scenario is defined such that the calculated BDCFs reflect the characteristics of the critical group and can be incorporated into the TSPA for dose calculations. The following is a description of the assessment scenario.

An individual lives in the vicinity of Yucca Mountain and draws untreated ground water for drinking water supply. This individual also uses the ground water to irrigate crops and lawns

and raise livestock. It is assumed that the groundwater is contaminated by various radionuclides, as specified in the following section. As a result, this individual will be exposed to radiation resulting from ingestion of contaminated water, as well as locally produced food; inhalation of resuspended dust; and direct external exposure to contaminated soil. The BDCF is the radiation dose to this individual due to unit radionuclide concentration in groundwater for a radionuclide of interest. The ground water concentration unit used for this analysis is pCi/L, and the dose to be calculated is the Total Effective Dose Equivalent, or TEDE (mrem/yr). The TEDE is defined as the sum of the deep-dose equivalent (for external exposures) and the 50-year committed effective dose equivalent (for internal exposures) (10 CFR 20).

4.2.2 Radionuclides of Interest

The radionuclides of interest are defined by the Performance Assessment Operations (PAO) via an AP-3.14Q Input transmittal, *Radionuclides of Interest for the Development of BDCFs* (R&E-PA-99217.Tc) (CRWMS M&O 1999j). For the Non-disruptive event biosphere dose assessment, these radionuclides are C-14, Tc-99, I-129, Ac-227, Th-229, U-232, U-233, U-234, U-236, U-238, Np-237, Pu-238, Pu-239, Pu-240, Am-241, and Am-243. A BDCF will be generated for each of these radionuclides separately.

4.2.3 Prior Irrigation Time Periods

The prior irrigation time periods are the number of years that the land has been irrigated before the intake occurs. In order to use the BDCFs in the multiple realizations of the TSPA's RIP code to predict radiation dose from contaminated ground water to a receptor of interest, the Performance Assessment Operations (PAO) requested that a set of BDCFs be calculated for each of the radionuclides of interest at each of six prior irrigation time periods (PR-R&E-99251.R) (CRWMS M&O 1999k). These time periods are provided in Table 3.

4.3 CODES AND STANDARDS

There are no applicable standards at this time. The Nuclear Regulatory Commission has proposed regulatory standard (10 CFR 63 draft) for a potential repository at Yucca Mountain (see Federal Register for February 22, 1999, 64 FR 8640). Until the final rulemaking for 10 CFR 63 is completed, the interim guidance provided by DOE (Dyer 1999) is followed.

Table 3. Prior Irrigation Time Periods

Radionuclide	Period Number					
	1	2	3	4	5	6
Number of Years of Prior Irrigation for Reasonable Representation						
C-14	0	752	1674	2864	4537	7401
Tc-99	0	1	2	3	4	5
I-129	0	1	2	3	4	5
Ac-227	0	6	13	22	35	56
Th-229	0	858	1910	3269	5179	8448
U-232	0	9	21	36	57	93
U-233	0	9	21	36	57	93
U-234	0	9	21	36	57	93
U-236	0	9	21	36	57	93
U-238	0	9	21	36	57	93
Np-237	0	1	3	5	8	14
Pu-238	0	23	51	88	139	227
Pu-239	0	148	329	563	893	1456
Pu-240	0	148	329	563	893	1456
Am-241	0	114	253	432	685	1117
Am-243	0	511	1138	1947	3084	5031
Number of Years of Prior Irrigation for Bounding Representation						
C-14	0	1504	3346	5720	9066	-
Tc-99	0	4	10	17	26	43
I-129	0	22	49	83	131	214
Ac-227	0	6	13	22	35	56
Th-229	0	1930	4294	7340	11634	-
U-232	0	19	42	72	114	186
U-233	0	591	1315	2250	3565	5815
U-234	0	591	1315	2250	3565	5815
U-236	0	591	1315	2250	3565	5815
U-238	0	591	1315	2250	3565	5815
Np-237	0	105	233	398	631	1029
Pu-238	0	23	51	88	139	227
Pu-239	0	6329	14078	-	-	-
Pu-240	0	1719	3824	6537	10361	-
Am-241	0	114	253	432	685	1117
Am-243	0	1941	4317	7380	11697	-

5. ASSUMPTIONS

Not Applicable (N/A).

6. ANALYSIS

GENII-S is a successor to a Pacific Northwest Laboratories code, GENII. GENII, which is available from the Radiation Safety Information Computational Center (RSICC) as code CCC-601, was developed to incorporate the internal dosimetry models recommended by the International Commission on Radiological Protection, Publication 30 (ICRP-30) into the environmental pathway analysis models used at Hanford. GENII is a coupled system of seven programs and the associated data libraries that comprise the Hanford Dosimetry System (Generation II) to estimate potential radiation doses to individuals or populations from both routine and accidental releases. The programs analyze environmental contamination resulting from both far-field and near-field scenarios and calculate radiation doses to humans. GENII can be used in prospective dose calculations for purposes such as siting facilities, environmental impact statements, and safety analysis reports. GENII-S is essentially the GENII code implemented in a software shell, Sensitivity and Uncertainty analysis Shell (SUNS). As a result, GENII-S has the same core part of GENII with additional capability to perform Monte Carlo simulation. This added feature is a useful tool for identifying important model input parameters and evaluating uncertainty of model output.

The BDCFs are calculated using GENII-S software in this analysis. After the permanent closure of the potential repository, the engineered systems within the repository will eventually lose their abilities to contain radionuclide inventory, and the radionuclides will migrate through the geosphere and eventually enter the local water table moving toward inhabited areas. The primary release scenario is a groundwater well used for drinking water supply and irrigation, and this analysis takes this postulated releases and follows them through various pathways until they result in a dose to a receptor of interest. The pathways considered in this assessment are inhalation, ingestion, and direct exposure.

This analysis is divided in two categories: the Reasonable Representation and the Bounding Representation. Both categories use the same scenario but different input data, as described in Section 4 of this document. For the Reasonable Representation analysis, the corresponding input data are incorporated into the GENII-S software, and stochastic runs are performed to propagate the uncertainties of input parameters into the output BDCFs. The number of realizations is set to 130, which is the maximum that the software can perform due to the computing limitation.

For the Bounding Representation analysis, the conservative bounding values (i.e., the Bounding Representation input data) will be used as inputs to run the GENII-S software. Deterministic runs are conducted to calculate the conservative bounding BDCFs. Because each of the input parameters is presented as a conservative bounding value, uncertainty is not an applicable issue for the Bounding Representation analysis.

Since the software used in this analysis is qualified, the qualification status of the output BDCFs depends upon the qualification status of the input data. Until the input data are qualified, the BDCFs generated in this analysis have to be marked as To Be Verified (TBV).

Reasonable Representation

A BDCF is calculated for each of the radionuclides of interest at each of the prior irrigation time periods. The input and output files are named using the following conventions:

RRtXXXXX.*

The 1 st and 2nd space:	RR = Reasonable Representation
The 3rd space:	t = Prior irrigation time period, i.e., 1 to 6, as listed in Section 4.2.3
The 4 th to 8th space:	XXXXX = Radionuclides of interest, e.g., Np237, as listed in Section 4.2.2
Input file extension *:	* = ".flg", ".inp", ".pti", and ".vec"
Output file extension:	".rst" and ".out"

For each set of input data, the files with extension ".flg", ".inp", ".pti", and ".vec" are used by the GENII-S code to store the input data, and they must be used together for computer runs. For example, the input data files "RR1Np237.*" (a total of 4 files) are the input data set for calculating the Reasonable Representation BDCF for Np-237 at prior irrigation time period 1.

The output files has extension ".rst". For example, "RR1Np237.rst" contains the results of the stochastic run for the Reasonable Representation BDCF for Np-237 at prior irrigation time period 1. The ".rst" files will be used in the follow-on AMR analyses such as the sensitivity analysis, the distribution fit, and the BDCF abstraction AMRs. The ".out" files contain no data for stochastic runs. For the Reasonable Representation cases, a total of 96 BDCF data sets are generated as a result of this analysis, and summary results are provided in Section 7, Conclusions, of this document.

Bounding Representation

The Bounding Representation analysis is similar to the Reasonable Representation analysis. The input and output files are named using the following conventions:

SCtXXXXX.*

The 1 st and 2nd space:	SC = Bounding Representation
The 3rd space:	t = Prior irrigation time period, i.e., 1 to 6, as listed in Section 4.2.3
The 4 th to 8th space:	XXXXX = Radionuclides of interest, e.g., Np237, as listed in Section 4.2.2
Input file extension *:	* = ".flg", ".inp", ".pti", and ".vec"
Output file extension:	".out"

For each set of input data, the files with extension ".flg", ".inp", ".pti", and ".vec" are used by the GENII-S code to store the input data, and they must be used together for computer runs. For example, the input data files "SC1Np237.*" (a total of 4 files) are the input data set for calculating the Bounding Representation BDCF for Np-237 at prior irrigation time period 1.

The output files has extension ".out". For example, "SC1Np237.out" contains the results of the deterministic run for the Bounding Representation BDCF for Np-237 at prior irrigation time period 1. For the Bounding Representations, a total of 89 BDCFs are generated in this analysis, and the results are provided in Section 7, Conclusions, of this document.

7. CONCLUSIONS

The results of this analysis include computer input and output files. Due to the large volume of the data files, they are put on a CD-ROM as an attachment of this document. Attachment III provides a list of files stored on the CD-ROM. The BDCFs generated in this AMR are summarized in Table 4 and 5 for the Reasonable Representation and the Bounding Representation analyses, respectively.

Table 4. Summary Results of Reasonable Representation BDCFs

Radionuclide	Irrigation Period	Source File	TEDE	Standard Deviation
			mrem/yr per pCi/L ¹	
Ac-227	1	RR1AC227.RST	1.81E+01	3.08E+00
	2	RR2AC227.RST	1.81E+01	3.07E+00
	3	RR3AC227.RST	1.81E+01	3.07E+00
	4	RR4AC227.RST	1.82E+01	3.08E+00
	5	RR5AC227.RST	1.82E+01	3.08E+00
	6	RR6AC227.RST	1.82E+01	3.08E+00
Am-241	1	RR1AM241.RST	4.65E+00	7.88E-01
	2	RR2AM241.RST	4.74E+00	7.89E-01
	3	RR3AM241.RST	4.82E+00	7.92E-01
	4	RR4AM241.RST	4.90E+00	7.95E-01
	5	RR5AM241.RST	4.97E+00	7.97E-01
	6	RR6AM241.RST	5.04E+00	8.02E-01
Am-243	1	RR1AM243.RST	4.64E+00	7.87E-01
	2	RR2AM243.RST	5.29E+00	8.03E-01
	3	RR3AM243.RST	5.92E+00	8.53E-01
	4	RR4AM243.RST	6.50E+00	9.14E-01
	5	RR5AM243.RST	7.04E+00	9.78E-01
	6	RR6AM243.RST	7.50E+00	1.05E+00
C-14	1	RR1C14.RST	4.06E-03	2.48E-04
	2	RR2C14.RST	4.06E-03	2.48E-04
	3	RR3C14.RST	4.06E-03	2.48E-04
	4	RR4C14.RST	4.06E-03	2.48E-04
	5	RR5C14.RST	4.06E-03	2.48E-04
	6	RR6C14.RST	4.06E-03	2.48E-04
I-129	1	RR1I129.RST	3.61E-01	6.86E-02
	2	RR2I129.RST	3.62E-01	6.87E-02
	3	RR3I129.RST	3.62E-01	6.88E-02
	4	RR4I129.RST	3.62E-01	6.88E-02
	5	RR5I129.RST	3.62E-01	6.88E-02
	6	RR6I129.RST	3.62E-01	6.88E-02
Np-237	1	RR1NP237.RST	6.76E+00	1.15E+00
	2	RR2NP237.RST	6.77E+00	1.15E+00
	3	RR3NP237.RST	6.78E+00	1.15E+00

Radionuclide	Irrigation Period	Source File	TEDE	Standard Deviation
			mrem/yr per pCi/L ¹	
	4	RR4NP237.RST	6.79E+00	1.15E+00
	5	RR5NP237.RST	6.80E+00	1.15E+00
	6	RR6NP237.RST	6.82E+00	1.15E+00
Pu-238	1	RR1PU238.RST	4.11E+00	6.97E-01
	2	RR2PU238.RST	4.12E+00	6.98E-01
	3	RR3PU238.RST	4.14E+00	6.97E-01
	4	RR4PU238.RST	4.15E+00	6.97E-01
	5	RR5PU238.RST	4.16E+00	6.97E-01
	6	RR6PU238.RST	4.17E+00	6.97E-01
Pu-239	1	RR1PU239.RST	4.57E+00	7.74E-01
	2	RR2PU239.RST	4.66E+00	7.75E-01
	3	RR3PU239.RST	4.75E+00	7.75E-01
	4	RR4PU239.RST	4.84E+00	7.77E-01
	5	RR5PU239.RST	4.94E+00	7.79E-01
	6	RR6PU239.RST	5.03E+00	7.82E-01
Pu-240	1	RR1PU240.RST	4.56E+00	7.73E-01
	2	RR2PU240.RST	4.65E+00	7.74E-01
	3	RR3PU240.RST	4.74E+00	7.74E-01
	4	RR4PU240.RST	4.83E+00	7.76E-01
	5	RR5PU240.RST	4.92E+00	7.78E-01
	6	RR6PU240.RST	5.00E+00	7.80E-01
Tc-99	1	RR1TC99.RST	4.02E-03	1.60E-03
	2	RR2TC99.RST	4.07E-03	1.68E-03
	3	RR3TC99.RST	4.08E-03	1.68E-03
	4	RR4TC99.RST	4.08E-03	1.68E-03
	5	RR5TC99.RST	4.08E-03	1.68E-03
	6	RR6TC99.RST	4.08E-03	1.68E-03
Th-229	1	RR1TH229.RST	4.59E+00	7.95E-01
	2	RR2TH229.RST	6.71E+00	1.19E+00
	3	RR3TH229.RST	8.67E+00	1.84E+00
	4	RR4TH229.RST	1.04E+01	2.49E+00
	5	RR5TH229.RST	1.19E+01	3.07E+00
	6	RR6TH229.RST	1.31E+01	3.53E+00
U-232	1	RR1U232.RST	1.71E+00	2.91E-01
	2	RR2U232.RST	1.75E+00	2.91E-01
	3	RR3U232.RST	1.81E+00	2.92E-01
	4	RR4U232.RST	1.86E+00	2.94E-01
	5	RR5U232.RST	1.91E+00	2.95E-01
	6	RR6U232.RST	1.94E+00	2.96E-01
U-233	1	RR1U233.RST	3.77E-01	6.40E-02
	2	RR2U233.RST	3.79E-01	6.40E-02
	3	RR3U233.RST	3.81E-01	6.41E-02
	4	RR4U233.RST	3.83E-01	6.43E-02
	5	RR5U233.RST	3.85E-01	6.45E-02

Radionuclide	Irrigation Period	Source File	TEDE	Standard Deviation
			mrem/yr per pCi/L ¹	
	6	RR6U233.RST	3.88E-01	6.49E-02
U-234	1	RR1U234.RST	3.70E-01	6.28E-02
	2	RR2U234.RST	3.72E-01	6.29E-02
	3	RR3U234.RST	3.74E-01	6.29E-02
	4	RR4U234.RST	3.76E-01	6.32E-02
	5	RR5U234.RST	3.78E-01	6.33E-02
	6	RR6U234.RST	3.80E-01	6.36E-02
U-236	1	RR1U236.RST	3.51E-01	5.95E-02
	2	RR2U236.RST	3.53E-01	5.96E-02
	3	RR3U236.RST	3.55E-01	5.96E-02
	4	RR4U236.RST	3.56E-01	5.99E-02
	5	RR5U236.RST	3.58E-01	6.00E-02
	6	RR6U236.RST	3.60E-01	6.03E-02
U-238	1	RR1U238.RST	3.39E-01	5.81E-02
	2	RR2U238.RST	3.41E-01	5.81E-02
	3	RR3U238.RST	3.44E-01	5.82E-02
	4	RR4U238.RST	3.46E-01	5.84E-02
	5	RR5U238.RST	3.49E-01	5.85E-02
	6	RR6U238.RST	3.52E-01	5.89E-02

Note: 1. Computer outputs are in rem/yr per pCi/L.

Table 5. Summary Results of Bounding Representation BDCFs

Radionuclide	Irrigation Period	Source File	TEDE
			mrem/yr per pCi/L ¹
Ac-227	1	SC1AC227.OUT	2.30E+02
	2	SC2AC227.OUT	2.40E+02
	3	SC3AC227.OUT	2.40E+02
	4	SC4AC227.OUT	2.40E+02
	5	SC5AC227.OUT	2.40E+02
	6	SC6AC227.OUT	2.50E+02
Am-241	1	SC1AM241.OUT	5.80E+01
	2	SC2AM241.OUT	6.80E+01
	3	SC3AM241.OUT	7.40E+01
	4	SC4AM241.OUT	8.50E+01
	5	SC5AM241.OUT	9.10E+01
	6	SC6AM241.OUT	1.00E+02
Am-243	1	SC1AM243.OUT	5.70E+01
	2	SC2AM243.OUT	2.10E+02
	3	SC3AM243.OUT	3.70E+02
	4	SC4AM243.OUT	5.30E+02
	5	SC5AM243.OUT	7.20E+02
	6	-	-
C-14	1	SC1C14.OUT	3.60E-02
	2	SC2C14.OUT	3.60E-02
	3	SC3C14.OUT	3.60E-02
	4	SC4C14.OUT	3.60E-02
	5	SC5C14.OUT	3.60E-02
	6	- ²	-
I-129	1	SC1I129.OUT	1.40E+01
	2	SC2I129.OUT	2.00E+01
	3	SC3I129.OUT	2.60E+01
	4	SC4I129.OUT	3.20E+01
	5	SC5I129.OUT	3.80E+01
	6	SC6I129.OUT	4.40E+01
Np-237	1	SC1NP237.OUT	9.60E+01
	2	SC2NP237.OUT	1.60E+02
	3	SC3NP237.OUT	2.20E+02
	4	SC4NP237.OUT	2.90E+02
	5	SC5NP237.OUT	3.60E+02
	6	SC6NP237.OUT	4.30E+02
Pu-238	1	SC1PU238.OUT	5.10E+01
	2	SC2PU238.OUT	5.50E+01
	3	SC3PU238.OUT	5.50E+01
	4	SC4PU238.OUT	5.60E+01
	5	SC5PU238.OUT	5.60E+01
	6	SC6PU238.OUT	6.00E+01
Pu-239	1	SC1PU239.OUT	5.60E+01
	2	SC2PU239.OUT	4.30E+01

Radionuclide	Irrigation Period	Source File	TEDE
			mrem/yr per pCi/L ¹
	3	SC3PU239.OUT	7.40E+02
	4	-	-
	5	-	-
	6	-	-
Pu-240	1	SC1PU240.OUT	5.60E+01
	2	SC2PU240.OUT	1.60E+02
	3	SC3PU240.OUT	2.60E+02
	4	SC4PU240.OUT	3.60E+02
	5	SC5PU240.OUT	4.50E+02
	6	-	-
Tc-99	1	SC1TC99.OUT	1.00E+00
	2	SC2TC99.OUT	4.30E+00
	3	SC3TC99.OUT	8.40E+00
	4	SC4TC99.OUT	1.20E+01
	5	SC5TC99.OUT	1.50E+01
	6	SC6TC99.OUT	1.90E+01
Th-229	1	SC1TH229.OUT	5.90E+01
	2	SC2TH229.OUT	3.60E+02
	3	SC3TH229.OUT	6.50E+02
	4	SC4TH229.OUT	9.40E+02
	5	SC5TH229.OUT	1.20E+03
	6	-	-
U-232	1	SC1U232.OUT	2.50E+01
	2	SC2U232.OUT	2.90E+01
	3	SC3U232.OUT	3.20E+01
	4	SC4U232.OUT	3.60E+01
	5	SC5U232.OUT	3.90E+01
	6	SC6U232.OUT	4.10E+01
U-233	1	SC1U233.OUT	5.60E+00
	2	SC2U233.OUT	2.00E+01
	3	SC3U233.OUT	4.10E+01
	4	SC4U233.OUT	7.10E+01
	5	SC5U233.OUT	1.20E+02
	6	SC6U233.OUT	2.00E+02
U-234	1	SC1U234.OUT	5.50E+00
	2	SC2U234.OUT	1.80E+01
	3	SC3U234.OUT	2.90E+01
	4	SC4U234.OUT	4.10E+01
	5	SC5U234.OUT	5.30E+01
	6	SC6U234.OUT	6.50E+01
U-236	1	SC1U236.OUT	5.20E+00
	2	SC2U236.OUT	1.70E+01
	3	SC3U236.OUT	2.80E+01
	4	SC4U236.OUT	3.90E+01
	5	SC5U236.OUT	5.00E+01
	6	SC6U236.OUT	6.20E+01

Radionuclide	Irrigation Period	Source File	TEDE
			mrem/yr per pCi/L ¹
U-238	1	SC1U238.OUT	5.00E+00
	2	SC2U238.OUT	1.70E+01
	3	SC3U238.OUT	2.80E+01
	4	SC4U238.OUT	3.90E+01
	5	SC5U238.OUT	5.10E+01
	6	SC6U238.OUT	6.20E+01

Note: 1. Computer outputs are in rem/yr per pCi/L.
2. Not required. See Table 3 in subsection 4.2.3, Prior Irrigation Time Periods.

8. REFERENCES

8.1 DATA CITED

MO9911RIB00064.000. Environmental Transport Parameter Values for Dose Assessment. Submittal date: 11/12/1999.

MO9911RIB00065.000. Parameter Values for Transfer Coefficients. Submittal date: 11/12/1999.

MO9901RIB00061.000. Input Parameter Values for External and Inhalation Radiation Exposure Analysis. Submittal date: 10/07/1999. ACC: MOL19991110.0266.

MO9912RIB00066.000. Parameter Values for Internal and External Dose Conversion Factors. Submittal date: 12/03/1999.

MO9912SPAING06.033. Ingestion Exposure Pathway Parameters. Submittal date: 12/22/1999.

MO9912SPACON05.001. Recommended Distribution-based and Fixed (Mean) Consumption Parameters for Locally Produced Food by Type and Tap Water. Submittal date: 12/13/1999.

SN9912T0512299.001. Leaching Coefficients for GENII-S Code. Submittal date: 12/06/1999.

8.2 DOCUMENTS CITED

CRWMS M&O 1998. *Software Qualification Report (SQR): GENII-S 1.485 Environmental Radiation Dosimetry Software System, Version 1.485 (CSCI: 30034 V1.4.8.5)*. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19980715.0029.

CRWMS M&O 1999a. *Development Plan for Non-Disruptive Event Biosphere Dose Conversion Factors, Rev. 1 (TDP-MGR-MD-000010)*. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19991029.0319.

CRWMS M&O 1999b. Activity Evaluation: *Scientific Investigation of Radiological Doses in Biosphere*. B00000000-01717-2200-00169 Rev. 4. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19991207.0225.

CRWMS M&O 1999e. *Input Parameter Values for External and Inhalation Radiation Exposure Analysis (ANL-MGR-MD-000001)*. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19990923.0235.

CRWMS M&O 1999f. *Transfer Coefficient Analysis (ANL-MGR-MD-000008)*. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19991115.0237.

CRWMS M&O 1999g. *Environmental Transport Parameters Analysis (ANL-MGR-MD-000007)*. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19991115.0238.

CRWMS M&O 1999h. *Dose Conversion Factor Analysis (ANL-MGR-MD-000002)*. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19991207.0215.

CRWMS M&O 1999j. *Design Input Transmittal for Status of Radionuclide Screening for the TSPA-SR. (Input Tracking Number: R&E-PA-99217.Tc.)*. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19991115.0133.

CRWMS M&O 1999k. *Input Request for Biosphere Dose Conversion Factors (BDCFs) To Be Used in the TSPA-SR. (Input Tracking Number: PA-R&E-99251.R.)*. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19990819.0070.

DOE (U.S. Department of Energy) 1998. *Quality Assurance Requirements and Description for the Civilian Radioactive Waste Management Program. DOE/RW-0333P REV. 8*. Washington, D.C. U.S. Department of Energy. ACC: MOL.19980601.0022.

Dyer, J.R. 1999. "Revised Interim Guidance Pending Issuance of New U.S. Nuclear Regulatory Commission (NRC) Regulations (Revision 01, July 22, 1999), for Yucca Mountain, Nevada." Letter from J.R. Dyer (DOE) to Dr. D.R. Wilkins (CRWMS M&O), September 3, 1999, OL&RC:SB-1714, with enclosure, "Interim Guidance Pending Issuance of New NRC Regulations for Yucca Mountain (Revision 01)." ACC: MOL.19990910.0079.

Leigh, C.D., Thompson, S.D., Campbell, J.E., Longsine, D.E., Kennedy, R.A., and Napier, B.A. 1993. *User's Guide for GENII-S: A Code for Statistical and Deterministic Simulations of Radiation Doses to Humans from Radionuclides in the Environment*. SAND91-0561. Albuquerque, New Mexico: Sandia National Laboratories. TIC 231133.

8.3 CODES, STANDARDS, AND REGULATIONS

10 CFR 20. Energy: Standards for Protection Against Radiation.

8.4 PROCEDURES

AP-2.1Q, Rev. 0, ICN 0. *Indoctrination and Training of Personnel*. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.19990702.0318.

AP-2.2Q, Rev. 0, ICN 0. *Establishment and Verification of Required Education and Experience of Personnel*. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.19990701.0618.

AP-2.13Q, Rev. 0, ICN 0. *Technical Product Development Planning*. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.19990701.0617.

AP-2.14Q, Rev. 0, ICN 0. *Review of Technical Products*. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.19990701.0616.

AP-3.4Q, Rev. 1, ICN 1. *Level 3 Change Control*. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.19991117.0140.

AP-3.10Q, Rev. 1, ICN 0. *Analyses and Models*. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.19991019.0467.

AP-3.14Q, Rev. 0, ICN 0. *Transmittal of Input*. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.19990701.0621.

AP-3.15Q, Rev. 1, ICN 0. *Managing Technical Product Inputs*. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.19991214.0623.

AP-6.1Q, Rev. 3, ICN 0. *Controlled Documents*. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.19990702.0309.

AP-17.1Q, Rev. 1, ICN 1 *Record Source Responsibilities for Inclusionary Records*. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.19990902.0444.

AP-SI.1Q, Rev.2 ICN 2 *Software Management*. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.19991214.0627.

AP-SIII.2Q. Rev. 0, ICN 0. *Qualification of Unqualified Data and the Documentation of Rationale for Accepted Data*. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.19990702.0308.

AP-SIII.3Q. Rev. 0, ICN 2 *Submittal and Incorporation of Data to the Technical Data Management System*. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.19991214.0632.

AP-SIII.4Q, Rev. 0, ICN 1. *Development, Review, Online Placement, and Maintenance of Individual Reference Information Base Data Items*. Washington, D.C.: U.S. Department of Energy, Office of Civilian Radioactive Waste Management. ACC: MOL.19991214.0631.

QAP-2-0, Rev. 5. *Conduct of Activities*. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19980826.0209.

QAP-2-3. Rev. 10. *Classification of Permanent Items*. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19990806.0070.

NLP-2-0. Rev. 5. *Determination of Importance Evaluations*. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19981116.0120.

YAP-SV.1Q. Rev. 0, ICN 1. *Control of the Electronic Management of Data*. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19991008.0209.

ATTACHMENT I. DOCUMENT INPUT REFERENCE SHEETS

**OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
DOCUMENT INPUT REFERENCE SHEET**

1. Document Identifier No./Rev.: ANL-MGR-MD-000009/Rev. 00		Change: 0	Title: Non-Disruptive Event Biosphere Dose Conversion Factors						
Input Document		4. Input Status	5. Section Used In	6. Input Description	7. TBV/TBD Priority	8. TBV Due To			
2. Technical Product Input Source Title and Identifier(s) with Version	3. Section					Unqual.	From Uncontrolled Source	Un-confirmed	
2a									
1.	MO9912SPAING06.033. Ingestion Exposure Pathway Parameters. Submittal date: 12/22/1999.	Entire	TBV-3958	4.1 Data and Parameters	Parameter Values for: Eggs Grow Time Beef Grow time Milk Grow Time Leafy Vegetables Holdup Other (Root) Vegetables holdup Fruit Holdup Grain Holdup Poultry Holdup Eggs Holdup Beef Holdup Milk Holdup Poultry - Feed Storage time Eggs - Feed Storage Time Beef - Feed Storage Time Milk - Feed Storage Time Poultry - Dietary Fraction Eggs - Dietary Fraction Beef - Dietary Fraction Milk - Dietary Fraction Reason for TBV: AMR pending approval.	1	x	N/A	x

**OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
DOCUMENT INPUT REFERENCE SHEET**

1. Document Identifier No./Rev.: ANL-MGR-MD-000009/Rev. 00		Change: 0	Title: Non-Disruptive Event Biosphere Dose Conversion Factors						
Input Document		4. Input Status	5. Section Used in	6. Input Description	7. TBV/TBD Priority	8. TBV Due To			
2. Technical Product Input Source Title and Identifier(s) with Version	3. Section					Unqual.	From Uncontrolled Source	Un-confirmed	
2.	MO9912SPACON05.001. Recommended Distribution-based and Fixed (Mean) Consumption Parameters for Locally Produced Food by Type and Tap Water. Submittal date: 12/13/1999.	Entire	TBV-3957	4.1 Data and Parameters	Parameter Values for: Leafy Vegetable Consumption Rate Root Vegetable Consumption Rate Grains Consumption Rate Fruit Consumption Rate Poultry Consumption Rate Meat Consumption Rate Fish Consumption Rate Eggs Consumption Rate Milk Consumption Rate Tap Water Consumption Rate Reason for TBV: AMR pending approval.	1	x	N/A	x

**OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
DOCUMENT INPUT REFERENCE SHEET**

1. Document Identifier No./Rev.: ANL-MGR-MD-000009/Rev. 00			Change: 0	Title: Non-Disruptive Event Biosphere Dose Conversion Factors					
Input Document		3. Section	4. Input Status	5. Section Used in	6. Input Description	7. TBV/TBD Priority	8. TBV Due To		
2. Technical Product Input Source Title and Identifier(s) with Version	Unqual.						From Uncontrolled Source	Un-confirmed	
3.	MO9910RIB00061.000. Input Parameter Values for External and Inhalation Radiation Exposure Analysis. Submittal date: 10/7/99.	Entire	Qualified	4.1 Data and Parameters	Parameter Values for: Exposure from Inhalation: Mass Loading (grams/m ³) Inhalation Exposure Time (hours/year) Chronic Breathing Rate (m ³ /day) External Ground Exposure: Soil Exposure Time (hours/year) Home Irrigation Rate (inches/year) Duration of Home Irrigation (months/year)	N/A	N/A	N/A	N/A
4.	MO9911RIB00065.000. Parameter Values for Transfer Coefficients. Submittal date: 11/12/99	Entire	Qualified	4.1 Data and Parameters	Parameter Values for: Transfer parameter values in input data file FTRANS.DAT Soil-to-plant transfer scale factor Animal uptake scale factor	N/A	N/A	N/A	N/A

**OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
DOCUMENT INPUT REFERENCE SHEET**

1. Document Identifier No./Rev.: ANL-MGR-MD-000009/Rev. 00		Change: 0	Title: Non-Disruptive Event Biosphere Dose Conversion Factors						
Input Document		4. Input Status	5. Section Used In	6. Input Description	7. TBV/TBD Priority	8. TBV Due To			
2. Technical Product Input Source Title and Identifier(s) with Version	3. Section					Unqual.	From Uncontrolled Source	Un-confirmed	
5.	MO9911RIB00064.000. Environmental Transport Parameters for Dose Assessment. Submittal date: 11/12/99.	Entire	Qualified	4.1 Data and Parameters	Parameter values in input file DEFAULT.IN Deposition velocity (m/sec) in FTRANS.DAT Resuspension factor (1/m) Fraction of plant roots in surface soil Fraction of plant roots in deep soil Surface soil density (kg/m ²): soil mass per unit area for surface soil Deep soil density (kg/m ³): soil mass per unit volume for deep soil Soil ingestion rate (mg/day)	N/A	N/A	N/A	N/A
6.	MO9911RIB00066.000. Parameter Values for Internal and External Dose Conversion Factors. Submittal date: 11/12/99.	Entire	Qualified	4.1 Data and Parameters	External dose conversion factors data file, GRDF.DAT Internal dose conversion factors data file, DOSINC.DAT	N/A	N/A	N/A	N/A
7.	SN9912T0512299.001. Leaching Coefficients for GENII-S Code. Submittal date: 12/06/99.	Entire	TBV-3956	4.1 Data and Parameters	Leaching factors in input data file, FTRANS.DAT Reason for TBV: AMR pending approval.	1	x	N/A	x

**OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
DOCUMENT INPUT REFERENCE SHEET**

1. Document Identifier No./Rev.: ANL-MGR-MD-000009/Rev. 00			Change: 0	Title: Non-Disruptive Event Biosphere Dose Conversion Factors					
Input Document		4. Input Status	5. Section Used in	6. Input Description	7. TBV/TBD Priority	8. TBV Due To			
2. Technical Product Input Source Title and Identifier(s) with Version	3. Section					Unqual.	From Uncontrolled Source	Un-confirmed	
8.	CRWMS M&O 1998. <i>Software Qualification Report (SQR): GENII-S 1.485 Environmental Radiation Dosimetry Software System, Version 1.485 (CSCI: 30034 V1.4.8.5)</i> . Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19980715.0029.	Entire	Qualified	3.	Documents usage of qualified software.	N/A	N/A	N/A	N/A
9.	CRWMS M&O 1999a. <i>Development Plan for Non-Disruptive Event Biosphere Dose Conversion Factors, Rev. 1 (TDP-MGR-MD-000010)</i> . Las Vegas, Nevada: CRWMS M&O. ACC: TBD	Entire	N/A Reference only.	1.	Development plan for this analysis.	N/A	N/A	N/A	N/A
10.	CRWMS M&O 1999b. <i>Activity Evaluation: Scientific Investigation of Radiological Doses in Biosphere</i> . B00000000-01717-2200-00169. Rev. 4. Las Vegas, Nevada: CRWMS M&O. ACC: MOL.19991207.0225.	Entire	N/A Reference only.	2.	Activity evaluation for this analysis.	N/A	N/A	N/A	N/A

**OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT
DOCUMENT INPUT REFERENCE SHEET**

1. Document Identifier No./Rev.: ANL-MGR-MD-000009/Rev. 00			Change: 0	Title: Non-Disruptive Event Biosphere Dose Conversion Factors					
Input Document		3. Section	4. Input Status	5. Section Used In	6. Input Description	7. TBV/TBD Priority	8. TBV Due To		
2. Technical Product Input Source Title and Identifier(s) with Version	Unqual.						From Uncontrolled Source	Un-confirmed	
11.	DOE (U.S. Department of Energy) 1998. <i>Quality Assurance Requirements and Description for the Civilian Radioactive Waste Management Program. DOE/RW-0333P REV. 8.</i> Washington, D.C. U.S. Department of Energy. ACC:MOL.19980601.0022.	Entire	N/A Reference only.	2.	Quality Assurance requirements.	N/A	N/A	N/A	N/A
12.	Leigh, C.D., Thompson, S.D., Campbell, J.E., Longsine, D.E., Kennedy, R.A., and Napier, B.A. 1993. <i>User's Guide for GENII-S: A Code for Statistical and Deterministic Simulations of Radiation Doses to Humans from Radionuclides in the Environment.</i> SAND91-0561. Albuquerque, New Mexico: Sandia National Laboratories. TIC 231133.	Entire	N/A Reference only.	3.	Provides general information on the software used in the analysis.	N/A	N/A	N/A	N/A
13.	10 CFR 20. Energy: Standards for Protection Against Radiation.	20.1003	N/A Reference only.	4.2.1	Provides definition of the TEDE.	N/A	N/A	N/A	N/A

AP-3.15Q.1

Rev. 06/30/199

ATTACHMENT II. ACRONYMS AND ABBREVIATIONS

Acronyms

AMR	Analysis and Model Report
BDCF	Biosphere Dose Conversion Factor
CRWMS	Civilian Radioactive Waste Management System
DTN	Data Tracking Number
ICRP-30	International Commission on Radiological Protection, Publication 30
M&O	Management and Operating
NCRP	National Council on Radiation Protection and Measurement
OCRWM	Office of Civilian Radioactive Waste Management
PAO	Performance Assessment Organization
PMR	Process Model Report
RSICC	Radiation Safety Information Computational Center
TBV	To Be Verified
TDMS	Technical Data Management System
TEDE	Total Effective Dose Equivalent
TSPA	Total System Performance Assessment

Abbreviations

Ac	Actinium
Am	Americium
C	Carbon
I	Iodine
mrem/yr	milli-rem per year

Np	Neptunium
pCi/L	pico Curie per liter
Pu	Plutonium
Tc	Technetium
Th	Thorium
U	Uranium

ATTACHMENT III. LIST OF FILES ON CD-ROM

..\ (root directory)

README DOC 22,000 1/4/00 1:35p

..\RR_data\ (input and output files for Reasonable Representation analysis)

RR1AC227	FLG	712	01/09/00	12:55:18
RR1AC227	INP	15447	01/09/00	12:55:28
RR1AC227	OUT	832	01/09/00	12:55:52
RR1AC227	PTI	8173	01/09/00	12:55:52
RR1AC227	RST	112189	01/09/00	12:56:26
RR1AC227	VEC	38112	01/09/00	12:55:52
RR1AM241	FLG	712	01/08/00	16:10:14
RR1AM241	INP	15447	01/08/00	16:10:14
RR1AM241	OUT	832	12/28/99	18:55:02
RR1AM241	PTI	8173	12/28/99	18:55:02
RR1AM241	RST	112189	01/08/00	16:12:52
RR1AM241	VEC	38112	12/28/99	18:55:02
RR1AM243	FLG	712	01/08/00	16:27:38
RR1AM243	INP	15447	01/08/00	16:27:48
RR1AM243	OUT	832	01/08/00	16:28:12
RR1AM243	PTI	8173	01/08/00	16:28:12
RR1AM243	RST	112189	01/08/00	16:29:08
RR1AM243	VEC	38112	01/08/00	16:28:12
RR1C14	FLG	710	01/08/00	16:47:28
RR1C14	INP	15447	01/08/00	16:47:38
RR1C14	OUT	832	01/08/00	16:47:56
RR1C14	PTI	8173	01/08/00	16:47:56
RR1C14	RST	112187	01/08/00	16:51:54
RR1C14	VEC	38112	01/08/00	16:47:56
RR1I129	FLG	712	01/08/00	17:01:50
RR1I129	INP	15447	01/08/00	17:02:00
RR1I129	OUT	832	01/08/00	17:02:16
RR1I129	PTI	8173	01/08/00	17:02:16
RR1I129	RST	112188	01/08/00	17:03:06
RR1I129	VEC	38112	01/08/00	17:02:16
RR1NP237	FLG	712	01/08/00	17:11:30
RR1NP237	INP	15447	01/08/00	17:11:40
RR1NP237	OUT	832	01/08/00	17:11:58
RR1NP237	PTI	8173	01/08/00	17:11:58
RR1NP237	RST	112189	01/08/00	17:12:56
RR1NP237	VEC	38112	01/08/00	17:11:58
RR1PU238	FLG	712	01/08/00	19:44:42
RR1PU238	INP	15447	01/08/00	19:44:54
RR1PU238	OUT	832	01/08/00	19:45:12
RR1PU238	PTI	8173	01/08/00	19:45:12
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RR1PU238	VEC	38112	01/08/00	19:45:12
RR1PU239	FLG	712	01/08/00	17:52:20
RR1PU239	INP	15447	01/08/00	17:52:30
RR1PU239	OUT	832	01/08/00	17:52:48
RR1PU239	PTI	8173	01/08/00	17:52:48
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RR1PU240	OUT	832	01/08/00	19:56:48
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RR1PU240	VEC	38112	01/08/00	19:56:48
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RR1TC99	INP	15447	01/08/00	18:13:12
RR1TC99	OUT	832	01/08/00	18:13:28
RR1TC99	PTI	8173	01/08/00	18:13:28
RR1TC99	RST	112188	01/08/00	18:14:24
RR1TC99	VEC	38112	01/08/00	18:13:28
RR1TH229	FLG	712	01/08/00	18:22:08
RR1TH229	INP	15447	01/08/00	18:22:18
RR1TH229	OUT	832	01/08/00	18:22:40
RR1TH229	PTI	8173	01/08/00	18:22:40
RR1TH229	RST	112189	01/08/00	18:23:46
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RR1U232	INP	15447	01/08/00	18:48:58
RR1U232	OUT	1000	01/08/00	18:49:30
RR1U232	PTI	8173	01/08/00	18:49:30
RR1U232	RST	112188	01/08/00	18:50:40
RR1U232	VEC	38112	01/08/00	18:49:30
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RR1U234	VEC	38112	01/08/00	19:11:14
RR1U236	FLG	712	01/08/00	19:20:28
RR1U236	INP	15447	01/08/00	19:20:42
RR1U236	OUT	832	01/08/00	19:21:00
RR1U236	PTI	8173	01/08/00	19:21:00
RR1U236	RST	112188	01/08/00	19:22:08
RR1U236	VEC	38112	01/08/00	19:21:00
RR1U238	FLG	712	01/08/00	19:29:56
RR1U238	INP	15447	01/08/00	19:30:08
RR1U238	OUT	832	01/08/00	19:30:30
RR1U238	PTI	8173	01/08/00	19:30:30
RR1U238	RST	112188	01/08/00	19:31:32
RR1U238	VEC	38112	01/08/00	19:30:30
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RR2AC227	INP	15447	01/09/00	12:56:50
RR2AC227	OUT	832	01/09/00	12:57:12
RR2AC227	PTI	8173	01/09/00	12:57:12
RR2AC227	RST	112189	01/09/00	12:57:42
RR2AC227	VEC	38112	01/09/00	12:57:12
RR2AM241	FLG	712	01/08/00	16:13:08
RR2AM241	INP	15449	01/08/00	16:13:20
RR2AM241	OUT	888	01/08/00	16:13:52
RR2AM241	PTI	8173	01/08/00	16:13:52
RR2AM241	RST	112189	01/08/00	16:14:44
RR2AM241	VEC	38112	01/08/00	16:13:52
RR2AM243	FLG	712	01/08/00	16:29:24
RR2AM243	INP	15449	01/08/00	16:29:46
RR2AM243	OUT	832	01/08/00	16:30:34
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RR2AM243	RST	112189	01/08/00	16:31:18
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RR2C14	FLG	710	01/08/00	16:52:10

RR2C14	INP	15449	01/08/00	16:52:22
RR2C14	OUT	832	01/08/00	16:52:44
RR2C14	PTI	8173	01/08/00	16:52:44
RR2C14	RST	112187	01/08/00	16:53:36
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RR2I129	RST	112188	01/08/00	17:04:44
RR2I129	VEC	38112	01/08/00	17:03:52
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RR2PU238	PTI	8173	01/08/00	19:47:56
RR2PU238	RST	112189	01/08/00	19:48:32
RR2PU238	VEC	38112	01/08/00	19:47:56
RR2PU239	FLG	712	01/08/00	17:54:12
RR2PU239	INP	15449	01/08/00	17:54:24
RR2PU239	OUT	832	01/08/00	17:54:42
RR2PU239	PTI	8173	01/08/00	17:54:42
RR2PU239	RST	112189	01/08/00	17:55:26
RR2PU239	VEC	38112	01/08/00	17:54:42
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RR2TC99	OUT	832	01/08/00	18:15:18
RR2TC99	PTI	8173	01/08/00	18:15:18
RR2TC99	RST	112188	01/08/00	18:16:00
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RR2TH229	OUT	832	01/08/00	18:25:14
RR2TH229	PTI	8173	01/08/00	18:25:14
RR2TH229	RST	112189	01/08/00	18:26:18
RR2TH229	VEC	38112	01/08/00	18:25:14
RR2U232	FLG	712	01/08/00	18:50:56
RR2U232	INP	15447	01/08/00	18:51:04
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RR2U232	PTI	8173	01/08/00	18:51:36
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RR2U234	FLG	712	01/08/00	19:12:46
RR2U234	INP	15447	01/08/00	19:12:54
RR2U234	OUT	832	01/08/00	19:13:12

RR2U234	PTI	8173	01/08/00	19:13:12
RR2U234	RST	112188	01/08/00	19:13:52
RR2U234	VEC	38112	01/08/00	19:13:12
RR2U236	FLG	712	01/08/00	19:22:24
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RR2U236	OUT	832	01/08/00	19:22:50
RR2U236	PTI	8173	01/08/00	19:22:50
RR2U236	RST	112188	01/08/00	19:23:38
RR2U236	VEC	38112	01/08/00	19:22:50
RR2U238	FLG	712	01/08/00	19:33:44
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RR2U238	OUT	832	01/08/00	19:34:20
RR2U238	PTI	8173	01/08/00	19:34:20
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RR2U238	VEC	38112	01/08/00	19:34:20
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RR3AC227	OUT	832	01/09/00	12:58:28
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RR3AC227	RST	112189	01/09/00	12:59:02
RR3AC227	VEC	38112	01/09/00	12:58:28
RR3AM241	FLG	712	01/08/00	16:15:02
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RR3AM241	OUT	888	01/08/00	16:15:48
RR3AM241	PTI	8173	01/08/00	16:15:48
RR3AM241	RST	112189	01/08/00	16:16:32
RR3AM241	VEC	38112	01/08/00	16:15:48
RR3AM243	FLG	712	01/08/00	16:31:34
RR3AM243	INP	15450	01/08/00	16:31:46
RR3AM243	OUT	832	01/08/00	16:32:56
RR3AM243	PTI	8173	01/08/00	16:32:56
RR3AM243	RST	112189	01/08/00	16:33:58
RR3AM243	VEC	38112	01/08/00	16:32:56
RR3C14	FLG	710	01/08/00	16:53:52
RR3C14	INP	15450	01/08/00	16:54:02
RR3C14	OUT	832	01/08/00	16:54:28
RR3C14	PTI	8173	01/08/00	16:54:28
RR3C14	RST	112187	01/08/00	16:55:36
RR3C14	VEC	38112	01/08/00	16:54:28
RR3I129	FLG	712	01/08/00	17:05:04
RR3I129	INP	15447	01/08/00	17:05:14
RR3I129	OUT	832	01/08/00	17:05:30
RR3I129	PTI	8173	01/08/00	17:05:30
RR3I129	RST	112188	01/08/00	17:06:16
RR3I129	VEC	38112	01/08/00	17:05:30
RR3NP237	FLG	712	01/08/00	17:14:46
RR3NP237	INP	15447	01/08/00	17:14:56
RR3NP237	OUT	832	01/08/00	17:15:16
RR3NP237	PTI	8173	01/08/00	17:15:16
RR3NP237	RST	112189	01/08/00	17:16:14
RR3NP237	VEC	38112	01/08/00	17:15:16
RR3PU238	FLG	712	01/08/00	19:49:00
RR3PU238	INP	15448	01/08/00	19:49:14
RR3PU238	OUT	832	01/08/00	19:49:36
RR3PU238	PTI	8173	01/08/00	19:49:36
RR3PU238	RST	112189	01/08/00	19:50:30
RR3PU238	VEC	38112	01/08/00	19:49:36
RR3PU239	FLG	712	01/08/00	17:55:42
RR3PU239	INP	15449	01/08/00	17:55:52
RR3PU239	OUT	832	01/08/00	17:56:14
RR3PU239	PTI	8173	01/08/00	17:56:14
RR3PU239	RST	112189	01/08/00	17:57:00

RR3PU239	VEC	38112	01/08/00	17:56:14
RR3PU240	FLG	712	01/08/00	20:01:36
RR3PU240	INP	15449	01/08/00	20:01:46
RR3PU240	OUT	832	01/08/00	20:02:14
RR3PU240	PTI	8173	01/08/00	20:02:14
RR3PU240	RST	112189	01/08/00	20:02:48
RR3PU240	VEC	38112	01/08/00	20:02:14
RR3TC99	FLG	711	01/08/00	18:16:14
RR3TC99	INP	15447	01/08/00	18:16:24
RR3TC99	OUT	832	01/08/00	18:16:40
RR3TC99	PTI	8173	01/08/00	18:16:40
RR3TC99	RST	112188	01/08/00	18:17:28
RR3TC99	VEC	38112	01/08/00	18:16:40
RR3TH229	FLG	712	01/08/00	18:26:34
RR3TH229	INP	15450	01/08/00	18:26:44
RR3TH229	OUT	832	01/08/00	18:28:30
RR3TH229	PTI	8173	01/08/00	18:28:30
RR3TH229	RST	112189	01/08/00	18:29:58
RR3TH229	VEC	38112	01/08/00	18:28:30
RR3U232	FLG	712	01/08/00	18:52:42
RR3U232	INP	15448	01/08/00	18:52:52
RR3U232	OUT	1000	01/08/00	18:53:30
RR3U232	PTI	8173	01/08/00	18:53:30
RR3U232	RST	112188	01/08/00	18:54:20
RR3U232	VEC	38112	01/08/00	18:53:30
RR3U233	FLG	712	01/08/00	19:03:40
RR3U233	INP	15448	01/08/00	19:03:50
RR3U233	OUT	832	01/08/00	19:04:18
RR3U233	PTI	8173	01/08/00	19:04:18
RR3U233	RST	112188	01/08/00	19:05:06
RR3U233	VEC	38112	01/08/00	19:04:18
RR3U234	FLG	712	01/08/00	19:14:08
RR3U234	INP	15448	01/08/00	19:14:20
RR3U234	OUT	832	01/08/00	19:14:38
RR3U234	PTI	8173	01/08/00	19:14:38
RR3U234	RST	112188	01/08/00	19:15:32
RR3U234	VEC	38112	01/08/00	19:14:38
RR3U236	FLG	712	01/08/00	19:23:52
RR3U236	INP	15448	01/08/00	19:24:02
RR3U236	OUT	832	01/08/00	19:24:20
RR3U236	PTI	8173	01/08/00	19:24:20
RR3U236	RST	112188	01/08/00	19:25:10
RR3U236	VEC	38112	01/08/00	19:24:20
RR3U238	FLG	712	01/08/00	19:35:26
RR3U238	INP	15448	01/08/00	19:35:40
RR3U238	OUT	832	01/08/00	19:36:04
RR3U238	PTI	8173	01/08/00	19:36:04
RR3U238	RST	112188	01/08/00	19:36:50
RR3U238	VEC	38112	01/08/00	19:36:04
RR4AC227	FLG	712	01/09/00	12:59:16
RR4AC227	INP	15448	01/09/00	12:59:24
RR4AC227	OUT	832	01/09/00	12:59:46
RR4AC227	PTI	8173	01/09/00	12:59:46
RR4AC227	RST	112189	01/09/00	13:00:20
RR4AC227	VEC	38112	01/09/00	12:59:46
RR4AM241	FLG	712	01/08/00	16:16:50
RR4AM241	INP	15449	01/08/00	16:17:04
RR4AM241	OUT	888	01/08/00	16:17:52
RR4AM241	PTI	8173	01/08/00	16:17:52
RR4AM241	RST	112189	01/08/00	16:18:32
RR4AM241	VEC	38112	01/08/00	16:17:52
RR4AM243	FLG	712	01/08/00	16:34:12

RR4AM243	INP	15450	01/08/00	16:34:22
RR4AM243	OUT	832	01/08/00	16:36:04
RR4AM243	PTI	8173	01/08/00	16:36:04
RR4AM243	RST	112189	01/08/00	16:38:16
RR4AM243	VEC	38112	01/08/00	16:36:04
RR4C14	FLG	710	01/08/00	16:55:52
RR4C14	INP	15450	01/08/00	16:56:04
RR4C14	OUT	832	01/08/00	16:56:36
RR4C14	PTI	8173	01/08/00	16:56:36
RR4C14	RST	112187	01/08/00	16:57:16
RR4C14	VEC	38112	01/08/00	16:56:36
RR4I129	FLG	712	01/08/00	17:06:34
RR4I129	INP	15447	01/08/00	17:06:58
RR4I129	OUT	832	01/08/00	17:07:16
RR4I129	PTI	8173	01/08/00	17:07:16
RR4I129	RST	112188	01/08/00	17:08:10
RR4I129	VEC	38112	01/08/00	17:07:16
RR4NP237	FLG	712	01/08/00	17:16:28
RR4NP237	INP	15447	01/08/00	17:16:38
RR4NP237	OUT	832	01/08/00	17:16:58
RR4NP237	PTI	8173	01/08/00	17:16:58
RR4NP237	RST	112189	01/08/00	17:17:52
RR4NP237	VEC	38112	01/08/00	17:16:58
RR4PU238	FLG	712	01/08/00	19:50:50
RR4PU238	INP	15448	01/08/00	19:51:00
RR4PU238	OUT	832	01/08/00	19:51:22
RR4PU238	PTI	8173	01/08/00	19:51:22
RR4PU238	RST	112189	01/08/00	19:51:56
RR4PU238	VEC	38112	01/08/00	19:51:22
RR4PU239	FLG	712	01/08/00	17:57:14
RR4PU239	INP	15449	01/08/00	17:57:22
RR4PU239	OUT	832	01/08/00	17:57:48
RR4PU239	PTI	8173	01/08/00	17:57:48
RR4PU239	RST	112189	01/08/00	17:58:50
RR4PU239	VEC	38112	01/08/00	17:57:48
RR4PU240	FLG	712	01/08/00	20:03:10
RR4PU240	INP	15449	01/08/00	20:03:20
RR4PU240	OUT	832	01/08/00	20:03:52
RR4PU240	PTI	8173	01/08/00	20:03:52
RR4PU240	RST	112189	01/08/00	20:04:30
RR4PU240	VEC	38112	01/08/00	20:03:52
RR4TC99	FLG	711	01/08/00	18:17:46
RR4TC99	INP	15447	01/08/00	18:17:54
RR4TC99	OUT	832	01/08/00	18:18:12
RR4TC99	PTI	8173	01/08/00	18:18:12
RR4TC99	RST	112188	01/08/00	18:19:10
RR4TC99	VEC	38112	01/08/00	18:18:12
RR4TH229	FLG	712	01/08/00	18:30:12
RR4TH229	INP	15450	01/08/00	18:30:22
RR4TH229	OUT	832	01/08/00	18:33:08
RR4TH229	PTI	8173	01/08/00	18:33:08
RR4TH229	RST	112189	01/08/00	18:34:24
RR4TH229	VEC	38112	01/08/00	18:33:08
RR4U232	FLG	712	01/08/00	18:54:36
RR4U232	INP	15448	01/08/00	18:54:46
RR4U232	OUT	1000	01/08/00	18:55:24
RR4U232	PTI	8173	01/08/00	18:55:24
RR4U232	RST	112188	01/08/00	18:56:10
RR4U232	VEC	38112	01/08/00	18:55:24
RR4U233	FLG	712	01/08/00	19:05:22
RR4U233	INP	15448	01/08/00	19:05:30
RR4U233	OUT	832	01/08/00	19:05:58

RR4U233	PTI	8173	01/08/00	19:05:58
RR4U233	RST	112188	01/08/00	19:06:44
RR4U233	VEC	38112	01/08/00	19:05:58
RR4U234	FLG	712	01/08/00	19:15:46
RR4U234	INP	15448	01/08/00	19:16:00
RR4U234	OUT	832	01/08/00	19:16:18
RR4U234	PTI	8173	01/08/00	19:16:18
RR4U234	RST	112188	01/08/00	19:17:02
RR4U234	VEC	38112	01/08/00	19:16:18
RR4U236	FLG	712	01/08/00	19:25:28
RR4U236	INP	15448	01/08/00	19:25:38
RR4U236	OUT	832	01/08/00	19:25:56
RR4U236	PTI	8173	01/08/00	19:25:56
RR4U236	RST	112188	01/08/00	19:26:40
RR4U236	VEC	38112	01/08/00	19:25:56
RR4U238	FLG	712	01/08/00	19:37:06
RR4U238	INP	15448	01/08/00	19:37:16
RR4U238	OUT	832	01/08/00	19:37:40
RR4U238	PTI	8173	01/08/00	19:37:40
RR4U238	RST	112188	01/08/00	19:38:24
RR4U238	VEC	38112	01/08/00	19:37:40
RR5AC227	FLG	712	01/09/00	13:00:38
RR5AC227	INP	15448	01/09/00	13:00:46
RR5AC227	OUT	832	01/09/00	13:01:12
RR5AC227	PTI	8173	01/09/00	13:01:12
RR5AC227	RST	112189	01/09/00	13:01:48
RR5AC227	VEC	38112	01/09/00	13:01:12
RR5AM241	FLG	712	01/08/00	16:18:48
RR5AM241	INP	15449	01/08/00	16:18:56
RR5AM241	OUT	888	01/08/00	16:19:58
RR5AM241	PTI	8173	01/08/00	16:19:58
RR5AM241	RST	112189	01/08/00	16:20:44
RR5AM241	VEC	38112	01/08/00	16:19:58
RR5AM243	FLG	712	01/08/00	16:38:34
RR5AM243	INP	15450	01/08/00	16:38:46
RR5AM243	OUT	832	01/08/00	16:41:16
RR5AM243	PTI	8173	01/08/00	16:41:16
RR5AM243	RST	112189	01/08/00	16:42:02
RR5AM243	VEC	38112	01/08/00	16:41:16
RR5C14	FLG	710	01/08/00	16:57:34
RR5C14	INP	15450	01/08/00	16:57:56
RR5C14	OUT	832	01/08/00	16:58:36
RR5C14	PTI	8173	01/08/00	16:58:36
RR5C14	RST	112187	01/08/00	16:59:22
RR5C14	VEC	38112	01/08/00	16:58:36
RR5I129	FLG	712	01/08/00	17:08:24
RR5I129	INP	15447	01/08/00	17:08:34
RR5I129	OUT	832	01/08/00	17:08:52
RR5I129	PTI	8173	01/08/00	17:08:52
RR5I129	RST	112188	01/08/00	17:09:34
RR5I129	VEC	38112	01/08/00	17:08:52
RR5NP237	FLG	712	01/08/00	17:18:10
RR5NP237	INP	15447	01/08/00	17:18:20
RR5NP237	OUT	832	01/08/00	17:18:40
RR5NP237	PTI	8173	01/08/00	17:18:40
RR5NP237	RST	112189	01/08/00	17:20:14
RR5NP237	VEC	38112	01/08/00	17:18:40
RR5PU238	FLG	712	01/08/00	19:52:12
RR5PU238	INP	15449	01/08/00	19:52:22
RR5PU238	OUT	832	01/08/00	19:52:44
RR5PU238	PTI	8173	01/08/00	19:52:44
RR5PU238	RST	112189	01/08/00	19:53:16

RR5PU238	VEC	38112	01/08/00	19:52:44
RR5PU239	FLG	712	01/08/00	17:59:06
RR5PU239	INP	15449	01/08/00	17:59:14
RR5PU239	OUT	832	01/08/00	17:59:42
RR5PU239	PTI	8173	01/08/00	17:59:42
RR5PU239	RST	112189	01/08/00	18:00:32
RR5PU239	VEC	38112	01/08/00	17:59:42
RR5PU240	FLG	712	01/08/00	20:04:50
RR5PU240	INP	15449	01/08/00	20:05:02
RR5PU240	OUT	832	01/08/00	20:05:42
RR5PU240	PTI	8173	01/08/00	20:05:42
RR5PU240	RST	112189	01/08/00	20:06:18
RR5PU240	VEC	38112	01/08/00	20:05:42
RR5TC99	FLG	711	01/08/00	18:19:26
RR5TC99	INP	15447	01/08/00	18:19:38
RR5TC99	OUT	832	01/08/00	18:19:54
RR5TC99	PTI	8173	01/08/00	18:19:54
RR5TC99	RST	112188	01/08/00	18:20:32
RR5TC99	VEC	38112	01/08/00	18:19:54
RR5TH229	FLG	712	01/08/00	18:34:44
RR5TH229	INP	15450	01/08/00	18:34:54
RR5TH229	OUT	832	01/08/00	18:39:04
RR5TH229	PTI	8173	01/08/00	18:39:04
RR5TH229	RST	112189	01/08/00	18:40:22
RR5TH229	VEC	38112	01/08/00	18:39:04
RR5U232	FLG	712	01/08/00	18:56:24
RR5U232	INP	15448	01/08/00	18:56:32
RR5U232	OUT	1000	01/08/00	18:57:16
RR5U232	PTI	8173	01/08/00	18:57:16
RR5U232	RST	112188	01/08/00	18:57:58
RR5U232	VEC	38112	01/08/00	18:57:16
RR5U233	FLG	712	01/08/00	19:07:00
RR5U233	INP	15448	01/08/00	19:07:10
RR5U233	OUT	832	01/08/00	19:07:38
RR5U233	PTI	8173	01/08/00	19:07:38
RR5U233	RST	112188	01/08/00	19:08:36
RR5U233	VEC	38112	01/08/00	19:07:38
RR5U234	FLG	712	01/08/00	19:17:16
RR5U234	INP	15448	01/08/00	19:17:26
RR5U234	OUT	832	01/08/00	19:17:44
RR5U234	PTI	8173	01/08/00	19:17:44
RR5U234	RST	112188	01/08/00	19:18:30
RR5U234	VEC	38112	01/08/00	19:17:44
RR5U236	FLG	712	01/08/00	19:26:54
RR5U236	INP	15448	01/08/00	19:27:04
RR5U236	OUT	832	01/08/00	19:27:22
RR5U236	PTI	8173	01/08/00	19:27:22
RR5U236	RST	112188	01/08/00	19:28:10
RR5U236	VEC	38112	01/08/00	19:27:22
RR5U238	FLG	712	01/08/00	19:38:40
RR5U238	INP	15448	01/08/00	19:38:50
RR5U238	OUT	832	01/08/00	19:39:18
RR5U238	PTI	8173	01/08/00	19:39:18
RR5U238	RST	112188	01/08/00	19:40:00
RR5U238	VEC	38112	01/08/00	19:39:18
RR6AC227	FLG	712	01/09/00	13:02:12
RR6AC227	INP	15448	01/09/00	13:02:20
RR6AC227	OUT	832	01/09/00	13:02:48
RR6AC227	PTI	8173	01/09/00	13:02:48
RR6AC227	RST	112189	01/09/00	13:03:22
RR6AC227	VEC	38112	01/09/00	13:02:48
RR6AM241	FLG	712	01/08/00	16:21:00

RR6AM241	INP	15450	01/08/00	16:23:04
RR6AM241	OUT	888	01/08/00	16:24:32
RR6AM241	PTI	8173	01/08/00	16:24:32
RR6AM241	RST	112189	01/08/00	16:27:20
RR6AM241	VEC	38112	01/08/00	16:24:32
RR6AM243	FLG	712	01/08/00	16:42:18
RR6AM243	INP	15450	01/08/00	16:42:30
RR6AM243	OUT	832	01/08/00	16:46:18
RR6AM243	PTI	8173	01/08/00	16:46:18
RR6AM243	RST	112189	01/08/00	16:47:08
RR6AM243	VEC	38112	01/08/00	16:46:18
RR6C14	FLG	710	01/08/00	16:59:38
RR6C14	INP	15450	01/08/00	16:59:48
RR6C14	OUT	832	01/08/00	17:00:46
RR6C14	PTI	8173	01/08/00	17:00:46
RR6C14	RST	112187	01/08/00	17:01:32
RR6C14	VEC	38112	01/08/00	17:00:46
RR6I129	FLG	712	01/08/00	17:09:50
RR6I129	INP	15447	01/08/00	17:09:58
RR6I129	OUT	832	01/08/00	17:10:16
RR6I129	PTI	8173	01/08/00	17:10:16
RR6I129	RST	112188	01/08/00	17:11:08
RR6I129	VEC	38112	01/08/00	17:10:16
RR6NP237	FLG	712	01/08/00	17:20:30
RR6NP237	INP	15448	01/08/00	17:20:44
RR6NP237	OUT	832	01/08/00	17:21:06
RR6NP237	PTI	8173	01/08/00	17:21:06
RR6NP237	RST	112189	01/08/00	17:21:48
RR6NP237	VEC	38112	01/08/00	17:21:06
RR6PU238	FLG	712	01/08/00	19:53:34
RR6PU238	INP	15449	01/08/00	19:53:44
RR6PU238	OUT	832	01/08/00	19:54:08
RR6PU238	PTI	8173	01/08/00	19:54:08
RR6PU238	RST	112189	01/08/00	19:54:42
RR6PU238	VEC	38112	01/08/00	19:54:08
RR6PU239	FLG	712	01/08/00	18:00:48
RR6PU239	INP	15450	01/08/00	18:01:00
RR6PU239	OUT	832	01/08/00	18:01:34
RR6PU239	PTI	8173	01/08/00	18:01:34
RR6PU239	RST	112189	01/08/00	18:02:16
RR6PU239	VEC	38112	01/08/00	18:01:34
RR6PU240	FLG	712	01/08/00	20:06:32
RR6PU240	INP	15450	01/08/00	20:06:40
RR6PU240	OUT	832	01/08/00	20:07:32
RR6PU240	PTI	8173	01/08/00	20:07:32
RR6PU240	RST	112189	01/08/00	20:08:02
RR6PU240	VEC	38112	01/08/00	20:07:32
RR6TC99	FLG	711	01/08/00	18:20:46
RR6TC99	INP	15447	01/08/00	18:20:56
RR6TC99	OUT	832	01/08/00	18:21:14
RR6TC99	PTI	8173	01/08/00	18:21:14
RR6TC99	RST	112188	01/08/00	18:21:50
RR6TC99	VEC	38112	01/08/00	18:21:14
RR6TH229	FLG	712	01/08/00	18:40:38
RR6TH229	INP	15450	01/08/00	18:40:48
RR6TH229	OUT	832	01/08/00	18:47:18
RR6TH229	PTI	8173	01/08/00	18:47:18
RR6TH229	RST	112189	01/08/00	18:48:28
RR6TH229	VEC	38112	01/08/00	18:47:18
RR6U232	FLG	712	01/08/00	18:58:12
RR6U232	INP	15448	01/08/00	18:58:20
RR6U232	OUT	1000	01/08/00	18:59:10

RR6U232	PTI	8173	01/08/00	18:59:10
RR6U232	RST	112188	01/08/00	18:59:56
RR6U232	VEC	38112	01/08/00	18:59:10
RR6U233	FLG	712	01/08/00	19:08:56
RR6U233	INP	15448	01/08/00	19:09:06
RR6U233	OUT	832	01/08/00	19:09:38
RR6U233	PTI	8173	01/08/00	19:09:38
RR6U233	RST	112188	01/08/00	19:10:30
RR6U233	VEC	38112	01/08/00	19:09:38
RR6U234	FLG	712	01/08/00	19:18:46
RR6U234	INP	15448	01/08/00	19:18:56
RR6U234	OUT	832	01/08/00	19:19:16
RR6U234	PTI	8173	01/08/00	19:19:16
RR6U234	RST	112188	01/08/00	19:20:08
RR6U234	VEC	38112	01/08/00	19:19:16
RR6U236	FLG	712	01/08/00	19:28:26
RR6U236	INP	15448	01/08/00	19:28:34
RR6U236	OUT	832	01/08/00	19:28:52
RR6U236	PTI	8173	01/08/00	19:28:52
RR6U236	RST	112188	01/08/00	19:29:40
RR6U236	VEC	38112	01/08/00	19:28:52
RR6U238	FLG	712	01/08/00	19:40:16
RR6U238	INP	15448	01/08/00	19:40:26
RR6U238	OUT	832	01/08/00	19:40:54
RR6U238	PTI	8173	01/08/00	19:40:54
RR6U238	RST	112188	01/08/00	19:41:36
RR6U238	VEC	38112	01/08/00	19:40:54

..\SC_data\ (input and output files for Bounding Representation analysis)

SC1AC227	FLG	664	01/09/00	13:35:20
SC1AC227	INP	6687	01/09/00	13:35:28
SC1AC227	OUT	15414	01/09/00	13:35:40
SC1AC227	PTI	1311	01/09/00	13:35:40
SC1AC227	VEC	3132	01/09/00	13:35:40
SC1AM241	FLG	664	01/09/00	13:41:12
SC1AM241	INP	6687	01/09/00	13:41:20
SC1AM241	OUT	15470	01/09/00	13:41:32
SC1AM241	PTI	1311	01/09/00	13:41:32
SC1AM241	VEC	3132	01/09/00	13:41:32
SC1AM243	FLG	664	01/09/00	13:47:34
SC1AM243	INP	6687	01/09/00	13:47:42
SC1AM243	OUT	15341	01/09/00	13:47:54
SC1AM243	PTI	1311	01/09/00	13:47:54
SC1AM243	VEC	3132	01/09/00	13:47:54
SC1C14	FLG	662	01/09/00	13:52:42
SC1C14	INP	6687	01/09/00	13:52:42
SC1C14	OUT	13985	12/28/99	12:11:24
SC1C14	PTI	1311	12/28/99	12:11:24
SC1C14	VEC	3132	12/28/99	12:11:24
SC1I129	FLG	664	01/09/00	13:57:12
SC1I129	INP	6687	01/09/00	13:57:20
SC1I129	OUT	13985	01/09/00	13:57:32
SC1I129	PTI	1311	01/09/00	13:57:32
SC1I129	VEC	3132	01/09/00	13:57:32
SC1NP237	FLG	664	01/09/00	14:02:32
SC1NP237	INP	6687	01/09/00	14:02:44
SC1NP237	OUT	15268	01/09/00	14:02:56
SC1NP237	PTI	1311	01/09/00	14:02:56
SC1NP237	VEC	3132	01/09/00	14:02:56
SC1PU238	FLG	664	01/09/00	14:08:04
SC1PU238	INP	6687	01/09/00	14:08:12
SC1PU238	OUT	15268	01/09/00	14:08:24
SC1PU238	PTI	1311	01/09/00	14:08:24
SC1PU238	VEC	3132	01/09/00	14:08:24
SC1PU239	FLG	664	01/09/00	14:17:54
SC1PU239	INP	6687	01/09/00	14:17:54
SC1PU239	OUT	14043	01/09/00	14:15:56
SC1PU239	PTI	1311	01/09/00	14:15:56
SC1PU239	VEC	3132	01/09/00	14:15:56
SC1PU240	FLG	664	01/09/00	14:21:58
SC1PU240	INP	6687	01/09/00	14:21:58
SC1PU240	OUT	15268	01/09/00	14:21:06
SC1PU240	PTI	1311	01/09/00	14:21:06
SC1PU240	VEC	3132	01/09/00	14:21:06
SC1TC99	FLG	663	01/09/00	14:27:06
SC1TC99	INP	6687	01/09/00	14:27:16
SC1TC99	OUT	14043	01/09/00	14:27:28
SC1TC99	PTI	1311	01/09/00	14:27:28
SC1TC99	VEC	3132	01/09/00	14:27:28
SC1TH229	FLG	664	01/09/00	14:32:20
SC1TH229	INP	6687	01/09/00	14:32:28
SC1TH229	OUT	15341	01/09/00	14:32:40
SC1TH229	PTI	1311	01/09/00	14:32:40
SC1TH229	VEC	3132	01/09/00	14:32:40
SC1U232	FLG	664	01/09/00	14:37:40
SC1U232	INP	6687	01/09/00	14:37:54
SC1U232	OUT	15874	01/09/00	14:38:14
SC1U232	PTI	1311	01/09/00	14:38:14

SC1U232	VEC	3132	01/09/00	14:38:14
SC1U233	FLG	664	01/09/00	14:44:20
SC1U233	INP	6687	01/09/00	14:44:28
SC1U233	OUT	15414	01/09/00	14:44:40
SC1U233	PTI	1311	01/09/00	14:44:40
SC1U233	VEC	3132	01/09/00	14:44:40
SC1U234	FLG	664	01/09/00	14:50:44
SC1U234	INP	6687	01/09/00	14:50:54
SC1U234	OUT	14043	01/09/00	14:51:06
SC1U234	PTI	1311	01/09/00	14:51:06
SC1U234	VEC	3132	01/09/00	14:51:06
SC1U236	FLG	664	01/09/00	14:56:48
SC1U236	INP	6687	01/09/00	14:56:56
SC1U236	OUT	14043	01/09/00	14:57:08
SC1U236	PTI	1311	01/09/00	14:57:06
SC1U236	VEC	3132	01/09/00	14:57:08
SC1U238	FLG	664	01/09/00	15:02:28
SC1U238	INP	6687	01/09/00	15:02:38
SC1U238	OUT	15341	01/09/00	15:02:50
SC1U238	PTI	1311	01/09/00	15:02:50
SC1U238	VEC	3132	01/09/00	15:02:50
SC2AC227	FLG	664	01/09/00	13:36:34
SC2AC227	INP	6687	01/09/00	13:36:42
SC2AC227	OUT	15498	01/09/00	13:36:52
SC2AC227	PTI	1311	01/09/00	13:36:52
SC2AC227	VEC	3132	01/09/00	13:36:52
SC2AM241	FLG	664	01/09/00	13:42:08
SC2AM241	INP	6689	01/09/00	13:42:18
SC2AM241	OUT	15554	01/09/00	13:42:30
SC2AM241	PTI	1311	01/09/00	13:42:30
SC2AM241	VEC	3132	01/09/00	13:42:30
SC2AM243	FLG	664	01/09/00	13:48:30
SC2AM243	INP	6690	01/09/00	13:48:38
SC2AM243	OUT	15425	01/09/00	13:48:52
SC2AM243	PTI	1311	01/09/00	13:48:52
SC2AM243	VEC	3132	01/09/00	13:48:52
SC2C14	FLG	662	01/09/00	13:53:18
SC2C14	INP	6690	01/09/00	13:53:28
SC2C14	OUT	14069	01/09/00	13:53:38
SC2C14	PTI	1311	01/09/00	13:53:38
SC2C14	VEC	3132	01/09/00	13:53:38
SC2I129	FLG	664	01/09/00	13:58:10
SC2I129	INP	6688	01/09/00	13:58:18
SC2I129	OUT	14069	01/09/00	13:58:30
SC2I129	PTI	1311	01/09/00	13:58:30
SC2I129	VEC	3132	01/09/00	13:58:30
SC2NP237	FLG	664	01/09/00	14:03:30
SC2NP237	INP	6689	01/09/00	14:03:40
SC2NP237	OUT	15352	01/09/00	14:03:52
SC2NP237	PTI	1311	01/09/00	14:03:52
SC2NP237	VEC	3132	01/09/00	14:03:52
SC2PU238	FLG	664	01/09/00	14:09:18
SC2PU238	INP	6688	01/09/00	14:09:30
SC2PU238	OUT	15352	01/09/00	14:09:42
SC2PU238	PTI	1311	01/09/00	14:09:42
SC2PU238	VEC	3132	01/09/00	14:09:42
SC2PU239	FLG	664	01/09/00	14:18:24
SC2PU239	INP	6690	01/09/00	14:18:24
SC2PU239	OUT	14127	01/09/00	14:17:02
SC2PU239	PTI	1311	01/09/00	14:17:02
SC2PU239	VEC	3132	01/09/00	14:17:02
SC2PU240	FLG	664	01/09/00	14:22:28

SC2PU240	INP	6690	01/09/00	14:22:38
SC2PU240	OUT	15352	01/09/00	14:22:50
SC2PU240	PTI	1311	01/09/00	14:22:50
SC2PU240	VEC	3132	01/09/00	14:22:50
SC2TC99	FLG	663	01/09/00	14:28:04
SC2TC99	INP	6687	01/09/00	14:28:14
SC2TC99	OUT	14127	01/09/00	14:28:26
SC2TC99	PTI	1311	01/09/00	14:28:26
SC2TC99	VEC	3132	01/09/00	14:28:26
SC2TH229	FLG	664	01/09/00	14:33:10
SC2TH229	INP	6690	01/09/00	14:33:20
SC2TH229	OUT	15425	01/09/00	14:33:32
SC2TH229	PTI	1311	01/09/00	14:33:32
SC2TH229	VEC	3132	01/09/00	14:33:32
SC2U232	FLG	664	01/09/00	14:39:00
SC2U232	INP	6688	01/09/00	14:39:16
SC2U232	OUT	15958	01/09/00	14:39:28
SC2U232	PTI	1311	01/09/00	14:39:28
SC2U232	VEC	3132	01/09/00	14:39:28
SC2U233	FLG	664	01/09/00	14:45:26
SC2U233	INP	6689	01/09/00	14:45:34
SC2U233	OUT	15498	01/09/00	14:45:50
SC2U233	PTI	1311	01/09/00	14:45:50
SC2U233	VEC	3132	01/09/00	14:45:50
SC2U234	FLG	664	01/09/00	14:51:46
SC2U234	INP	6689	01/09/00	14:51:56
SC2U234	OUT	14127	01/09/00	14:52:06
SC2U234	PTI	1311	01/09/00	14:52:06
SC2U234	VEC	3132	01/09/00	14:52:06
SC2U236	FLG	664	01/09/00	14:57:44
SC2U236	INP	6689	01/09/00	14:57:54
SC2U236	OUT	14127	01/09/00	14:58:06
SC2U236	PTI	1311	01/09/00	14:58:06
SC2U236	VEC	3132	01/09/00	14:58:06
SC2U238	FLG	664	01/09/00	15:03:40
SC2U238	INP	6689	01/09/00	15:03:50
SC2U238	OUT	15425	01/09/00	15:04:02
SC2U238	PTJ	1311	01/09/00	15:04:02
SC2U238	VEC	3132	01/09/00	15:04:02
SC3AC227	FLG	664	01/09/00	13:37:26
SC3AC227	INP	6688	01/09/00	13:37:34
SC3AC227	OUT	15498	01/09/00	13:37:46
SC3AC227	PTI	1311	01/09/00	13:37:46
SC3AC227	VEC	3132	01/09/00	13:37:46
SC3AM241	FLG	664	01/09/00	13:43:12
SC3AM241	INP	6689	01/09/00	13:43:18
SC3AM241	OUT	15554	01/09/00	13:43:30
SC3AM241	PTI	1311	01/09/00	13:43:30
SC3AM241	VEC	3132	01/09/00	13:43:30
SC3AM243	FLG	664	01/09/00	13:49:22
SC3AM243	INP	6690	01/09/00	13:49:30
SC3AM243	OUT	15425	01/09/00	13:49:42
SC3AM243	PTI	1311	01/09/00	13:49:42
SC3AM243	VEC	3132	01/09/00	13:49:42
SC3C14	FLG	662	01/09/00	13:54:24
SC3C14	INP	6690	01/09/00	13:54:32
SC3C14	OUT	14069	01/09/00	13:54:42
SC3C14	PTI	1311	01/09/00	13:54:42
SC3C14	VEC	3132	01/09/00	13:54:42
SC3I129	FLG	664	01/09/00	13:59:04
SC3I129	INP	6688	01/09/00	13:59:14
SC3I129	OUT	14069	01/09/00	13:59:24

SC3I129	PTI	1311	01/09/00	13:59:24
SC3I129	VEC	3132	01/09/00	13:59:24
SC3NP237	FLG	664	01/09/00	14:04:26
SC3NP237	INP	6689	01/09/00	14:04:38
SC3NP237	OUT	15352	01/09/00	14:04:50
SC3NP237	PTI	1311	01/09/00	14:04:50
SC3NP237	VEC	3132	01/09/00	14:04:50
SC3PU238	FLG	664	01/09/00	14:10:24
SC3PU238	INP	6688	01/09/00	14:10:32
SC3PU238	OUT	15352	01/09/00	14:10:44
SC3PU238	PTI	1311	01/09/00	14:10:44
SC3PU238	VEC	3132	01/09/00	14:10:44
SC3PU239	FLG	664	01/09/00	14:19:02
SC3PU239	INP	6691	01/09/00	14:19:10
SC3PU239	OUT	14127	01/09/00	14:19:26
SC3PU239	PTI	1311	01/09/00	14:19:26
SC3PU239	VEC	3132	01/09/00	14:19:26
SC3PU240	FLG	664	01/09/00	14:23:36
SC3PU240	INP	6690	01/09/00	14:23:46
SC3PU240	OUT	15352	01/09/00	14:23:58
SC3PU240	PTI	1311	01/09/00	14:23:58
SC3PU240	VEC	3132	01/09/00	14:23:58
SC3TC99	FLG	663	01/09/00	14:28:58
SC3TC99	INP	6688	01/09/00	14:29:08
SC3TC99	OUT	14127	01/09/00	14:29:18
SC3TC99	PTI	1311	01/09/00	14:29:18
SC3TC99	VEC	3132	01/09/00	14:29:18
SC3TH229	FLG	664	01/09/00	14:34:18
SC3TH229	INP	6690	01/09/00	14:34:30
SC3TH229	OUT	15425	01/09/00	14:34:42
SC3TH229	PTI	1311	01/09/00	14:34:42
SC3TH229	VEC	3132	01/09/00	14:34:42
SC3U232	FLG	664	01/09/00	14:40:08
SC3U232	INP	6688	01/09/00	14:40:18
SC3U232	OUT	15958	01/09/00	14:40:30
SC3U232	PTI	1311	01/09/00	14:40:30
SC3U232	VEC	3132	01/09/00	14:40:30
SC3U233	FLG	664	01/09/00	14:46:34
SC3U233	INP	6690	01/09/00	14:46:44
SC3U233	OUT	15498	01/09/00	14:46:58
SC3U233	PTI	1311	01/09/00	14:46:58
SC3U233	VEC	3132	01/09/00	14:46:58
SC3U234	FLG	664	01/09/00	14:52:56
SC3U234	INP	6690	01/09/00	14:53:04
SC3U234	OUT	14127	01/09/00	14:53:16
SC3U234	PTI	1311	01/09/00	14:53:16
SC3U234	VEC	3132	01/09/00	14:53:16
SC3U236	FLG	664	01/09/00	14:58:46
SC3U236	INP	6690	01/09/00	14:58:58
SC3U236	OUT	14127	01/09/00	14:59:10
SC3U236	PTI	1311	01/09/00	14:59:10
SC3U236	VEC	3132	01/09/00	14:59:10
SC3U238	FLG	664	01/09/00	15:04:38
SC3U238	INP	6690	01/09/00	15:04:48
SC3U238	OUT	15425	01/09/00	15:04:58
SC3U238	PTI	1311	01/09/00	15:04:58
SC3U238	VEC	3132	01/09/00	15:04:58
SC4AC227	FLG	664	01/09/00	13:38:28
SC4AC227	INP	6688	01/09/00	13:38:36
SC4AC227	OUT	15498	01/09/00	13:38:46
SC4AC227	PTI	1311	01/09/00	13:38:46
SC4AC227	VEC	3132	01/09/00	13:38:46

SC4AM241	FLG	664	01/09/00	13:44:24
SC4AM241	INP	6689	01/09/00	13:44:32
SC4AM241	OUT	15554	01/09/00	13:44:44
SC4AM241	PTI	1311	01/09/00	13:44:44
SC4AM241	VEC	3132	01/09/00	13:44:44
SC4AM243	FLG	664	01/09/00	13:50:26
SC4AM243	INP	6690	01/09/00	13:50:32
SC4AM243	OUT	15425	01/09/00	13:50:46
SC4AM243	PTI	1311	01/09/00	13:50:46
SC4AM243	VEC	3132	01/09/00	13:50:46
SC4C14	FLG	662	01/09/00	13:55:20
SC4C14	INP	6690	01/09/00	13:55:34
SC4C14	OUT	14069	01/09/00	13:55:50
SC4C14	PTI	1311	01/09/00	13:55:50
SC4C14	VEC	3132	01/09/00	13:55:50
SC4I129	FLG	664	01/09/00	13:59:58
SC4I129	INP	6688	01/09/00	14:00:10
SC4I129	OUT	14069	01/09/00	14:00:20
SC4I129	PTI	1311	01/09/00	14:00:20
SC4I129	VEC	3132	01/09/00	14:00:20
SC4NP237	FLG	664	01/09/00	14:05:24
SC4NP237	INP	6689	01/09/00	14:05:34
SC4NP237	OUT	15352	01/09/00	14:05:46
SC4NP237	PTI	1311	01/09/00	14:05:46
SC4NP237	VEC	3132	01/09/00	14:05:46
SC4PU238	FLG	664	01/09/00	14:11:34
SC4PU238	INP	6688	01/09/00	14:11:44
SC4PU238	OUT	15352	01/09/00	14:11:54
SC4PU238	PTI	1311	01/09/00	14:11:54
SC4PU238	VEC	3132	01/09/00	14:11:54
SC4PU240	FLG	664	01/09/00	14:25:12
SC4PU240	INP	6690	01/09/00	14:25:18
SC4PU240	OUT	15352	01/09/00	14:25:32
SC4PU240	PTI	1311	01/09/00	14:25:32
SC4PU240	VEC	3132	01/09/00	14:25:32
SC4TC99	FLG	663	01/09/00	14:29:50
SC4TC99	INP	6688	01/09/00	14:30:04
SC4TC99	OUT	14127	01/09/00	14:30:16
SC4TC99	PTI	1311	01/09/00	14:30:16
SC4TC99	VEC	3132	01/09/00	14:30:16
SC4TH229	FLG	664	01/09/00	14:35:22
SC4TH229	INP	6690	01/09/00	14:35:40
SC4TH229	OUT	15425	01/09/00	14:35:56
SC4TH229	PTI	1311	01/09/00	14:35:56
SC4TH229	VEC	3132	01/09/00	14:35:56
SC4U232	FLG	664	01/09/00	14:41:04
SC4U232	INP	6688	01/09/00	14:41:16
SC4U232	OUT	15958	01/09/00	14:41:32
SC4U232	PTI	1311	01/09/00	14:41:32
SC4U232	VEC	3132	01/09/00	14:41:32
SC4U233	FLG	664	01/09/00	14:47:36
SC4U233	INP	6690	01/09/00	14:47:46
SC4U233	OUT	15498	01/09/00	14:47:58
SC4U233	PTI	1311	01/09/00	14:47:58
SC4U233	VEC	3132	01/09/00	14:47:58
SC4U234	FLG	664	01/09/00	14:53:58
SC4U234	INP	6690	01/09/00	14:54:08
SC4U234	OUT	14127	01/09/00	14:54:18
SC4U234	PTI	1311	01/09/00	14:54:18
SC4U234	VEC	3132	01/09/00	14:54:18
SC4U236	FLG	664	01/09/00	14:59:42
SC4U236	INP	6690	01/09/00	14:59:52

SC4U236	OUT	14127	01/09/00	15:00:02
SC4U236	PTI	1311	01/09/00	15:00:02
SC4U236	VEC	3132	01/09/00	15:00:02
SC4U238	FLG	664	01/09/00	15:05:34
SC4U238	INP	6690	01/09/00	15:05:44
SC4U238	OUT	15425	01/09/00	15:05:56
SC4U238	PTI	1311	01/09/00	15:05:56
SC4U238	VEC	3132	01/09/00	15:05:56
SC5AC227	FLG	664	01/09/00	13:39:14
SC5AC227	INP	6688	01/09/00	13:39:22
SC5AC227	OUT	15498	01/09/00	13:39:32
SC5AC227	PTI	1311	01/09/00	13:39:32
SC5AC227	VEC	3132	01/09/00	13:39:32
SC5AM241	FLG	664	01/09/00	13:45:16
SC5AM241	INP	6689	01/09/00	13:45:26
SC5AM241	OUT	15554	01/09/00	13:45:36
SC5AM241	PTI	1311	01/09/00	13:45:36
SC5AM241	VEC	3132	01/09/00	13:45:36
SC5AM243	FLG	664	01/09/00	13:51:34
SC5AM243	INP	6691	01/09/00	13:51:46
SC5AM243	OUT	15425	01/09/00	13:52:02
SC5AM243	PTI	1311	01/09/00	13:52:02
SC5AM243	VEC	3132	01/09/00	13:52:02
SC5C14	FLG	662	01/09/00	13:56:20
SC5C14	INP	6690	01/09/00	13:56:30
SC5C14	OUT	14069	01/09/00	13:56:42
SC5C14	PTI	1311	01/09/00	13:56:42
SC5C14	VEC	3132	01/09/00	13:56:42
SC5I129	FLG	664	01/09/00	14:00:50
SC5I129	INP	6689	01/09/00	14:00:56
SC5I129	OUT	14069	01/09/00	14:01:08
SC5I129	PTI	1311	01/09/00	14:01:08
SC5I129	VEC	3132	01/09/00	14:01:08
SC5NP237	FLG	664	01/09/00	14:06:26
SC5NP237	INP	6689	01/09/00	14:06:32
SC5NP237	OUT	15352	01/09/00	14:06:44
SC5NP237	PTI	1311	01/09/00	14:06:44
SC5NP237	VEC	3132	01/09/00	14:06:44
SC5PU238	FLG	664	01/09/00	14:12:34
SC5PU238	INP	6689	01/09/00	14:12:42
SC5PU238	OUT	15352	01/09/00	14:12:54
SC5PU238	PTI	1311	01/09/00	14:12:54
SC5PU238	VEC	3132	01/09/00	14:12:54
SC5PU240	FLG	664	01/09/00	14:26:06
SC5PU240	INP	6691	01/09/00	14:26:14
SC5PU240	OUT	15352	01/09/00	14:26:28
SC5PU240	PTI	1311	01/09/00	14:26:28
SC5PU240	VEC	3132	01/09/00	14:26:28
SC5TC99	FLG	663	01/09/00	14:30:42
SC5TC99	INP	6688	01/09/00	14:30:52
SC5TC99	OUT	14127	01/09/00	14:31:02
SC5TC99	PTI	1311	01/09/00	14:31:02
SC5TC99	VEC	3132	01/09/00	14:31:02
SC5TH229	FLG	664	01/09/00	14:36:32
SC5TH229	INP	6691	01/09/00	14:36:44
SC5TH229	OUT	15425	01/09/00	14:37:00
SC5TH229	PTI	1311	01/09/00	14:37:00
SC5TH229	VEC	3132	01/09/00	14:37:00
SC5U232	FLG	664	01/09/00	14:42:06
SC5U232	INP	6689	01/09/00	14:42:18
SC5U232	OUT	15958	01/09/00	14:42:32
SC5U232	PTI	1311	01/09/00	14:42:32

SC5U232	VEC	3132	01/09/00	14:42:32
SC5U233	FLG	664	01/09/00	14:48:34
SC5U233	INP	6690	01/09/00	14:48:44
SC5U233	OUT	15498	01/09/00	14:48:56
SC5U233	PTI	1311	01/09/00	14:48:56
SC5U233	VEC	3132	01/09/00	14:48:56
SC5U234	FLG	664	01/09/00	14:54:56
SC5U234	INP	6690	01/09/00	14:55:04
SC5U234	OUT	14127	01/09/00	14:55:16
SC5U234	PTI	1311	01/09/00	14:55:16
SC5U234	VEC	3132	01/09/00	14:55:16
SC5U236	FLG	664	01/09/00	15:00:36
SC5U236	INP	6690	01/09/00	15:00:46
SC5U236	OUT	14127	01/09/00	15:00:58
SC5U236	PTI	1311	01/09/00	15:00:58
SC5U236	VEC	3132	01/09/00	15:00:58
SC5U238	FLG	664	01/09/00	15:06:30
SC5U238	INP	6690	01/09/00	15:06:40
SC5U238	OUT	15425	01/09/00	15:06:52
SC5U238	PTI	1311	01/09/00	15:06:52
SC5U238	VEC	3132	01/09/00	15:06:52
SC6AC227	FLG	664	01/09/00	13:40:04
SC6AC227	INP	6688	01/09/00	13:40:14
SC6AC227	OUT	15498	01/09/00	13:40:26
SC6AC227	PTI	1311	01/09/00	13:40:26
SC6AC227	VEC	3132	01/09/00	13:40:26
SC6AM241	FLG	664	01/09/00	13:46:06
SC6AM241	INP	6690	01/09/00	13:46:36
SC6AM241	OUT	15554	01/09/00	13:46:48
SC6AM241	PTI	1311	01/09/00	13:46:48
SC6AM241	VEC	3132	01/09/00	13:46:48
SC6I129	FLG	664	01/09/00	14:01:44
SC6I129	INP	6689	01/09/00	14:01:50
SC6I129	OUT	14069	01/09/00	14:02:02
SC6I129	PTI	1311	01/09/00	14:02:02
SC6I129	VEC	3132	01/09/00	14:02:02
SC6NP237	FLG	664	01/09/00	14:07:12
SC6NP237	INP	6690	01/09/00	14:07:18
SC6NP237	OUT	15352	01/09/00	14:07:30
SC6NP237	PTI	1311	01/09/00	14:07:30
SC6NP237	VEC	3132	01/09/00	14:07:30
SC6PU238	FLG	664	01/09/00	14:13:42
SC6PU238	INP	6689	01/09/00	14:14:30
SC6PU238	OUT	15352	01/09/00	14:14:42
SC6PU238	PTI	1311	01/09/00	14:14:42
SC6PU238	VEC	3132	01/09/00	14:14:42
SC6TC99	FLG	663	01/09/00	14:31:30
SC6TC99	INP	6688	01/09/00	14:31:42
SC6TC99	OUT	14127	01/09/00	14:31:54
SC6TC99	PTI	1311	01/09/00	14:31:54
SC6TC99	VEC	3132	01/09/00	14:31:54
SC6U232	FLG	664	01/09/00	14:43:14
SC6U232	INP	6689	01/09/00	14:43:20
SC6U232	OUT	15958	01/09/00	14:43:34
SC6U232	PTI	1311	01/09/00	14:43:34
SC6U232	VEC	3132	01/09/00	14:43:34
SC6U233	FLG	664	01/09/00	14:49:36
SC6U233	INP	6690	01/09/00	14:49:44
SC6U233	OUT	15498	01/09/00	14:50:02
SC6U233	PTI	1311	01/09/00	14:50:02
SC6U233	VEC	3132	01/09/00	14:50:02
SC6U234	FLG	664	01/09/00	14:55:48

SC6U234	INP	6690	01/09/00	14:55:58
SC6U234	OUT	14127	01/09/00	14:56:10
SC6U234	PTI	1311	01/09/00	14:56:10
SC6U234	VEC	3132	01/09/00	14:56:10
SC6U236	FLG	664	01/09/00	15:01:32
SC6U236	INP	6690	01/09/00	15:01:40
SC6U236	OUT	14127	01/09/00	15:01:52
SC6U236	PTI	1311	01/09/00	15:01:52
SC6U236	VEC	3132	01/09/00	15:01:52
SC6U238	FLG	664	01/09/00	15:07:38
SC6U238	INP	6690	01/09/00	15:07:48
SC6U238	OUT	15425	01/09/00	15:08:02
SC6U238	PTI	1311	01/09/00	15:08:02
SC6U238	VEC	3132	01/09/00	15:08:02