ENCLOSURE A

Beaver Valley Power Station (BVPS) Unit Nos. 1 and 2

Letter L-08-081

Scientech Calculation 17676-0002,
"Beaver Valley Power Station MACCS2 Input Data,"
Revision 3, August 17, 2007

Beaver Valley Power Station

MACCS2 Evacuation Sensitivity Runs

Calculation 17676-0004

Revision 3

Prepared by: _____ Date: August 15, 2007
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1.0 PURPOSE

This report documents the preparation and application of Beaver Valley Power Station (Units 1 and 2) (BVPS) site-specific input files for the severe accident consequence MELCOR Accident Consequence Code System MACCS2 [2] [3]. MACCS2 simulates the impact of severe accidents at nuclear power plants on the surrounding environment and is used for the quantification of Level 3 PSAs. The principal phenomena considered in MACCS2 are atmospheric transport, mitigative actions based on dose projections, dose accumulation by a number of pathways including food and water ingestion, early and latent health effects, and economic costs.

The model is appropriate for use with Unit 1 or Unit 2. This is because the two units are sited immediately adjacent to one another, and their exterior dimensions are essentially the same.

The calculation was performed under Purchase Order 55105239 dated July 27, 2006.

2.0 TECHNICAL APPROACH

The Level 3 severe accident consequence analysis was carried out with the MELCOR Accident Consequence Code System (MACCS2) code. MACCS2 simulates the impact of severe accidents at nuclear power plants on the surrounding environment. The principal phenomena considered in MACCS are atmospheric transport, mitigative actions based on dose projections, dose accumulation by a number of pathways including food and water ingestion, early and latent health effects, and economic costs. This analysis was performed with the MACCS2 version 1.13.1 [2] [3].

The input data sources and preparation are summarized in the next section. The MACCS2 code is described in the technical reports provided with the code package.

There are five user-prepared input files for MACCS2. They are commonly referred to as the ATMOS, EARLY, CHRONC, SITE, and MET files. The first three titles are also used to describe the main calculation phases of the code. The input files for MACCS2 prepared for BVPS are described in the following sections.

3.0 ASSUMPTIONS

a) The percentage of farm value of land and buildings from buildings given in NUREG/CR-4551 [1], Table 5.7 for Pennsylvania of 26.6 percent for Pennsylvania is assumed to be representative for the region.

b) Since there was no data in the 2002 Census of Agriculture for dairy sales for Harrison County, Ohio and Ohio County, West Virginia, data was taken from the 1997 Census of Agriculture for these counties for dairy sales.

c) Bad meteorological data was filled in with NOAA data from the Pittsburgh International Airport obtained from the NOAA Internet website.

d) Bad stability class data was filled in by using the stability class on either side of the bad data.

4.0 SITE DATA

The site data file was generated using SECPOP2000. The Environmental Protection Agency's computer program, SECPOP, has been used to calculate population estimates since 1973. In 1997, SECPOP90 was created to run on a PC and to use 1990 population and economic data.

When the U.S. Census Bureau released 2000 census population data and 1997 economic data, Sandia National Laboratories was tasked to develop a new version, SECPOP2000, to include the new data, be compatible with current Windows operating systems, and also be compatible with the 1990 data.

SECPOP90 supports both site and regional analyses. Site analysis evaluates population, land use, and economic data on a polar grid centered on a prescribed site. Regional analysis screens potential sites in a geographical region against a population criterion.

SECPOP2000 currently supports only site analysis. Regional analysis can be performed by using SECPOP90 as a screening tool followed by a confirmatory calculation with SECPOP2000 to evaluate potential sites with 2000 census data.

NUREG/CR-6525 [4] provides verification of the SECPOP90 and SECPOP2000 codes by comparing them with licensee-provided population data. The verification shows that SECPOP90 and SECPOP2000 provide reasonable population estimates. SECPOP2000 also agrees well with census estimates from other sources.

The county database input files to SECPOP90 and SECPOP2000 both contain a column labeled "Notes". In the county database developed for SECPOP90 by the code authors, each county entry is filled in. In the county database for SECPOP2000 many of the entries under the "Notes" column are blank. SECPOP2000 uses free formatting for reading the county data. When there are blanks in the "Notes" column, SECPOP2000 wraps around and reads information from the next line, i.e., different county and different variable. As a result, using the county database developed for SECPOP2000 will give erroneous results. For this analysis, the blanks were filled in with a dummy character (0 was used).

A second issue further exacerbates the "Notes" problem. There are a number of gaps in the numbering of the counties. SECPOP2000 expects the numbering to be sequential. The first gap is for county number 955. Counties beyond 955 are handled incorrectly by SECPOP2000. There are a total of 37 county indices that are currently skipped in the file. These correspond to counties that no longer exist. A workaround for this second is to insert dummy lines for the missing county indices. The West Virginia counties have county numbers higher than 955 and, therefore, are impacted by the county numbering problem.

The SECPOP2000 results were checked against hand calculations in Calculation 17676-0005 "SECPOP2000 Economic Data Output Check" [20] for the economic data to verify that SECPOP2000 was generating correct information for input into MACCS2. The county data file used in this analysis as in input into SECPOP2000 is provided in Attachment G.

4.1 Population Distribution

The population surrounding the Beaver Valley Power Station site, up to a 50 mile radius, was estimated based on the most recent United States Census Bureau decennial census data. Details are provided in "Calculation Package for Population Projections – Beaver Valley Power Station"

[18]. The population distribution was estimated in 9 concentric bands at 0 to 1 mile, 1 to 2 miles, 2 to 5 miles, 5 to 10 miles, 10 to 15 miles, 15 to 20 miles, 20 to 30 miles, 30 to 40 miles, and 40 to 50 miles, and 16 directional sectors with each direction consisting of 22.5 degrees. The population was projected to the year 2047 by calculating an annual growth rate for each county in the 50 mile radius derived from state and national population projections. Geometric growth rates were calculated for each county in Ohio and Pennsylvania based on 2030 county projections. However, if the county population had decreased from 2000 to 2030, it was assumed there was no growth through 2030 (i.e., the 2030 population was equal to the 2000 population), and the national growth rate was applied from 2030 to 2047 to obtain an overall multiplier fore the 2047 projection. For West Virginia, projections were available through 2050. The annual growth rate was applied to obtain a 2047 multiplier, unless a negative growth rate existed, in which case no growth was assumed. The population distribution used in the site file is provided in Attachment H.

4.2 Region Index

SECPOP2000 uses a default setting for the Region Index data block. For this analysis, region indexes were assigned based on the fractions of counties in each of the spatial intervals outward from the plant site. The Regional Economic Data data block assigns (Section 4.3 below) and provides the site economic to the regions used in the Region Index data block. Calculation 17676-0005 "SECPOP2000 Economic Data Output Check" [20] provides details of the development of the region index. Table 4-1 provides the Region Index used.

Table 4-1 Region Index Input into SECPOP2000

	rad (mi)	Radius (miles) 1	2	5	10	15	20	30	40	50	rad (mi)	
Direction	N	1	2	2	2	2	3	4	5	6	N	Direction
	NNE	1	2	2	2	2	7	8	9	10	NNE	
	NE	1	2	2	2	2	11	12	13	14	NE	
	ENE	1	2	2	2	15	16	17	18	19	ENE	
	E	1	2	2	2	20	21	22	23	24	E	
	ESE	1	2	2	25	26	21	21	27	28	ESE	
	SE	1	2	2	29	21	21	30	31	32	SE	
	SSE	1	2	2	33	34	35	36	37	38	SSE	
	S	1	2	2	2	39	37	40	41	42	S	
	SSW	1	2	2	43	44	45	46	47	48	SSW	
	SW	1	2	2	49	50	51	52	53	54	SW	
	WSW	1	2	2	55	56	57	58	59	60	WSW	
	W	1	2	2	61	62	63	64	65	66	W	
	WNW	1	2	2	67	68	69	70	71	72	WNW	
	NW	1	2	2	73	68	69	74	75	76	NW	
	NNW	1	2	2	77	78	79	80	81	82	NNW	
	rad (mi)	1	2	5	10	15	20	30	40	50	rad (mi)	
		Radius (miles)										

4.3 Economic Data

The SECPOP2000 code has an included data base of county economic factors derived from the 2000 census and various other government sources dated 1997 to 1999. For the preparation of data for the Beaver Valley model, the county data file was updated with input developed in the sections below to circa 2002 for the 26 counties within 50 miles of the plant. By this means the SITE file (Attachment G) contained updated values for each economic region and hence sector.

4.3.1 VNFRM - Average Non-Farm Value

VNFRM is the average nonfarm value for the region ($/person). VNFRM is calculated for each county based on equations from NUREG/R-6625 [4]. First a value of VNFRM is calculated for the entire United States. Then estimates of county values are made using the following equation:

$$VNFRM_{County} = VNFRM_{US} \frac{PCI_{County}}{PCI_{US}}$$

Where:

$VNFRM_{County}$ = average non-farm value for the county ($ / person)
$VNFRM_{US}$ = average non-farm value for the United States ($ / person)
PCI_{County} = per capita income for the county ($ / person)
PCI_{US} = per capita income for the United States ($ / person)

$VNFRM_{US}$ is calculated using the equation:

$$VNFRM_{US} = \frac{RTW_{US} + VSL_{US} - VFA_{US} + VFHP_{US}}{POP_{US}}$$

Where:

RTW_{US} = reproducible tangible wealth for the United States ($)
VSL_{US} = value of suburban land in the United States ($)
VFA_{US} = value of farm assets in the United States ($)
$VFHP_{US}$ = value of farm household possessions in the United States ($)
POP_{US} = population of the United States (persons)

VSL_{US} is calculated using the equation:

$$VSL_{US} = UBL_{US} \times MHV_{US} \times LPA_{US} \times FLV_{US}$$

Where:

UBL_{US} = amount urban and built-up land in the United States (acres)
MHV_{US} = median housing value for the United States ($ / house)
LPA_{US} = average number of housing lots per acre (houses / acre)
FLV_{US} = average fraction of house cost due to land value

Table 4-2 $VNFRM_{US}$ - Average Non-Farm Value for United States

Parameter	Value	Reference	Description
RTW_{US}	4.0989E+13	8, Tbl 1	reproducible tangible wealth for the United States ($)
UBL_{US}	1.0810E+08	15, pg 5	amount urban and built-up land in the United States (acres)
MHV_{US}	165,344	16, Tbl 3-22	median housing value for the United States ($ / house)
LPA_{US}	5	1, Sctn 5.2.3, pg 5-4	average number of housing lots per acre (houses / acre)
FLV_{US}	0.2	1, Sctn 5.2.3, pg 5-4	average fraction of house cost due to land value
VSL_{US}	1.7874E+13	Calculated	value of suburban land in the United States ($)
VFA_{US}	1.8053E+12	17	value of farm assets in the United States ($)
$VFHP_{US}$	0	4	value of farm household possessions in the United States ($)
POP_{US}	296,410,404	7	population of the United States (persons)
$VNFRM_{US}$	**1.9249E+05**	**Calculated**	**average non-farm value for the United States ($ / person)**

Table 4-3 $VNFRM_{County}$ - Average Non-Farm Value for Counties

County	Per Capita Income ($)	Ratio of County to US Per Capita Income	County VNFRM ($/person)
Allegheny, PA	$ 39,605	1.1983	$ 230,672
Armstrong, PA	$ 26,725	0.8086	$ 155,655
Beaver, PA	$ 27,436	0.8301	$ 159,796
Butler, PA	$ 31,233	0.9450	$ 181,911
Clarion, PA	$ 25,916	0.7841	$ 150,943
Fayette, PA	$ 25,424	0.7693	$ 148,077
Greene, PA	$ 22,108	0.6689	$ 128,764
Lawrence, PA	$ 25,591	0.7743	$ 149,050
Mercer, PA	$ 25,519	0.7721	$ 148,630
Venango, PA	$ 26,118	0.7903	$ 152,119
Washington, PA	$ 31,473	0.9523	$ 183,308
Westmoreland, PA	$ 30,243	0.9151	$ 176,144
Belmont, OH	$ 25,259	0.7643	$ 147,116
Carroll, OH	$ 23,161	0.7008	$ 134,897
Columbiana, OH	$ 24,038	0.7273	$ 140,005
Harrison, OH	$ 22,932	0.6939	$ 133,563
Jefferson, OH	$ 25,418	0.7691	$ 148,042
Mahoning, OH	$ 27,427	0.8299	$ 159,743
Portage, OH	$ 29,012	0.8778	$ 168,975
Stark, OH	$ 28,551	0.8639	$ 166,290
Trumbull, OH	$ 26,929	0.8148	$ 156,843
Tuscarawas, OH	$ 24,787	0.7500	$ 144,367
Brooke, WV	$ 25,355	0.7672	$ 147,675
Hancock, WV	$ 25,891	0.7834	$ 150,797
Marshall, WV	$ 24,859	0.7522	$ 144,786
Ohio, WV	$ 31,461	0.9519	$ 183,238
PCI_{US}	$ 33,050	-NA-	-NA-

4.3.2 FRMFRC - Fraction of Land Devoted to Farming

FRMFRC is Fraction of land devoted to farming in the region. It comes directly from 2002 Census of Agriculture [10] [11] [12].

Table 4-4 FRMFRC - Fraction of Land Devoted to Farming

County	Approximate Land Area (Acres)	Land Area in farms (Acres)	FRMFRC - Fraction of Land Devoted to Farming	Reference
Allegheny, PA	467,309	33,788	0.072303	10, Ch2, Tbl 8
Armstrong, PA	418,515	130,637	0.312144	10, Ch2, Tbl 8
Beaver, PA	277,896	62,801	0.225987	10, Ch2, Tbl 8
Butler, PA	504,662	143,985	0.285310	10, Ch2, Tbl 8
Clarion, PA	385,562	108,860	0.282341	10, Ch2, Tbl 8
Fayette, PA	505,688	125,034	0.247255	10, Ch2, Tbl 8
Greene, PA	368,551	141,684	0.384435	10, Ch2, Tbl 8
Lawrence, PA	230,695	86,987	0.377065	10, Ch2, Tbl 8
Mercer, PA	429,962	164,306	0.382141	10, Ch2, Tbl 8
Venango, PA	432,024	64,528	0.149362	10, Ch2, Tbl 8
Washington, PA	548,538	261,139	0.476064	10, Ch2, Tbl 8
Westmoreland, PA	656,310	150,967	0.230024	10, Ch2, Tbl 8
Belmont, OH	343,904	141,908	0.412638	11, Ch2, Tbl 8
Carroll, OH	252,591	123,506	0.488956	11, Ch2, Tbl 8
Columbiana, OH	340,772	136,080	0.399329	11, Ch2, Tbl 8
Harrison, OH	258,257	138,423	0.535989	11, Ch2, Tbl 8
Jefferson, OH	262,149	67,231	0.256461	11, Ch2, Tbl 8
Mahoning, OH	265,758	76,543	0.288018	11, Ch2, Tbl 8
Portage, OH	315,130	96,874	0.307410	11, Ch2, Tbl 8
Stark, OH	368,727	145,163	0.393687	11, Ch2, Tbl 8
Trumbull, OH	394,546	125,962	0.319258	11, Ch2, Tbl 8
Tuscarawas, OH	363,248	159,665	0.439548	11, Ch2, Tbl 8
Brooke, WV	56,863	13,843	0.243445	12, Ch2, Tbl 8
Hancock, WV	53,005	7,017	0.132384	12, Ch2, Tbl 8
Marshall, WV	196,476	90,568	0.460962	12, Ch2, Tbl 8
Ohio, WV	67,953	22,258	0.327550	12, Ch2, Tbl 8

4.3.3 DFP - Fraction of Farm Sales Resulting from Dairy Production

DFP is the fraction of farm sales resulting from dairy production in the region and is derived from the 2002 Census of Agriculture [10] [11] [12] [13] [14].

Table 4-5 DFP - Fraction of Farm Sales Resulting from Dairy Production

County	Total Sales ($1,000)	Milk & Other Dairy Products from Cows ($1,000)	DPF - Fraction of Farm Sales Resulting from Dairy Production	Reference
Allegheny, PA	$ 9,391	$ 311	0.033117	10, Ch2, Tbl 2
Armstrong, PA	$ 46,326	$ 6,699	0.144606	10, Ch2, Tbl 2
Beaver, PA	$ 10,828	$ 4,719	0.435815	10, Ch2, Tbl 2
Butler, PA	$ 32,458	$ 8,867	0.273184	10, Ch2, Tbl 2
Clarion, PA	$ 17,637	$ 9,843	0.558088	10, Ch2, Tbl 2
Fayette, PA	$ 21,344	$ 8,978	0.420633	10, Ch2, Tbl 2

County	Total Sales ($1,000)	Milk & Other Dairy Products from Cows ($1,000)	DPF - Fraction of Farm Sales Resulting from Dairy Production	Reference
Greene, PA	$ 7,197	$ 1,144	0.158955	10, Ch2, Tbl 2
Lawrence, PA	$ 22,361	$ 12,203	0.545727	10, Ch2, Tbl 2
Mercer, PA	$ 43,737	$ 21,307	0.487162	10, Ch2, Tbl 2
Venango, PA	$ 7,787	$ 3,739	0.480159	10, Ch2, Tbl 2
Washington, PA	$ 30,166	$ 8,836	0.292913	10, Ch2, Tbl 2
Westmoreland, PA	$ 35,464	$ 12,409	0.349904	10, Ch2, Tbl 2
Belmont, OH	$ 14,776	$ 4,700	0.318083	11, Ch2, Tbl 2
Carroll, OH	$ 23,283	$ 7,137	0.306533	11, Ch2, Tbl 2
Columbiana, OH	$ 43,559	$ 22,874	0.525127	11, Ch2, Tbl 2
Harrison, OH[1]	$ 16,830	$ 2,881	0.171182	13, Ch2, Tbl 2
Jefferson, OH	$ 6,765	$ 2,351	0.347524	11, Ch2, Tbl 2
Mahoning, OH	$ 27,501	$ 10,179	0.370132	11, Ch2, Tbl 2
Portage, OH	$ 24,695	$ 4,606	0.186515	11, Ch2, Tbl 2
Stark, OH	$ 69,046	$ 20,297	0.293963	11, Ch2, Tbl 2
Trumbull, OH	$ 30,568	$ 7,818	0.255758	11, Ch2, Tbl 2
Tuscarawas, OH	$ 52,072	$ 23,356	0.448533	11, Ch2, Tbl 2
Brooke, WV	$ 728	$ 206	0.282967	12, Ch2, Tbl 2
Hancock, WV	$ 596	$ -	0.000000	12, Ch2, Tbl 2
Marshall, WV	$ 2,945	$ 625	0.212224	12, Ch2, Tbl 2
Ohio, WV[1]	$ 1,744	$ 1,133	0.649656	14, Ch2, Tbl 2

Note 1: There was no data in the 2002 Census of Agriculture for dairy sales for Harrison County, Ohio and Ohio County, West Virginia. Data was taken from the 1997 Census of Agriculture for these counties for dairy sales.

4.3.4 ASFP - Annual Average Farm Sales

ASFP is the annual average farm sales for the region and is derived from the 2002 Census of Agriculture [10] [11] [12].

Table 4-6 ASFP - Annual Average Farm Sales

County	Land Area in farms (Acres)	Total Sales ($1,000)	ASFP - Annual Ave Farm Sales ($/hectare)	Reference
Allegheny, PA	33,788	$ 9,391	$ 687	10, Ch2, Tbl 2 & 8
Armstrong, PA	130,637	$ 46,326	$ 876	10, Ch2, Tbl 2 & 8
Beaver, PA	62,801	$ 10,828	$ 426	10, Ch2, Tbl 2 & 8
Butler, PA	143,985	$ 32,458	$ 557	10, Ch2, Tbl 2 & 8
Clarion, PA	108,860	$ 17,637	$ 400	10, Ch2, Tbl 2 & 8
Fayette, PA	125,034	$ 21,344	$ 422	10, Ch2, Tbl 2 & 8
Greene, PA	141,684	$ 7,197	$ 126	10, Ch2, Tbl 2 & 8
Lawrence, PA	86,987	$ 22,361	$ 635	10, Ch2, Tbl 2 & 8
Mercer, PA	164,306	$ 43,737	$ 658	10, Ch2, Tbl 2 & 8
Venango, PA	64,528	$ 7,787	$ 298	10, Ch2, Tbl 2 & 8
Washington, PA	261,139	$ 30,166	$ 285	10, Ch2, Tbl 2 & 8
Westmoreland, PA	150,967	$ 35,464	$ 580	10, Ch2, Tbl 2 & 8
Belmont, OH	141,908	$ 14,776	$ 257	11, Ch2, Tbl 2 & 8
Carroll, OH	123,506	$ 23,283	$ 466	11, Ch2, Tbl 2 & 8
Columbiana, OH	136,080	$ 43,559	$ 791	11, Ch2, Tbl 2 & 8
Harrison, OH	138,423	$ 16,830	$ 300	11, Ch2, Tbl 2 & 8
Jefferson, OH	67,231	$ 6,765	$ 249	11, Ch2, Tbl 2 & 8

County	Land Area in farms (Acres)	Total Sales ($1,000)	ASFP - Annual Ave Farm Sales ($/hectare)	Reference
Mahoning, OH	76,543	$ 27,501	$ 888	11, Ch2, Tbl 2 & 8
Portage, OH	96,874	$ 24,695	$ 630	11, Ch2, Tbl 2 & 8
Stark, OH	145,163	$ 69,046	$ 1,175	11, Ch2, Tbl 2 & 8
Trumbull, OH	125,962	$ 30,568	$ 600	11, Ch2, Tbl 2 & 8
Tuscarawas, OH	159,665	$ 52,072	$ 806	11, Ch2, Tbl 2 & 8
Brooke, WV	13,843	$ 728	$ 130	12, Ch2, Tbl 2 & 8
Hancock, WV	7,017	$ 596	$ 210	12, Ch2, Tbl 2 & 8
Marshall, WV	90,568	$ 2,945	$ 80	12, Ch2, Tbl 2 & 8
Ohio, WV	22,258	$ 1,744	$ 194	12, Ch2, Tbl 2 & 8

4.3.5 VFRM - Average Farmland Value for County

VFRM is the average farmland value for the county and includes the average value of farmland, buildings, and machinery. It is derived from the 2002 Census of Agriculture [10] [11] [12].

County	Land Area in farms (Acres)	Number of Farms	Estimated Market Value of Land & Buildings (Ave $ Per Acre)	Estimated Market Value of All Machinery & Equip (Ave Per Farm)	Estimated Market Value of All Machinery & Equip (Ave $ Per Acre)	VFRM - Ave Farmland Value (Ave $ Per Hectare)
Allegheny, PA	33,788	464	$ 4,763	$ 38,100	$ 523	$ 13,063
Armstrong, PA	130,637	739	$ 2,333	$ 60,428	$ 342	$ 6,610
Beaver, PA	62,801	645	$ 2,976	$ 37,071	$ 381	$ 8,295
Butler, PA	143,985	1,174	$ 3,950	$ 56,795	$ 463	$ 10,905
Clarion, PA	108,860	591	$ 1,837	$ 62,906	$ 342	$ 5,383
Fayette, PA	125,034	978	$ 1,844	$ 53,543	$ 419	$ 5,592
Greene, PA	141,684	881	$ 1,184	$ 33,740	$ 210	$ 3,444
Lawrence, PA	86,987	703	$ 2,441	$ 145,126	$ 1,173	$ 8,930
Mercer, PA	164,306	1,239	$ 2,070	$ 46,184	$ 348	$ 5,976
Venango, PA	64,528	473	$ 1,489	$ 29,244	$ 214	$ 4,209
Washington, PA	261,139	2,506	$ 2,095	$ 35,303	$ 339	$ 6,014
Westmoreland, PA	150,967	1,353	$ 2,814	$ 45,928	$ 412	$ 7,971
Belmont, OH	141,908	753	$ 1,644	$ 58,902	$ 313	$ 4,835
Carroll, OH	123,506	749	$ 2,091	$ 36,689	$ 222	$ 5,717
Columbiana, OH	136,080	1,184	$ 2,896	$ 62,850	$ 547	$ 8,507
Harrison, OH	138,423	450	$ 1,157	$ 34,933	$ 114	$ 3,140
Jefferson, OH	67,231	461	$ 1,866	$ 49,333	$ 338	$ 5,447
Mahoning, OH	76,543	652	$ 3,110	$ 51,881	$ 442	$ 8,777
Portage, OH	96,874	962	$ 4,245	$ 59,839	$ 594	$ 11,958
Stark, OH	145,163	1,337	$ 4,039	$ 70,527	$ 650	$ 11,586
Trumbull, OH	125,962	1,016	$ 3,017	$ 54,798	$ 442	$ 8,547
Tuscarawas, OH	159,665	1,076	$ 2,856	$ 60,830	$ 410	$ 8,070
Brooke, WV	13,843	98	$ 1,206	$ 29,948	$ 212	$ 3,504
Hancock, WV	7,017	85	$ 2,373	$ 25,996	$ 315	$ 6,642
Marshall, WV	90,568	706	$ 950	$ 17,881	$ 139	$ 2,692
Ohio, WV	22,258	166	$ 1,222	$ 23,891	$ 178	$ 3,460

4.4 SECPOP2000 Output/Results

Attachment A provides the MACCS2 site input deck generated by SECPOP2000. Several of the data blocks in this file were revised before use by MACCS2. Because of the desire to use 2047 population estimates, the population data developed in Section 4.1 were copied into the

"POPULATION" data block. The region indexes developed in Section 4.2 were copied into the "REGION INDEX" data block.

The MACCS2 site data input file uses fixed format. In the "REGIONAL ECONOMIC DATA" data block of the site input file, variable DPF "Fraction of Farm Sales Resulting from Dairy Production in Region" was offset by 4 spaces as generated by SECPOP2000. DPF is supposed to reside in columns 26 to 30 for MACCS2. Instead, SECPOP2000 outputs DPF to be in columns 25 to 34. This correction was also made to the site input file. The final site file used by MACCS2 is provided in Attachment I.

5.0 METEROLOGICAL DATA

Each year of meteorological data consists of 8,760 weather data sets of hourly recordings of wind direction, wind speed, atmospheric stability, and accumulated precipitation. The data were from the Beaver Valley Power Station site weather facility for the years 2001, 2002, 2003, 2004, and 2005. MACCS2 does not permit missing data, so bad data and blank data were filled in with NOAA from the Pittsburgh International Airport obtained from the NOAA Internet website. MACCS2 also does not accept more than 365 days worth of data for a single year. With 2004 being a leap year, the December 31, 2004 data was removed from the 2004 weather data set before being used by MACCS2. Attachment B provides the monthly data used to fill in missing or bad data, the raw meteorological data, and the final met data input files used as input to MACCS2 in embedded zip files.

6.0 MACCS2 ATMOS DATA

ATMOS calculates the dispersion and deposition of material released to the atmosphere as a function of downwind distance. It utilizes a Gaussian plume model with Pasquill-Gifford dispersion parameters (Turner 1970). The phenomena that ATMOS treats are (1) building wake effects, (2) buoyant plume rise, (3) plume dispersion during transport, (4) wet and dry deposition, and (5) radioactive decay and ingrowth. A detailed discussion of the atmospheric dispersion and deposition models implemented in MACCS2 is provided in Chapter 2 of the MACCS Model Description.

At the midpoint of each spatial interval along the transport path, air and ground concentrations for all the radionuclides are calculated as well as miscellaneous information about plume size, height, and transport timing. These data are stored in common blocks which are used later by the EARLY and CHRONC modules of MACCS2.

Transport and deposition in ATMOS are treated with a one-dimensional model. Concentration values are calculated only for the plume centerline. There is no calculation in ATMOS of off-centerline concentrations. The adjustment for off-axis location is handled in the EARLY and CHRONC modules.

MACCS incorporated a database limited to 60 radionuclides. In any single MACCS2 run, the user can define a list of up to 150 radionuclides (including all of the daughter products) which are to be considered in the analysis. All of the selected radionuclides must be present in the decay chain database included in the MACCS2 package and in the selected DCF file used for code execution.

Several different options for specifying weather conditions are available to the user. These include two weather sampling options (category bin sampling and strictly random sampling) as well as three different methods of specifying a single weather trial: (1) constant weather conditions, (2) fixed start time in the weather file, and (3) user-supplied 120-hr weather sequence.

It is up to the user to specify the various parameters needed for these calculations. There are no default values. All of this information is supplied through the user input file to ATMOS and all of the input parameters are described in Chapter 5 of the MACCS2 User's Guide [2].

Attachment C is an ATMOS input deck for Beaver Valley Power Station Unit 1 Release Category 'INTACT'. Most of the data was taken from Calculation NISYS-1092-C0005 [6]. Plume data for each of the release categories was determined in Calculation 17676-0001 [19]. The references used for each input parameter are listed by the parameter description. The plume data for all Unit 1 and Unit 2 release categories are provided in Attachment D. The MACCS2 ATMOS input decks for all release categories are provided in Attachment J.

7.0 MACCS2 EARLY DATA

The EARLY module models the time period immediately following a radioactive release. This period is commonly referred to as the emergency phase. It may extend up to 1 week after the arrival of the first plume at any downwind spatial interval. The subsequent intermediate and long-term periods are treated by CHRONC.

In the EARLY module the user may specify emergency response scenarios that include evacuation, sheltering, and dose-dependent relocation. The EARLY module has the capability for combining results from up to three different emergency response scenarios. This is accomplished by appending change records to the EARLY input file. The first emergency response scenario is defined in the main body of the EARLY input file. Up to two additional emergency-response scenarios can be defined through change record sets positioned at the end of the file. The delimiter used to separate the change record sets is a period (.) in column 1 that is also used to signify the end of a MACCS2 user input file. All of the MACCS2 user input files must thus end with a period in column 1.

The purpose of the change-record processing in EARLY is solely to allow modification of the previously specified emergency response scenario data. Any records appearing in the change record sets must have been previously defined in either the evacuation zone data or the shelter and relocation data. If data items from another data block appear in the change records, they will be ignored. Each set of change records must include a new value of EANAM2, a text field describing the emergency response scenario. Also, each set of change records must produce a change in at least one of the numeric input variables described in the evacuation zone data or in the shelter and relocation data.

Results are output for each of the user-defined emergency-response scenarios and for a weighted sum of the emergency-response scenarios. Scenarios may be combined by assigning time fractions (frequencies of occurrence) or population fractions (fraction of the population engaging in the specified behavior) to each scenario or by a simple summation of the results for each emergency-response scenario (when a unique population distribution is defined for each emergency-response scenario).

CCDFs calculated for emergency-response scenarios combined based on time fractions are a function of the probability for each meteorological trial/wind direction multiplied by the time fraction applied to the emergency-response scenario. Emergency-response scenarios combined using population fractions are a function of the consequence calculated for each meteorological trial/wind direction multiplied by the fraction of people assigned to the scenario. The approach selected (fraction of people or fraction of time) will affect the shape of the CCDF but will not affect the mean results.

For results that are calculated by both EARLY and CHRONC, such as population dose and cancer cases, the OUTPUT module automatically adds the value of the consequence calculated by CHRONC to the value of the same consequence measure produced by EARLY in order to generate the overall combined results. If more than one EARLY emergency response scenario is being run, these results are combined according to the weighting fractions supplied by the user in the EARLY input file, and the weighted sum is then combined with the CHRONC result to produce the overall result. Whenever results are combined by the code, the listing produced by the OUTPUT module will present the overall combination of results as well as each of the components from which it is constructed.

Attachment E is an EARLY input deck for Beaver Valley Power Station Unit 1. Most of the data was taken from Calculation NISYS-1092-C0005 [6]. The references used for each input parameter are listed by the parameter description.

8.0 MACCS2 CHRONC DATA

The CHRONC module simulates the events that occur following the emergency-phase time period modeled by EARLY. Various long-term protective actions may be taken during this period to limit radiation doses to acceptable levels. The parameters defining these protective actions are under user control, and all of them are described in Chapter 7 of the MACCS2 User's Guide [2].

CHRONC calculates the individual health effects that result from both (1) direct exposure to contaminated ground and from inhalation of resuspended materials as well as (2) indirect health effects caused by the consumption of contaminated food and water by individuals who could reside both on and off of the computational grid. CHRONC also calculates the economic costs of the long-term protective actions as well as the cost of the emergency response actions that were modeled in the EARLY module.

It is up to the user to specify the various parameters needed for these calculations. There are no default values for the parameters used by CHRONC. In addition to specifying the characteristics of the model, the user has complete control over the output produced by CHRONC and must explicitly specify which results are to be produced. All of this information is supplied through the CHRONC input file, and all of the input parameters are described in Chapter 7 of the MACCS2 User's Guide [2].

Four long-term exposure pathways are modeled in MACCS2 to predict the long-term radiation exposures from accidental radiological releases: groundshine, resuspension inhalation, ingestion of contaminated food, and ingestion of contaminated drinking water. The dose from each of the long-term pathways is evaluated for each spatial element surrounding the accident site. For the intermediate phase, only the groundshine and resuspension inhalation exposure pathways are considered.

MACCS2 incorporates two options for the user regarding food ingestion models: (1) the food ingestion model of MACCS and (2) the COMIDA-based food ingestion model. The MACCS food ingestion model is based on the simple principle that the long-term dose produced by any radionuclide to an organ via a pathway is the product of (1) the ground concentration of the radionuclide, (2) the integrated transfer factor for the radionuclide to human intake for the pathway, and (3) the ingestion dose conversion factor. There are a number of limitations of the MACCS food ingestion model. A main drawback of this model is that the integrated transfer factors for food pathway radionuclides not included in the MACCS sample problems must be derived by the user external to the code. The calculation procedures are difficult and error prone. In contrast, the

COMIDA2-based ingestion model is based on a preprocessor that can be exercised by the user, with consideration of site-specific data, if such data are available.

The radiation dose for the exposure pathways of the intermediate and long-term phases is calculated for each of the coarse spatial elements using the initial ground concentration under the plume centerline calculated by the ATMOS module. Similar to the early exposure pathways, MACCS2 uses an off-centerline correction factor and the ground concentration under the plume centerline to estimate the initial ground concentration at the off-centerline region of various spatial elements. In contrast to EARLY, however, which utilizes a Gaussian histogram subdividing each 22.5-degree compass sector, the CHRONC calculations do not utilize the Gaussian histogram subdivisions in any respect.

For all of the CHRONC calculations, relating to both direct exposure (groundshine and resuspension as well as food and water ingestion) the Gaussian is averaged over the entire 22.5-degree compass sector to yield a single off-centerline geometric adjustment factor.

Attachment F is a CHRONC input deck for Beaver Valley Power Station Unit 1. Most of the data was taken from Calculation NISYS-1092-C0005 [6]. The references used for each input parameter are listed by the parameter description.

8.1 Economic Data - CHRONC

8.1.1 EVACST - Daily Cost of Compensation for Evacuees (Emergency Phase)

EVACST defines the daily cost of compensation for evacuees and short-term relocatees who are removed from their homes as a result of radiation exposure during the emergency-phase period. This value could include the following components: food, housing, transportation, and lost income.

NUREG/CR-4551 [1], Table 5.1 gives a value of $27 per day as the recommended cost for EVACST. This value is based on 1986 dollars (See Section 5.2.1 of NUREG/CR-4551). The EVACST value range provided in NUREG/CR-4551 is $25 to $30 per day. The values were corrected for 2006 average dollars through June using Consumer Price Index data from the U.S. Department of Labor [5] in the table below.

Table 8-1 EVACST – Daily Cost of Compensation for Evacuees (Emergency Phase)

EVACST				
Year	**Recommended**	**Low**	**High**	**Average CPI**
Ave 1986	$ 27.00	$ 25.00	$ 30.00	109.6
Ave 2006 thru June	$ 49.42	$ 45.76	$ 54.91	200.6

8.1.2 RELCST - Daily Cost of Compensation for Individuals (Intermediate Phase)

RELCST Defines the daily cost of compensation for individuals removed from their homes due to intermediate-phase relocation modeled by CHRONC. The costs should include the following components: food, housing, transportation, lost income, and replacement of lost personal property.

The value for RELCST is based on the same analysis used for EVACST above and will have a value of $49.42 after adjustment for average 2006 dollar through June.

8.1.3 CDFRM - Farmland Decontamination Cost

CDFRM defines the farmland decontamination cost. A value must be supplied for each of the decontamination levels and the values must be monotonically increasing. Two decontamination levels are defined.

The values for the example problem from NUREG/CR-6613 [2] were used. These were developed from the sample problem from NUREG/CR-4551 [1]. The values are assumed to be based on 1982 dollars and were adjusted for 2006 average dollars through June.

Table 8-2 CDFRM – Farmland Decontamination Cost

CDFRM			
Year	Decon Level 1 Cost ($ per hectacre)	Decon Level 2 Cost ($ per hectacre)	Average CPI
Ave 1982	$ 562.50	$ 1,250.00	96.5
Ave 2006 thru June	$ 1,169.30	$ 2,598.45	200.6

8.1.4 CDNFRM - Non-Farmland Decontamination Cost

CDNFRM defines the non-farmland decontamination cost. A value must be supplied for each of the decontamination levels and the values must be monotonically increasing.

As above for CDFRM, the values for the example problem from NUREG/CR-6613 [2] were used.

Table 8-3 CDNFRM – Non-Farmland Decontamination Cost

CDNFRM			
Year	Decon Level 1 Cost ($ per hectacre)	Decon Level 2 Cost ($ per hectacre)	Average CPI
Ave 1982	$ 3,000.00	$ 8,000.00	96.5
Ave 2006 thru June	$ 6,236.27	$ 16,630.05	200.6

8.1.5 DLBCST - Labor Cost of Decontamination

DLBCST defines the labor cost of a decontamination worker. The value for the example problem from NUREG/CR-6613 [2] was used.

Table 8-4 DLBCST – Labor Cost of Decontamination

DLBCST		
Year	Decon Labor Cost ($ per man-year)	Average CPI
Ave 1982	$ 35,000.00	96.5
Ave 2006 thru June	$ 72,756.48	200.6

8.1.6 POPCST - Per Capita Removal Cost of Population and Business

POPCST defines the per capita removal cost for temporary or permanent relocation of population and businesses in a region rendered uninhabitable during the long-term phase time period. This cost is assessed if any of the following actions are required: decontamination alone, decontamination followed by interdiction, or condemnation. This value should be derived in a way

that takes account of both personal and corporate income losses for a transitional period as well as moving expenses.

NUREG/CR-4551 [1], Table 5.1 gives a value of $5,000 as the recommended cost for POPCST. This value is based on 1986 dollars (See Section 5.2.3 of NUREG/CR-4551). The POPCST value range provided in NUREG/CR-4551 is $3,500 to $7,500. The values were corrected for 2006 average dollars through June are provided below.

Table 8-5 POPCST – Per Capita Removal Cost of Population and Business

POPCST Year	Recommended	Low	High	Average CPI
Ave 1986	$ 5,000.00	$ 3,500.00	$ 7,500.00	109.6
Ave 2006 thru June	$ 9,151.46	$ 6,406.02	$ 13,727.19	200.6

Use $13,727.19 as a conservative estimate.

8.1.7 VALWNF - Value of Non-Farm Wealth

VALWNF defines the value of the nonfarm wealth in the region. Nonfarm wealth includes all public and private property not associated with farming that would be unusable if the region was rendered either temporarily or permanently uninhabitable. This value should include the cost of land, buildings, infrastructure, and the cost of any nonrecoverable equipment or machinery.

Table 8-6 VALWNF – Value of Non-Farm Wealth

County	Population	County VNFRM ($/person)	Total County Wealth ($)
Allegheny, PA	1,281,666	$ 230,672	$295,643,964,069
Armstrong, PA	72,392	$ 155,655	$ 11,268,144,943
Beaver, PA	181,412	$ 159,796	$ 28,988,846,933
Butler, PA	174,083	$ 181,911	$ 31,667,530,622
Clarion, PA	41,765	$ 150,943	$ 6,304,121,760
Fayette, PA	148,644	$ 148,077	$ 22,010,778,284
Greene, PA	40,672	$ 128,764	$ 5,237,078,943
Lawrence, PA	94,643	$ 149,050	$ 14,106,520,053
Mercer, PA	120,293	$ 148,630	$ 17,879,202,510
Venango, PA	57,565	$ 152,119	$ 8,756,742,159
Washington, PA	202,897	$ 183,308	$ 37,192,716,785
Westmoreland, PA	369,993	$ 176,144	$ 65,172,219,674
Belmont, OH	70,226	$ 147,116	$ 10,331,377,265
Carroll, OH	28,836	$ 134,897	$ 3,889,882,286
Columbiana, OH	112,075	$ 140,005	$ 15,691,021,375
Harrison, OH	15,856	$ 133,563	$ 2,117,774,457
Jefferson, OH	73,894	$ 148,042	$ 10,939,429,839
Mahoning, OH	257,555	$ 159,743	$ 41,142,665,761
Portage, OH	152,061	$ 168,975	$ 25,694,468,978
Stark, OH	378,098	$ 166,290	$ 62,873,818,894
Trumbull, OH	225,116	$ 156,843	$ 35,307,805,482
Tuscarawas, OH	90,914	$ 144,367	$ 13,124,986,595
Brooke, WV	25,447	$ 147,675	$ 3,757,892,396
Hancock, WV	32,667	$ 150,797	$ 4,926,088,533
Marshall, WV	35,519	$ 144,786	$ 5,142,668,380
Ohio, WV	47,433	$ 183,238	$ 8,691,550,378
	4,331,722	**VALWNF**	**$ 181,881**

VALWNF was determined to be $181,881/person and used VNFRM as determined in Section 4.3 above and the 2000 U.S. Census data [7].

8.1.8 VALWF - Estimated Market Value of Farms

VALWF defines the value of farm wealth in the region. This value should include both publicly and privately owned grazing lands, farmland, farm buildings, and nonrecoverable farm machinery, as well as any publicly owned infrastructure serving the farm industry.

Table 8-7 VALWF - Estimated Market Value of Farms

County	Land Area in Farms (Acres)	Number of Farms	Estimated Market Value of Land & Buildings (Ave $ Per Acre)	Estimated Market Value of All Machinery & Equip (Ave Per Farm)	Estimated Market Value of All Machinery & Equip (Ave $ Per Acre)	Estimated Value of Land, Bldgs, & Equip (Ave $ Per Acre)	Total Estimated Market Value of Land, Bldgs, & Equip ($)
Allegheny, PA	33,788	464	$ 4,763	$ 38,100	$ 523	$ 5,286	$ 178,610,644
Armstrong, PA	130,637	739	$ 2,333	$ 60,428	$ 342	$ 2,675	$ 349,432,413
Beaver, PA	62,801	645	$ 2,976	$ 37,071	$ 381	$ 3,357	$ 210,806,571
Butler, PA	143,985	1,174	$ 3,950	$ 56,795	$ 463	$ 4,413	$ 635,418,080
Clarion, PA	108,860	591	$ 1,837	$ 62,906	$ 342	$ 2,179	$ 237,153,266
Fayette, PA	125,034	978	$ 1,844	$ 53,543	$ 419	$ 2,263	$ 282,927,750
Greene, PA	141,684	881	$ 1,184	$ 33,740	$ 210	$ 1,394	$ 197,478,796
Lawrence, PA	86,987	703	$ 2,441	$ 145,126	$ 1,173	$ 3,614	$ 314,358,845
Mercer, PA	164,306	1,239	$ 2,070	$ 46,184	$ 348	$ 2,418	$ 397,335,396
Venango, PA	64,528	473	$ 1,489	$ 29,244	$ 214	$ 1,703	$ 109,914,604
Washington, PA	261,139	2,506	$ 2,095	$ 35,303	$ 339	$ 2,434	$ 635,555,523
Westmoreland, PA	150,967	1,353	$ 2,814	$ 45,928	$ 412	$ 3,226	$ 486,961,722
Belmont, OH	141,908	753	$ 1,644	$ 58,902	$ 313	$ 1,957	$ 277,649,958
Carroll, OH	123,506	749	$ 2,091	$ 36,689	$ 222	$ 2,313	$ 285,731,107
Columbiana, OH	136,080	1,184	$ 2,896	$ 62,850	$ 547	$ 3,443	$ 468,502,080
Harrison, OH	138,423	450	$ 1,157	$ 34,933	$ 114	$ 1,271	$ 175,875,261
Jefferson, OH	67,231	461	$ 1,866	$ 49,333	$ 338	$ 2,204	$ 148,195,559
Mahoning, OH	76,543	652	$ 3,110	$ 51,881	$ 442	$ 3,552	$ 271,875,142
Portage, OH	96,874	962	$ 4,245	$ 59,839	$ 594	$ 4,839	$ 468,795,248
Stark, OH	145,163	1,337	$ 4,039	$ 70,527	$ 650	$ 4,689	$ 680,607,956
Trumbull, OH	125,962	1,016	$ 3,017	$ 54,798	$ 442	$ 3,459	$ 435,702,122
Tuscarawas, OH	159,665	1,076	$ 2,856	$ 60,830	$ 410	$ 3,266	$ 521,456,320
Brooke, WV	13,843	98	$ 1,206	$ 29,948	$ 212	$ 1,418	$ 19,629,562
Hancock, WV	7,017	85	$ 2,373	$ 25,996	$ 315	$ 2,688	$ 18,861,001
Marshall, WV	90,568	706	$ 950	$ 17,881	$ 139	$ 1,089	$ 98,663,586
Ohio, WV	22,258	166	$ 1,222	$ 23,891	$ 178	$ 1,400	$ 31,165,182
	2,819,757	**21,441**	**Value of Farm Wealth in Region ($/hectacre) - VALWF**				**$ 6,957**

VALWF was determined to be $6,957/hectacre and used 2002 data from the "2002 Census of Agriculture" [10] [11] [12].

8.1.9 FRFIM - Fraction of Farm Wealth in Region Due to Improvements

FRFIM defines the fraction of farm wealth in the region due to improvements. This value includes farm buildings, and nonrecoverable machinery, as well as any infrastructure such as silos or irrigation, which is devoted exclusively to the support of farming.

FRFIM was determined by subtracting the value of the land from the total farm wealth and dividing by the total farm wealth as follows:

$$FRFIM = \frac{\sum Val_{Total} - \sum Val_{Land}}{\sum Val_{Total}}$$

The 2002 Census of Agriculture provides the value of farms in terms of the market value of land and buildings. The census does not split out buildings separately from the land. NUREG/CR-4551 [1], Table 5.7 gives the percentage of value by buildings as 26.6 percent for Pennsylvania. This is assumed to be representative for the region. Based on this assumption, FRFIM was calculated to be 0.369 as shown in Table 8-8.

Table 8-8 FRFIM - Fraction of Farm Wealth in Region Due to Improvements

County	Land Area in Farms (Acres)	Estimated Market Value of Land & Buildings (Ave $ Per Acre)	Total Estimated Market Value of Land, Bldgs, & Equip ($)	Total Estimated Market Value of Land & Bldgs ($)	Estimated Value of Land ($)
Allegheny, PA	33,788	$ 4,763	$ 178,610,644	$ 160,932,244	$ 118,124,267
Armstrong, PA	130,637	$ 2,333	$ 349,432,413	$ 304,776,121	$ 223,705,673
Beaver, PA	62,801	$ 2,976	$ 210,806,571	$ 186,895,776	$ 137,181,500
Butler, PA	143,985	$ 3,950	$ 635,418,080	$ 568,740,750	$ 417,455,711
Clarion, PA	108,860	$ 1,837	$ 237,153,266	$ 199,975,820	$ 146,782,252
Fayette, PA	125,034	$ 1,844	$ 282,927,750	$ 230,562,696	$ 169,233,019
Greene, PA	141,684	$ 1,184	$ 197,478,796	$ 167,753,856	$ 123,131,330
Lawrence, PA	86,987	$ 2,441	$ 314,358,845	$ 212,335,267	$ 155,854,086
Mercer, PA	164,306	$ 2,070	$ 397,335,396	$ 340,113,420	$ 249,643,250
Venango, PA	64,528	$ 1,489	$ 109,914,604	$ 96,082,192	$ 70,524,329
Washington, PA	261,139	$ 2,095	$ 635,555,523	$ 547,086,205	$ 401,561,274
Westmoreland, PA	150,967	$ 2,814	$ 486,961,722	$ 424,821,138	$ 311,818,715
Belmont, OH	141,908	$ 1,644	$ 277,649,958	$ 233,296,752	$ 171,239,816
Carroll, OH	123,506	$ 2,091	$ 285,731,107	$ 258,251,046	$ 189,556,268
Columbiana, OH	136,080	$ 2,896	$ 468,502,080	$ 394,087,680	$ 289,260,357
Harrison, OH	138,423	$ 1,157	$ 175,875,261	$ 160,155,411	$ 117,554,072
Jefferson, OH	67,231	$ 1,866	$ 148,195,559	$ 125,453,046	$ 92,082,536
Mahoning, OH	76,543	$ 3,110	$ 271,875,142	$ 238,048,730	$ 174,727,768
Portage, OH	96,874	$ 4,245	$ 468,795,248	$ 411,230,130	$ 301,842,915
Stark, OH	145,163	$ 4,039	$ 680,607,956	$ 586,313,357	$ 430,354,004
Trumbull, OH	125,962	$ 3,017	$ 435,702,122	$ 380,027,354	$ 278,940,078
Tuscarawas, OH	159,665	$ 2,856	$ 521,456,320	$ 456,003,240	$ 334,706,378
Brooke, WV	13,843	$ 1,206	$ 19,629,562	$ 16,694,658	$ 12,253,879
Hancock, WV	7,017	$ 2,373	$ 18,861,001	$ 16,651,341	$ 12,222,084
Marshall, WV	90,568	$ 950	$ 98,663,586	$ 86,039,600	$ 63,153,066
Ohio, WV	22,258	$ 1,222	$ 31,165,182	$ 27,199,276	$ 19,964,269
Fraction of Farm Wealth in Region Due to Improvements - FRFIM				**0.369**	

9.0 REFERENCES

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2. NUREG/CR-6613, "Code manual for MACCS2: Volume 1 User's Guide", May 1998

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4. NUREG/CR-6525, Revision 1, "SECPOP2000: Sector Population, Land Fraction, and Economic Estimation Program"

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7. U.S. Census Bureau, http://www.census.gov/popest/national/files/NST_EST2005_ALLDATA.csv (2005 data)

8. Bureau of Economic Analysis, "The Survey of Current Business", Volume 86, No. 9, September 2006.

9. Bureau of Economic Analysis, Regional Economic Information System, Table CA1-3, http://www.bea.gov/bea/regional/reis/CA1-3fn.cfm (2004 data)

10. 2002 Census of Agriculture, Pennsylvania State and County Data, Volume 1, Geographic Area Series, Part 38, AC-02-A-38.

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15. National Resources Inventory, 2003 Annual NRI - Land Use (2003 Data).

16. American Housing Survey of the United States 2005.

17. Balance sheet of the U.S. farming sector, 2002- 2006F (2005 data)

18. "Calculation Package for Population Projections - Beaver Valley Power Station", November 14, 2006.

19. Calculation 17676-0001, "Beaver Valley Power Station - MACCS2 Plume Data", Revision 0.

20. Calculation 17676-0005, "SECPOP2000 Economic Data Output Check", Revision 0.

Attachment A

SECPOP2000 Output – MACCS2 Site Data File

```
SECPOP2000 V3.12  MACCS2 Site Data File for Beaver Valley  (C:\Program
Files\SECPOP\SITES\Beaver Valley.sit)
 Lat: 40d37'19'' Long:  80d26' 2'' Population multiplier: 1.0000   08/14/2007
   9 SPATIAL INTERVALS
  16 WIND DIRECTIONS
   7 CROP CATEGORIES
   4 WATER PATHWAY ISOTOPES
   1 WATERSHEDS
  82 ECONOMIC REGIONS
 SPATIAL DISTANCES     KILOMETERS
    1.6093    3.2187    8.0467   16.0935   24.1402   32.1869   48.2804   64.3739
   80.4674
 POPULATION
        0.      197.      835.     1708.     4297.     2679.    40448.    27393.
    67035.
        0.       62.     1016.     3875.    20102.    19651.    25927.    14394.
    26361.
       93.        4.     1062.    18244.    18866.     8256.    11544.    20468.
     9705.
       38.        7.      683.    14834.    13403.    26225.    26859.    52734.
    31197.
       88.       74.     1039.    19461.    18133.    20890.    73055.    88641.
    43404.
        0.       64.      713.     7307.    31028.    32047.   410196.   343130.
   115071.
        7.      116.      284.     1589.     5136.    20102.   227938.   114676.
    79774.
        0.       22.      637.     1697.     1105.     5210.    39083.    49039.
    21216.
        0.       18.      486.     1022.     1064.     5479.     5494.    10274.
     5221.
        0.       35.      742.     1284.     5120.    23299.    38710.    35720.
    72617.
        2.       25.      619.     2198.     9357.     6325.    20523.    10554.
    12337.
        0.       73.      217.     1886.     1931.     1568.     5090.     6314.
     9276.
        0.      141.      723.    19117.     6926.     1535.     4182.    15333.
    19628.
        0.        0.      802.     7332.     3491.     3151.    10727.    25741.
    83296.
      132.     1651.     1753.     1655.     2716.     5793.    33243.    19379.
    26594.
       53.      470.      573.     1283.     1975.     9801.    38242.   218945.
   123093.
 LAND FRACTION
 0.98 0.98 0.98 0.98 0.98 0.99 0.99 0.99 0.98
 0.98 0.98 0.98 0.98 0.98 0.99 0.99 0.99 0.99
 0.98 0.98 0.98 0.98 0.98 0.98 0.99 0.99 0.99
 0.98 0.98 0.98 0.98 0.98 0.99 0.99 0.99 0.99
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 0.00 0.98 0.98 0.98 1.00 1.00 0.99 0.99 0.99
 0.98 0.98 0.98 0.98 0.96 0.96 0.98 0.98 0.99
 0.98 0.98 0.98 0.95 0.96 1.00 1.00 0.99 0.99
 0.00 0.98 0.97 0.94 0.98 1.00 0.99 0.99 0.99
```

```
0.98 0.98 0.96 0.97 0.99 1.00 0.99 0.99 0.99
0.98 0.00 0.98 0.99 0.99 0.99 0.99 0.99 0.99
0.98 0.98 0.98 0.99 0.99 0.99 0.99 0.98 0.97
0.98 0.98 0.98 0.98 0.99 0.99 0.98 0.98 0.97
REGION INDEX
1 2 2 2 2 3 4 5 6
1 2 2 2 2 7 8 910
1 2 2 2 211121314
1 2 2 21516171819
1 2 2 22021222324
1 2 2252621212728
1 2 2292121303132
1 2 2333435363738
1 2 2 23937404142
1 2 2434445464748
1 2 2495051525354
1 2 2555657585960
1 2 2616263646566
1 2 2676869707172
1 2 2736869747576
1 2 2777879808182
WATERSHED INDEX
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
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1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
CROP SEASON AND SHARE
  1 PASTURE                90. 270.  0.4100
  2 STORED FORAGE         150. 240.  0.1300
  3 GRAINS                150. 240.  0.2100
  4 GRN LEAFY VEGETABLES  150. 240.  0.0020
  5 OTHER FOOD CROPS      150. 240.  0.0040
  6 LEGUMES AND SEEDS     150. 240.  0.1500
  7 ROOTS AND TUBERS      150. 240.  0.0030
WATERSHED DEFINITION  -- INITIAL AND ANNUAL WASHOFF AND INGESTION FACTORS
  1 Sr-89                          5.00E-06       0.0
  2 Sr-90                          5.00E-06       0.0
  3 Cs-134                         5.00E-06       0.0
  4 Cs-137                         5.00E-06       0.0
REGIONAL ECONOMIC DATA
  1 EXCLUSION     0.226     0.436     426.0    8295.0  159796.0
  2 REGION_02     0.225     0.431     423.7    8275.6  159686.1
  3 REGION_03     0.350     0.526     598.1    8818.0  150946.1
  4 REGION_04     0.371     0.534     651.2    8920.2  149736.3
  5 REGION_05     0.366     0.477     663.4    7569.5  150526.6
  6 REGION_06     0.366     0.428     643.1    6635.4  150736.5
```

7	REGION_07	0.306	0.494	537.0	8632.2	154090.1
8	REGION_08	0.372	0.531	630.8	9037.1	150832.5
9	REGION_09	0.360	0.470	627.5	8285.0	155489.4
10	REGION_10	0.347	0.474	605.7	6020.1	150927.7
11	REGION_11	0.234	0.414	443.4	8642.2	162737.6
12	REGION_12	0.291	0.304	558.4	10622.0	178087.5
13	REGION_13	0.285	0.273	557.0	10905.0	181910.9
14	REGION_14	0.276	0.285	546.6	10269.0	178871.2
15	REGION_15	0.226	0.436	426.0	8295.0	159796.0
16	REGION_16	0.265	0.303	531.4	10381.8	178402.8
17	REGION_17	0.285	0.273	557.0	10905.0	181911.0
18	REGION_18	0.285	0.273	557.0	10905.0	181910.9
19	REGION_19	0.306	0.177	797.8	7626.6	161882.7
20	REGION_20	0.199	0.365	472.0	9135.0	172282.9
21	REGION_21	0.073	0.034	686.5	13054.6	230534.5
22	REGION_22	0.105	0.070	667.2	12734.7	223254.3
23	REGION_23	0.160	0.156	638.0	11408.3	206565.9
24	REGION_24	0.276	0.234	747.3	7201.8	164564.6
25	REGION_25	0.226	0.436	426.0	8295.0	159796.1
26	REGION_26	0.101	0.110	637.4	12157.8	217216.5
27	REGION_27	0.076	0.040	684.8	12958.3	229553.3
28	REGION_28	0.228	0.345	581.6	8048.2	176970.0
29	REGION_29	0.226	0.435	426.2	8298.7	159851.6
30	REGION_30	0.128	0.069	631.4	12088.1	224121.9
31	REGION_31	0.250	0.147	510.5	9968.5	209880.8
32	REGION_32	0.299	0.304	473.5	7588.1	181320.4
33	REGION_33	0.226	0.436	426.0	8295.0	159796.0
34	REGION_34	0.329	0.206	428.5	8524.7	199200.5
35	REGION_35	0.397	0.242	364.0	7399.8	192619.6
36	REGION_36	0.469	0.288	292.4	6143.2	184176.7
37	REGION_37	0.476	0.293	285.0	6014.0	183308.7
38	REGION_38	0.444	0.253	237.7	5209.0	165827.3
39	REGION_39	0.476	0.293	285.0	6014.0	183308.0
40	REGION_40	0.470	0.293	281.0	5949.1	182386.6
41	REGION_41	0.447	0.348	266.6	5548.7	182306.2
42	REGION_42	0.425	0.230	167.8	4073.3	150703.1
43	REGION_43	0.220	0.408	412.4	8190.7	159228.0
44	REGION_44	0.271	0.133	248.4	6464.2	163926.5
45	REGION_45	0.256	0.212	188.2	4950.7	154978.9
46	REGION_46	0.251	0.313	186.1	4420.3	148024.1
47	REGION_47	0.314	0.456	215.1	4311.1	162004.4
48	REGION_48	0.417	0.328	191.5	3960.3	151174.5
49	REGION_49	0.152	0.093	255.9	6993.6	152711.0
50	REGION_50	0.187	0.154	227.3	6112.7	149576.8
51	REGION_51	0.253	0.339	248.0	5477.3	148111.8
52	REGION_52	0.272	0.338	251.8	5322.4	147259.6
53	REGION_53	0.431	0.239	280.5	4018.6	139132.5
54	REGION_54	0.472	0.248	277.5	4025.8	140645.8
55	REGION_55	0.132	0.000	210.0	6642.0	150797.0
56	REGION_56	0.212	0.222	235.3	5881.6	149031.6
57	REGION_57	0.256	0.348	249.0	5447.0	148042.0
58	REGION_58	0.318	0.327	290.2	5317.2	144679.6
59	REGION_59	0.513	0.238	382.1	4415.3	134223.1
60	REGION_60	0.508	0.253	436.2	4615.9	136128.5
61	REGION_61	0.280	0.291	531.7	7674.7	144821.2
62	REGION_62	0.395	0.516	780.9	8474.6	140192.2
63	REGION_63	0.372	0.492	689.1	7932.0	141515.3
64	REGION_64	0.450	0.363	529.0	6375.0	137108.7

65	REGION_65	0.489	0.307	466.0	5717.0	134897.1
66	REGION_66	0.444	0.343	791.5	8280.4	147724.6
67	REGION_67	0.399	0.525	791.0	8507.0	140005.0
68	REGION_68	0.399	0.525	791.0	8507.0	140005.0
69	REGION_69	0.399	0.525	791.0	8507.0	140005.0
70	REGION_70	0.407	0.508	764.8	8282.2	139593.5
71	REGION_71	0.395	0.437	896.1	9309.0	148803.0
72	REGION_72	0.390	0.290	1153.5	11596.7	166385.1
73	REGION_73	0.360	0.505	707.6	8458.5	144529.2
74	REGION_74	0.369	0.482	817.8	8581.5	145448.4
75	REGION_75	0.298	0.382	877.5	8780.6	158127.4
76	REGION_76	0.306	0.238	691.0	10782.6	165220.4
77	REGION_77	0.243	0.444	461.1	8315.4	157893.8
78	REGION_78	0.327	0.488	638.0	8418.1	148303.5
79	REGION_79	0.390	0.522	763.3	8542.1	141792.3
80	REGION_80	0.297	0.383	879.6	8757.5	158216.3
81	REGION_81	0.295	0.346	828.2	8729.2	159141.2
82	REGION_82	0.318	0.259	608.4	8553.7	156928.3

Attachment B

Raw and Final MACCS2 Meteorological Data

That meteorological data that has been corrected is shown as highlighted in the Word files in the "Met Data Input Files" embedded below.

Raw Met Data

C:\Proj-Dom 01\
Beaver Valley\Level 3

Pittsburgh Airport Met Data

C:\Proj-Dom 01\
Beaver Valley\Level 3

Met Data Input Files

C:\Proj-Dom 01\
Beaver Valley\Level 3

Attachment C

MACCS2 ATMOS Input Deck for BVPS Unit 1 Release Category INTACT

MACCS2 ATMOS Input Deck for BVPS Composite Release Category INTACT

```
*******************************************************************************
* GENERAL DESCRIPTIVE TITLE DESCRIBING "ATMOS" INPUT
*
RIATNAM1001  'BVC_1A.INP, BVPS COMPOSITE, RELEASE CATEGORY: INTACT, ATMOS INPUT'
*
*******************************************************************************
* GEOMETRY DATA BLOCK
*
* Number of Radial Spatial Elements
*
GENUMRAD001  9
*
* Beaver Valley Radial Distances (km) from 1, 2, 5, 10, 15, 20, 30, 40, & 50 mi
*
GESPAEND001     1.6093    3.2187    8.0467   16.0935   24.1402
GESPAEND002     32.1869   48.2804   64.3739  80.4674
*
*******************************************************************************
* NUCLIDE DATA BLOCK
*
* Number of pseudo-stable nuclides (used to truncate the decay chains)
* NISYS-1092-C0005 App A
*
ISNUMSTB001      29
*
* List of pseudo-stable nuclides  NISYS-1092-C0005 App A
*
ISNAMSTB001     Ac-228
ISNAMSTB002     Am-243
ISNAMSTB003     Cs-135
ISNAMSTB004     Eu-155
ISNAMSTB005     Nb-93m
ISNAMSTB006     Np-237
ISNAMSTB007     Pa-231
ISNAMSTB008     Pa-233
ISNAMSTB009     Pa-234
ISNAMSTB010     Pa-234m
ISNAMSTB011     Ra-226
ISNAMSTB012     Ra-228
ISNAMSTB013     Rb-87
ISNAMSTB014     Rn-222
ISNAMSTB015     Sm-147
ISNAMSTB016     Sm-151
ISNAMSTB017     Tc-99
ISNAMSTB018     Th-229
ISNAMSTB019     Th-230
ISNAMSTB020     Th-231
ISNAMSTB021     Th-232
ISNAMSTB022     Th-234
ISNAMSTB023     U-233
ISNAMSTB024     U-234
ISNAMSTB025     U-235
ISNAMSTB026     U-236
ISNAMSTB027     U-237
ISNAMSTB028     U-238
ISNAMSTB029     Zr-93
```

```
*
* Number of radioactive nuclides to be considered NISYS-1092-C0005 App A
*
ISNUMISO001 120
*
* Number of Nuclide Groups  NISYS-1092-C0005 App A
*
ISMAXGRP001  9
*
* Wet and dry deposition flags for each nuclide group  NISYS-1092-C0005 App A
*
*              WETDEP     DRYDEP
*
ISDEPFLA001    .FALSE.    .FALSE.
ISDEPFLA002    .TRUE.     .TRUE.
ISDEPFLA003    .TRUE.     .TRUE.
ISDEPFLA004    .TRUE.     .TRUE.
ISDEPFLA005    .TRUE.     .TRUE.
ISDEPFLA006    .TRUE.     .TRUE.
ISDEPFLA007    .TRUE.     .TRUE.
ISDEPFLA008    .TRUE.     .TRUE.
ISDEPFLA009    .TRUE.     .TRUE.
*
* Nuclide group data for 9 nuclide groups  NISYS-1092-C0005 App A
*
*              NUCNAM    IGROUP
*
ISOTPGRP001     Ag-111       4
ISOTPGRP002     Ag-112       4
ISOTPGRP003     Am-241       7
ISOTPGRP004     Am-242       7
ISOTPGRP005     Am-244       7
ISOTPGRP006     Ba-137m      5
ISOTPGRP007     Ba-139       5
ISOTPGRP008     Ba-140       5
ISOTPGRP009     Br-82        2
ISOTPGRP010     Br-83        2
ISOTPGRP011     Ce-141       9
ISOTPGRP012     Ce-143       9
ISOTPGRP013     Ce-144       9
ISOTPGRP014     Cm-242       7
ISOTPGRP015     Cm-244       7
ISOTPGRP016     Cs-134       3
ISOTPGRP017     Cs-134m      3
ISOTPGRP018     Cs-135m      3
ISOTPGRP019     Cs-136       3
ISOTPGRP020     Cs-137       3
ISOTPGRP021     Cs-138       3
ISOTPGRP022     Eu-156       7
ISOTPGRP023     Eu-157       7
ISOTPGRP024     H-3          1
ISOTPGRP025     I-129        2
ISOTPGRP026     I-130        2
ISOTPGRP027     I-131        2
ISOTPGRP028     I-132        2
ISOTPGRP029     I-133        2
ISOTPGRP030     I-134        2
ISOTPGRP031     I-135        2
```

ISOTPGRP032	Kr-83m	1
ISOTPGRP033	Kr-85	1
ISOTPGRP034	Kr-85m	1
ISOTPGRP035	Kr-87	1
ISOTPGRP036	Kr-88	1
ISOTPGRP037	La-140	7
ISOTPGRP038	La-141	7
ISOTPGRP039	La-142	7
ISOTPGRP040	La-143	7
ISOTPGRP041	Mo-101	8
ISOTPGRP042	Mo-99	8
ISOTPGRP043	Nb-95	7
ISOTPGRP044	Nb-95m	7
ISOTPGRP045	Nb-97	7
ISOTPGRP046	Nb-97m	7
ISOTPGRP047	Nd-147	7
ISOTPGRP048	Nd-149	7
ISOTPGRP049	Nd-151	7
ISOTPGRP050	Np-238	9
ISOTPGRP051	Np-239	9
ISOTPGRP052	Np-240	9
ISOTPGRP053	Pd-109	8
ISOTPGRP054	Pm-147	7
ISOTPGRP055	Pm-148	7
ISOTPGRP056	Pm-148m	7
ISOTPGRP057	Pm-149	7
ISOTPGRP058	Pm-151	7
ISOTPGRP059	Pr-142	7
ISOTPGRP060	Pr-143	7
ISOTPGRP061	Pr-144	7
ISOTPGRP062	Pr-144m	7
ISOTPGRP063	Pr-147	7
ISOTPGRP064	Pu-238	9
ISOTPGRP065	Pu-239	9
ISOTPGRP066	Pu-240	9
ISOTPGRP067	Pu-241	9
ISOTPGRP068	Pu-242	9
ISOTPGRP069	Pu-243	9
ISOTPGRP070	Rb-86	3
ISOTPGRP071	Rb-88	3
ISOTPGRP072	Rb-89	3
ISOTPGRP073	Rh-103m	8
ISOTPGRP074	Rh-105	8
ISOTPGRP075	Rh-106	8
ISOTPGRP076	Ru-103	8
ISOTPGRP077	Ru-105	8
ISOTPGRP078	Ru-106	8
ISOTPGRP079	Sb-127	4
ISOTPGRP080	Sb-129	4
ISOTPGRP081	Sb-130	4
ISOTPGRP082	Sb-131	4
ISOTPGRP083	Se-83	4
ISOTPGRP084	Sm-153	7
ISOTPGRP085	Sm-155	7
ISOTPGRP086	Sm-156	7
ISOTPGRP087	Sn-127	4
ISOTPGRP088	Sr-89	6
ISOTPGRP089	Sr-90	6

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ISOTPGRP090     Sr-91        6
ISOTPGRP091     Sr-92        6
ISOTPGRP092     Tc-101       8
ISOTPGRP093     Tc-104       8
ISOTPGRP094     Tc-99m       8
ISOTPGRP095     Te-127       4
ISOTPGRP096     Te-127m      4
ISOTPGRP097     Te-129       4
ISOTPGRP098     Te-129m      4
ISOTPGRP099     Te-131       4
ISOTPGRP100     Te-131m      4
ISOTPGRP101     Te-132       4
ISOTPGRP102     Te-133       4
ISOTPGRP103     Te-133m      4
ISOTPGRP104     Te-134       4
ISOTPGRP105     U-239        9
ISOTPGRP106     Xe-131m      1
ISOTPGRP107     Xe-133       1
ISOTPGRP108     Xe-133m      1
ISOTPGRP109     Xe-135       1
ISOTPGRP110     Xe-135m      1
ISOTPGRP111     Xe-138       1
ISOTPGRP112     Y-90         7
ISOTPGRP113     Y-91         7
ISOTPGRP114     Y-91m        7
ISOTPGRP115     Y-92         7
ISOTPGRP116     Y-93         7
ISOTPGRP117     Y-94         7
ISOTPGRP118     Y-95         7
ISOTPGRP119     Zr-95        7
ISOTPGRP120     Zr-97        7
*
*****************************************************************************
* WET DEPOSITION DATA BLOCK
*
* Washout coefficient number one, linear factor
* MCCS2 Users Manual (NUREG/CR-6613, Vol 1, App C)
*
WDCWASH1001  9.5E-5
*
* Washout coefficient number two, exponential factor  NISYS-1092-C0005 App A
*
WDCWASH2001  0.8
*
*****************************************************************************
* DRY DEPOSITION DATA BLOCK
*
* Number of particle size groups  NISYS-1092-C0005 App A
*
DDNPSGRP001   1
*
* Deposition velocity of each particle size group (M/S)
* MCCS2 Users Manual (NUREG/CR-6613, Vol 1, App C)
*
DDVDEPOS001   0.01
*
*****************************************************************************
* DISPERSION PARAMETER DATA BLOCK
```

```
*
* # of distances in plume-size tables - NUM_DIST set to zero to use power law
*  NISYS-1092-C0005 App A
*
NUM_DIST001    0
*
* TADMOR AND GUR PARAMETERIZATION FOR DISTANCE RANGE 0.5 TO 5.0 KM
* AS TAKEN FROM ATMOSPHERIC MOTION AND AIR POLLUTION (DOBBINS 1979).
*
* P-G CLASS:      A         B         C         D         E         F
DPCYSIGA001   0.3658    0.2751    0.2089    0.1474    0.1046    0.0722
DPCYSIGB001   0.9031    0.9031    0.9031    0.9031    0.9031    0.9031
DPCZSIGA001   0.00025   0.0019    0.2       0.3       0.4       0.2
DPCZSIGB001   2.125     1.6021    0.8543    0.6532    0.6021    0.6020
*
*  Linear scaling factor for Sigma-Y function  NISYS-1092-C0005 App A
*
DPYSCALE001    1.0
*
*  Linear scaling factor for Sigma-Z function  NISYS-1092-C0005 App A
*
DPZSCALE001    1.27
*
*******************************************************************************
* EXPANSION FACTOR DATA BLOCK
*
* Time base for expansion factor (seconds)  NISYS-1092-C0005 App A
*
PMTIMBAS001    180.0   (3 minutes)
*
* Break point for formula change (seconds)  NISYS-1092-C0005 App A
*
PMBRKPNT001   3600.0   (1 hour)
*
* Exponential expansion factor number 1  NISYS-1092-C0005 App A
*
PMXPFAC1001      0.2
*
* Exponential expansion factor number 2  NISYS-1092-C0005 App A
*
PMXPFAC2001      0.25
*
*******************************************************************************
* PLUME RISE DATA BLOCK
*
* Scaling factor for the critical wind speed for entrainment of a buoyant plume
* (used by function CAUGHT)
* MCCS2 Users Manual (NUREG/CR-6613, Vol 1, App C)
*
PRSCLCRW001   1.0
*
* Scaling factor for the A-D stability plume rise formula
* (used by function PLMRIS)
* MCCS2 Users Manual (NUREG/CR-6613, Vol 1, App C)
*
PRSCLADP001   1.0
*
* Scaling factor for the E-F stability plume rise formula
```

```
* (used by function PLMRIS)
* MCCS2 Users Manual (NUREG/CR-6613, Vol 1, App C)
*
PRSCLEFP001   1.0
*
*******************************************************************************
* RELEASE DATA BLOCK
*
RDATNAM2001 'BVPS COMPOSITE RELEASE CATEGORY: INTACT'
*
* Time after accident initiation when the accident reaches General Emergency
* conditions or when plant personnel can reliably predict that General
* Emergency conditions will be attained (s)  Calc 17676-0001
*
RDOALARM001      14400.0
*
* Number of plume segments that are released  Calc 17676-0001
*
RDNUMREL001          2
*
* Selection of risk dominant plume  NISYS-1092-C0005 App A
*
RDMAXRIS001          1
*
* Representative time point for each plume segment  NISYS-1092-C0005 App A
*
RDREFTIM001       1.0       0.5
*
* Heat content of the release segments (W)
* A value specified for each of the release segments  Calc 17676-0001
*
RDPLHEAT001     1.9E+3     1.1E+3
*
* Height of the plume segments at release (m)
* A value specified for each of the release segments  Calc 17676-0001
*
RDPLHITE001       43.7       43.7
*
* Duration of the plume segments (s)
* A value specified for each of the release segments  Calc 17676-0001
*
RDPLUDUR001      14400.0    72000.0
*
* Time of release for each plume (S after scram)
* A value specified for each of the release segments  Calc 17676-0001
*
RDPDELAY001      14400.0    28800.0
*
* Initial value of sigma-y for each plume - Note: values required for each plume
*  NISYS-1092-C0005 App A
*
SIGYINIT001  9.56  9.56
*
* Initial value of sigma-z for each plume - Note: values required for each plume
*  NISYS-1092-C0005 App A
*
SIGZINIT001  20.3  20.3
*
```

```
* Building height (meters)- Note: values required for each plume
*  NISYS-1092-C0005 App A
*
WEBUILDH001  43.7  43.7
*
* Particle size distribution of each nuclide group  NISYS-1092-C0005 App A
*
RDPSDIST001      1.
RDPSDIST002      1.
RDPSDIST003      1.
RDPSDIST004      1.
RDPSDIST005      1.
RDPSDIST006      1.
RDPSDIST007      1.
RDPSDIST008      1.
RDPSDIST009      1.
*
* END-OF-CYCLE SHUTDOWN CORE INVENTORY  NISYS-1092-C0005 Sctn 5.2.3.3
*
*              NUCNAM       CORINV (Curies)
RDCORINV001     Ag-111       5.05E+6
RDCORINV002     Ag-112       2.28E+6
RDCORINV003     Am-241       1.17E+4
RDCORINV004     Am-242       7.04E+6
RDCORINV005     Am-244       1.89E+7
RDCORINV006     Ba-137m      9.35E+6
RDCORINV007     Ba-139       1.41E+8
RDCORINV008     Ba-140       1.42E+8
RDCORINV009     Br-82        3.02E+5
RDCORINV010     Br-83        9.37E+6
RDCORINV011     Ce-141       1.30E+8
RDCORINV012     Ce-143       1.21E+8
RDCORINV013     Ce-144       9.82E+7
RDCORINV014     Cm-242       2.42E+6
RDCORINV015     Cm-244       5.97E+5
RDCORINV016     Cs-134       1.57E+7
RDCORINV017     Cs-134m      3.69E+6
RDCORINV018     Cs-135m      4.39E+6
RDCORINV019     Cs-136       4.97E+6
RDCORINV020     Cs-137       9.81E+6
RDCORINV021     Cs-138       1.48E+8
RDCORINV022     Eu-156       2.29E+7
RDCORINV023     Eu-157       2.41E+6
RDCORINV024     H-3          4.36E+4
RDCORINV025     I-129        2.86E+0
RDCORINV026     I-130        2.07E+6
RDCORINV027     I-131        7.78E+7
RDCORINV028     I-132        1.14E+8
RDCORINV029     I-133        1.60E+8
RDCORINV030     I-134        1.77E+8
RDCORINV031     I-135        1.52E+8
RDCORINV032     Kr-83m       9.46E+6
RDCORINV033     Kr-85        8.27E+5
RDCORINV034     Kr-85m       1.95E+7
RDCORINV035     Kr-87        3.91E+7
RDCORINV036     Kr-88        5.43E+7
RDCORINV037     La-140       1.46E+8
RDCORINV038     La-141       1.29E+8
```

RDCORINV039	La-142	1.26E+8
RDCORINV040	La-143	1.20E+8
RDCORINV041	Mo-101	1.33E+8
RDCORINV042	Mo-99	1.45E+8
RDCORINV043	Nb-95	1.34E+8
RDCORINV044	Nb-95m	1.52E+6
RDCORINV045	Nb-97	1.27E+8
RDCORINV046	Nb-97m	1.19E+8
RDCORINV047	Nd-147	5.22E+7
RDCORINV048	Nd-149	3.02E+7
RDCORINV049	Nd-151	1.58E+7
RDCORINV050	Np-238	3.98E+7
RDCORINV051	Np-239	1.66E+9
RDCORINV052	Np-240	4.32E+6
RDCORINV053	Pd-109	3.26E+7
RDCORINV054	Pm-147	1.38E+7
RDCORINV055	Pm-148	1.41E+7
RDCORINV056	Pm-148m	2.37E+6
RDCORINV057	Pm-149	4.82E+7
RDCORINV058	Pm-151	1.60E+7
RDCORINV059	Pr-142	5.57E+6
RDCORINV060	Pr-143	1.18E+8
RDCORINV061	Pr-144	9.89E+7
RDCORINV062	Pr-144m	1.38E+6
RDCORINV063	Pr-147	5.18E+7
RDCORINV064	Pu-238	3.40E+5
RDCORINV065	Pu-239	2.86E+4
RDCORINV066	Pu-240	3.87E+4
RDCORINV067	Pu-241	1.13E+7
RDCORINV068	Pu-242	2.01E+2
RDCORINV069	Pu-243	4.23E+7
RDCORINV070	Rb-86	1.69E+5
RDCORINV071	Rb-88	5.57E+7
RDCORINV072	Rb-89	7.26E+7
RDCORINV073	Rh-103m	1.26E+8
RDCORINV074	Rh-105	8.16E+7
RDCORINV075	Rh-106	5.13E+7
RDCORINV076	Ru-103	1.26E+8
RDCORINV077	Ru-105	8.90E+7
RDCORINV078	Ru-106	4.63E+7
RDCORINV079	Sb-127	6.92E+6
RDCORINV080	Sb-129	2.52E+7
RDCORINV081	Sb-130	8.37E+6
RDCORINV082	Sb-131	6.09E+7
RDCORINV083	Se-83	4.42E+6
RDCORINV084	Sm-153	4.02E+7
RDCORINV085	Sm-155	3.11E+6
RDCORINV086	Sm-156	1.93E+6
RDCORINV087	Sn-127	2.78E+6
RDCORINV088	Sr-89	7.61E+7
RDCORINV089	Sr-90	7.21E+6
RDCORINV090	Sr-91	9.50E+7
RDCORINV091	Sr-92	1.01E+8
RDCORINV092	Tc-101	1.33E+8
RDCORINV093	Tc-104	1.05E+8
RDCORINV094	Tc-99m	1.29E+8
RDCORINV095	Te-127	6.81E+6
RDCORINV096	Te-127m	1.13E+6

```
RDCORINV097     Te-129       2.40E+7
RDCORINV098     Te-129m      4.87E+6
RDCORINV099     Te-131       6.54E+7
RDCORINV100     Te-131m      1.57E+7
RDCORINV101     Te-132       1.12E+8
RDCORINV102     Te-133       8.66E+7
RDCORINV103     Te-133m      7.12E+7
RDCORINV104     Te-134       1.41E+8
RDCORINV105     U-239        1.66E+9
RDCORINV106     Xe-131m      1.08E+6
RDCORINV107     Xe-133       1.60E+8
RDCORINV108     Xe-133m      5.05E+6
RDCORINV109     Xe-135       4.84E+7
RDCORINV110     Xe-135m      3.36E+7
RDCORINV111     Xe-138       1.36E+8
RDCORINV112     Y-90         7.49E+6
RDCORINV113     Y-91         9.87E+7
RDCORINV114     Y-91m        5.51E+7
RDCORINV115     Y-92         1.02E+8
RDCORINV116     Y-93         7.73E+7
RDCORINV117     Y-94         1.23E+8
RDCORINV118     Y-95         1.28E+8
RDCORINV119     Zr-95        1.33E+8
RDCORINV120     Zr-97        1.26E+8
*
*  Scaling factor to adjust the core inventory for power level
*  NISYS-1092-C0005 App A
*
RDCORSCA001   3.7E+10  * Convert Curies to becquerels
*
*  Specifies how release fractions are applied to ingrowth decay products
*  NISYS-1092-C0005 App A
*
RDAPLFRC001   PARENT      (apply rel fracs the same as prior versions)
*
* Release fractions for isotope groups in release  Calc 17676-0001
*
* ISOTOPE GROUPS:
*
*             NG      I       Cs      Te       Ba       Sr       La       Mo       Ce
RDRELFRC001 9.7E-5 3.9E-7 3.6E-7 8.0E-8  5.2E-8 3.6E-8 3.3E-8  1.0E-7 4.7E-10
RDRELFRC002 9.4E-4 5.3E-8 9.4E-9 7.4E-11 0.000  0.000  1.0E-11 0.000  2.9E-13
*
*******************************************************************************
* OUTPUT CONTROL DATA BLOCK
*
* Flag to indicate that this is the last program in the series to be run
*
OCENDAT1001  .FALSE. (set this value to .TRUE. to skip EARLY and CHRONC)
*
OCIDEBUG001  0
*
* Name of the nuclide to be listed on the dispersion listings
*
OCNUCOUT001  Cs-137
*  NISYS-1092-C0005 App A
*
*              NUM0
```

```
TYPE0NUMBER      1
*
*              INDREL   INDRAD
TYPE0OUT001      1        9
*
*******************************************************************************
* METEOROLOGICAL SAMPLING DATA BLOCK
*
* Meteorological sampling option code:
*
* METCOD = 1, USER SPECIFIED DAY AND HOUR IN THE YEAR (FROM MET FILE),
*          2, WEATHER CATEGORY BIN SAMPLING,
*          3, 120 HOURS OF WEATHER SPECIFIED ON THE ATMOS USER INPUT FILE,
*          4, CONSTANT MET (BOUNDARY WEATHER USED FROM THE START),
*          5, STRATIFIED RANDOM SAMPLES FOR EACH DAY OF THE YEAR.
*  NISYS-1092-C0005 App A
*
M1METCOD001  2
*
* Last spatial interval for measured weather  NISYS-1092-C0005 App A
*
M2LIMSPA001  9
*
* Boundary weather mixing layer height  NISYS-1092-C0005 App A
*
M2BNDMXH001  1000.0  (METERS)
*
* Boundary weather stability class index  NISYS-1092-C0005 App A
*
M2IBDSTB001  1      (A-STABILITY)
*
* Boundary weather rain rate  NISYS-1092-C0005 App A
*
M2BNDRAN001  0.0     (MM/HR)
*
* Boundary weather wind speed  NISYS-1092-C0005 App A
*
M2BNDWND001  0.5     (M/S)
*
* Number of rain distance intervals for binning  NISYS-1092-C0005 App A
*
M4NRNINT001  6
*
* Endpoints of the rain distance intervals (kilometers)
*  NISYS-1092-C0005 App A
*
M4RNDSTS001  16.09   24.14   32.19   48.28   64.37   80.47
*
* Number of rain intensity breakpoints  NISYS-1092-C0005 App A
*
M4NRINTN001   3
*
* Rain intensity breakpoints for weather binning (millimeters per hour)
* MCCS2 Users Manual (NUREG/CR-6613, Vol 1, App C)
*
M4RNRATE001   2.0   4.0   6.0
*
* Number of samples per bin  NISYS-1092-C0005 App A
```

```
*
M4NSMPLS001   4
*
* Initial seed for random number generator  NISYS-1092-C0005 App A
*
M4IRSEED001    79
```

Attachment D

Plume Data for Release Categories
(See Calc 17676-0001 Ref. 19)

Release Category	MACCS2 Run Code	Time of Release (hr)	Duration (hr)	Plume Number	Energy Level (cal/sec)	Energy Level (W)	Release Height (m)	Alarm Delay (hr)	NG	I	Cs	Te	Ba	Sr	La	Mo	Ce
		PDELAY	PLUDUR	NUMREL		PLHEAT	PLHITE	OALARM	RELFRC								
INTACT	A	4.00	4.00	1	454	1.901E+03	43.7	4	9.730E-05	3.900E-07	3.603E-07	8.003E-08	5.230E-08	3.600E-08	3.281E-08	1.010E-07	4.692E-10
		8.00	20.00	2	262.84	1.100E+03	43.7		9.427E-04	5.300E-08	9.448E-09	7.435E-11	0.000E+00	0.000E+00	1.000E-11	0.000E+00	2.856E-13
ECF																	
VSEQ	B	2.00	0.50	1	3.75E+07	1.570E+08	3.2	1	1.000E+00	1.730E-01	1.714E-01	1.482E-02	2.420E-02	1.320E-02	2.000E-04	4.880E-02	1.771E-05
SGTR	C	8.00	0.50	1	8.48E+07	3.550E+08	26.82	1	1.000E+00	4.220E-01	2.811E-01	1.570E-02	1.152E-02	1.730E-03	7.390E-05	3.396E-02	3.726E-06
DCH	D	3.00	4.00	1	6.59E+07	2.759E+08	43.7	1	1.000E+00	2.070E-01	1.616E-01	1.072E-01	1.660E-02	2.189E-02	1.317E-02	1.461E-02	5.695E-04
SECF																	
VSEQ	E	3.00	1.00	1	1.00E+06	4.187E+06	3.2	1	1.000E+00	7.650E-02	7.233E-02	6.124E-03	8.680E-03	6.200E-03	1.950E-04	1.313E-02	1.932E-05
LOCI	F	1.50	0.50	1	2.15E+06	9.002E+06	12	1	2.740E-02	5.897E-03	5.894E-03	2.736E-04	2.130E-04	2.060E-04	3.170E-06	6.463E-05	4.299E-07
		2.00	9.50	2	1.12E+06	4.689E+06	12		9.726E-01	2.660E-02	2.438E-02	1.395E-02	1.827E-03	1.620E-03	4.581E-05	2.895E-03	2.103E-05
BV5	K	1.50	0.50	1	2.15E+06	9.002E+06	43.7	1	2.930E-03	2.730E-04	1.831E-04	2.533E-06	8.620E-07	1.400E-07	8.450E-09	4.471E-07	5.127E-10
		2.00	9.50	2	1.12E+06	4.689E+06	43.7		9.771E-01	7.668E-03	3.826E-03	9.954E-03	3.419E-03	3.410E-03	3.410E-03	3.480E-03	4.963E-05
LATE																	
Large	G	10.00	0.50	1	6.59E+07	2.759E+08	43.7	4	4.087E-01	1.390E-03	1.904E-04	8.545E-06	1.820E-07	1.810E-07	1.810E-07	2.123E-07	2.585E-09
		10.50	3.00	2	1.27E+07	5.317E+07	43.7		8.070E-02	4.300E-05	1.993E-05	3.607E-07	1.220E-09	7.400E-10	1.500E-11	4.500E-09	2.699E-12
Small	H	25.00	0.50	1	1.31E+07	5.485E+07	43.7	4	1.430E-01	9.669E-04	3.279E-04	1.132E-04	2.050E-06	1.690E-06	7.740E-07	5.976E-06	2.927E-08
		25.50	9.50	2	2.63E+06	1.101E+07	43.7		8.640E-01	3.294E-02	7.932E-03	1.814E-03	3.860E-06	2.440E-06	1.021E-07	2.704E-06	7.713E-08
H2 Burn	I	10.00	0.50	1	6.59E+07	2.759E+08	43.7	4	5.020E-01	4.313E-03	8.603E-04	9.396E-03	4.140E-05	4.680E-05	2.542E-05	2.300E-05	1.692E-06
		10.50	3.50	2	1.27E+07	5.317E+07	43.7		4.980E-01	1.418E-02	3.989E-03	1.794E-02	2.680E-05	2.190E-05	1.166E-05	1.110E-05	1.030E-06
BMMT	J	24.00	1.00	1	6.59E+07	2.759E+08	0	4	1.000E+00	1.410E-02	4.194E-03	1.339E-03	4.650E-06	8.039E-07	7.873E-07	8.438E-07	1.930E-08

Attachment E

MACCS2 EARLY Input Deck for BVPS Unit 1

MACCS2 EARLY Input Deck for BVPS Unit 1

```
*******************************************************************************
* GENERAL DESCRIPTIVE TITLE DESCRIBING "EARLY" INPUT
*
MIEANAM1001 'BV1_2.INP, BVPS UNIT 1, BASE CASE, EARLY INPUT'
DCF_FILE001 'DOSD825.INP'
*
*             ORGNAM          ORGFLG      File DOSD825.inp
*
MIORGDEF001   'A-GONADS'       .TRUE.
MIORGDEF002   'A-BREAST'       .TRUE.
MIORGDEF003   'A-LUNGS'        .TRUE.
MIORGDEF004   'A-RED MARR'     .TRUE.
MIORGDEF005   'A-BONE SUR'     .TRUE.
MIORGDEF006   'A-THYROID'      .TRUE.
MIORGDEF007   'A-REMAINDER'    .TRUE.
MIORGDEF008   'A-EFFECTIVE'    .TRUE.
MIORGDEF009   'A-SKIN(FGR)'    .TRUE.
MIORGDEF010   'L-GONADS'       .TRUE.
MIORGDEF011   'L-BREAST'       .TRUE.
MIORGDEF012   'L-LUNGS'        .TRUE.
MIORGDEF013   'L-RED MARR'     .TRUE.
MIORGDEF014   'L-BONE SUR'     .TRUE.
MIORGDEF015   'L-THYROID'      .TRUE.
MIORGDEF016   'L-REMAINDER'    .TRUE.
MIORGDEF017   'L-EFFECTIVE'    .TRUE.
MIORGDEF018   'L-SKIN(FGR)'    .TRUE.
*
* FLAG TO INDICATE THAT THIS IS THE LAST PROGRAM IN THE SERIES TO BE RUN
*
MIENDAT2001   .FALSE.     (SET THIS VALUE TO .TRUE. TO SKIP CHRONC)
*
* DISPERSION MODEL OPTION CODE:  1  *  STRAIGHT LINE
*                                2  *  WIND-SHIFT WITH ROTATION
*                                3  *  WIND-SHIFT WITHOUT ROTATION
*  NISYS-1092-C0005 APP B
MIIPLUME001   2
*
* NUMBER OF FINE GRID SUBDIVISIONS USED BY THE MODEL  NISYS-1092-C0005 APP B
*
MINUMFIN001   7     (3, 5 OR 7 ALLOWED)
*
* LEVEL OF DEBUG OUTPUT REQUIRED, NORMAL RUNS SHOULD SPECIFY ZERO
*
MIIPRINT001   0
*
* LOGICAL FLAG SIGNIFYING THAT THE BREAKDOWN OF RISK BY WEATHER CATEGORY
* BIN ARE TO BE PRESENTED TO SHOW THEIR RELATIVE CONTRIBUTION TO THE MEAN
*  NISYS-1092-C0005 APP B
*
MIRISCAT001    .FALSE.
*
* FLAG INDICATING IF WIND-ROSES FROM ATMOS ARE TO BE OVERRIDDEN
*  NISYS-1092-C0005 APP B
*
MIOVRRID001   .FALSE.   (USE THE WIND ROSE CALCULATED FOR EACH WEATHER BIN)
*
```

```
*******************************************************************************
* POPULATION DISTRIBUTION DATA BLOCK
*
*  NISYS-1092-C0005 APP B
PDPOPFLG001  FILE
*
*******************************************************************************
* SHIELDING AND EXPOSURE FACTORS
*
* THREE VALUES OF EACH PROTECTION FACTOR ARE SUPPLIED,
* ONE FOR EACH TYPE OF ACTIVTY:
*
* ACTIVITY TYPE:
*     1 - EVACUEES WHILE MOVING
*     2 - NORMAL ACTIVITY IN SHELTERING AND EVACUATION ZONE
*     3 - SHELTERED ACTIVITY
*  NISYS-1092-C0005 APP B
*            EVACUEES  NORMAL  SHELTER
*
SECSFACT001      1.0    0.75     0.6
*
* PROTECTION FACTOR FOR INHALATION  NISYS-1092-C0005 APP B
*
SEPROTIN001      1.0    1.0      0.4
*
* BREATHING RATE (CUBIC METERS PER SECOND)  NISYS-1092-C0005 APP B
*
SEBRRATE001  3.0E-4   3.0E-4   3.0E-4
*
* SKIN PROTECTION FACTOR  NISYS-1092-C0005 APP B
*
SESKPFAC001  1.0      0.5      0.2
*
* GROUND SHIELDING FACTOR  NISYS-1092-C0005 APP B
*
SEGSHFAC001      0.7    0.75    0.4
*
* RESUSPENSION INHALATION MODEL CONCENTRATION COEFFICIENT (/METER)
* MCCS2 Users Manual (NUREG/CR-6613, Vol 1, App C)
* RESCON = 1.E-4 IS APPROPRIATE FOR MECHANICAL RESUSPENSION BY VEHICLES.
* RESHAF = 2.11 DAYS CAUSES 1.E-4 TO DECAY IN ONE WEEK TO 1.E-5, THE VALUE
* OF RESCON USED IN THE FIRST TERM OF THE LONG-TERM RESUSPENSION EQUATION
* USED IN CHRONC.
*
SERESCON001   1.0E-4     (RESUSPENSION IS TURNED ON)
*
* RESUSPENSION CONCENTRATION COEFFICIENT HALF-LIFE (SEC)
*  MCCS2 Users Manual (NUREG/CR-6613, Vol 1, App C)
*
SERESHAF001   1.82E5      (2.11 DAYS)
*
*******************************************************************************
* EVACUATION ZONE DATA BLOCK
*
* SPECIFIC DESCRIPTION  NISYS-1092-C0005 APP B
*
EZEANAM2001  'EVACUATION WITHIN 10 MILES, RELOCATION MODELS APPLY ELSEWHERE'
*
```

```
EZWTNAME001  'PEOPLE'
*
* WEIGHTING FRACTION APPLICABLE TO THIS SCENARIO  NISYS-1092-C0005 APP B
*
EZWTFRAC001  0.95
*
* LAST RING IN THE MOVEMENT ZONE  NISYS-1092-C0005 APP B
*
EZLASMOV001     4
*
*  Flag defining the time at which evacuees "enter" the destination element
*  NISYS-1092-C0005 APP B
*
TRAVELPOINT   'CENTERPOINT'
*
* RADIAL EVACUATION SPEED (M/S)  NISYS-1092-C0005 APP B
*
EZESPEED001    0.2   0.2    0.2         (0.45 mph)
EZEVATYP001     'RADIAL'
EZDURBEG001    86400.0
* For DURMID  MCCS2 Users Manual (NUREG/CR-6613, Vol 1, App C)
* No intermediate phase modeled.
EZDURMID001    0.0
EZREFPNT001     'ALARM'
EZNUMEVA001      4
EZDLTSHL001   7200.  7200.  7200.  7200.
EZDLTEVA001      0.     0.     0.     0.
*
**********************************************************************
* SHELTER AND RELOCATION ZONE DATA BLOCK
*
* DURATION OF THE EMERGENCY PHASE (SECONDS FROM PLUME ARRIVAL)
*  NISYS-1092-C0005 APP B
*
SRENDEMP001  604800.
*
* CRITICAL ORGAN FOR RELOCATION DECISIONS  NISYS-1092-C0005 APP B
*
SRCRIORG001 'L-EFFECTIVE'
*
* HOT SPOT RELOCATION TIME (SECONDS FROM PLUME ARRIVAL)  NISYS-1092-C0005 APP B
*
SRTIMHOT001  43200.    (ONE-HALF DAY)
*
* NORMAL RELOCATION TIME (SECONDS FROM PLUME ARRIVAL)  NISYS-1092-C0005 APP B
*
SRTIMNRM001  86400.    (ONE DAY)
*
* HOT SPOT RELOCATION DOSE CRITERION THRESHOLD (SIEVERTS)
* MCCS2 Users Manual (NUREG/CR-6613, Vol 1, App C)
*
SRDOSHOT001  0.5
*
* NORMAL RELOCATION DOSE CRITERION THRESHOLD (SIEVERTS)
* MCCS2 Users Manual (NUREG/CR-6613, Vol 1, App C)
*
SRDOSNRM001  0.25
*
```

```
*******************************************************************************
* EARLY FATALITY MODEL PARAMETERS
*
* NUMBER OF EARLY FATALITY EFFECTS  NISYS-1092-C0005 APP B
*
EFNUMEFA001   0
*
*            ORGNAM        EFFACA   EFFACB   EFFTHR
*
*EFATAGRP001 'A-RED MARR'      3.8      5.0    1.5
*EFATAGRP002 'A-LUNGS'        10.0      7.0    5.0
*
*******************************************************************************
* EARLY INJURY MODEL PARAMETERS
*
* NUMBER OF EARLY INJURY EFFECTS  NISYS-1092-C0005 APP B
*
EINUMEIN001  0
*
*            EINAME            ORGNAM    EISUSC EITHRE EIFACA EIFACB
*
*EINJUGRP001 'PRODROMAL VOMIT' 'A-STOMACH'  1.     .5     2.     3.
*EINJUGRP002 'DIARRHEA'        'A-STOMACH'  1.     1.     3.     2.5
*EINJUGRP003 'PNEUMONITIS'     'A-LUNGS'    1.     5.    10.     7.
*EINJUGRP004 'SKIN ERYTHEMA'   'A-SKIN'     1.     3.     6.     5.
*EINJUGRP005 'TRANSEPIDERMAL'  'A-SKIN'     1.    10.    20.     5.
*EINJUGRP006 'THYROIDITIS'     'A-THYROIDH' 1.    40.   240.     2.
*EINJUGRP007 'HYPOTHYROIDISM'  'A-THYROIDH' 1.     2.    60.     1.3
*
*******************************************************************************
* ACUTE EXPOSURE CANCER PARAMETERS
*
* NUMBER OF ACUTE EXPOSURE CANCER EFFECTS  NISYS-1092-C0005 APP B
*
LCNUMACA001   0
*
* THRESHOLD DOSE FOR APPLYING THE DOSE DEPENDENT REDUCTION FACTOR
*
*LCDDTHRE001   0.2  (LOWEST DOSE FOR WHICH DDREFA WILL BE APPLIED)
*
* DOSE THRESHOLD FOR LINEAR DOSE RESPONSE (Sv)
*
*LCACTHRE001   0.0  (LINEAR-QUADRATIC MODEL IS NOT BEING USED)
*
*            ACNAME     ORGNAM      ACSUSC DOSEFA DOSEFB CFRISK  CIRISK  DDREFA
*
*LCANCERS001 'LEUKEMIA' 'L-RED MARR'  1.0   1.0   0.0   9.70E-3   0.0     2.0
*LCANCERS002 'BONE'     'L-BONE SUR'  1.0   1.0   0.0   9.00E-4   0.0     2.0
*LCANCERS003 'BREAST'   'L-BREAST'    1.0   1.0   0.0   5.40E-3   1.7E-2  1.0
*LCANCERS004 'LUNG'     'L-LUNGS'     1.0   1.0   0.0   1.55E-2   0.0     2.0
*LCANCERS005 'THYROID'  'L-THYROID'   1.0   1.0   0.0   7.20E-4   7.2E-3  1.0
*LCANCERS006 'OTHER'    'L-EFFECTIVE' 1.0   1.0   0.0   2.76E-2   0.0     2.0
*
*******************************************************************************
* RESULT 1 OPTIONS BLOCK
* TOTAL NUMBER OF A GIVEN EFFECT (LATENT CANCER, EARLY DEATH, EARLY INJURY)
*
* NUMBER OF DESIRED RESULTS OF THIS TYPE
```

```
*
TYPE1NUMBER    0
*
*TYPE1OUT001    'ERL FAT/TOTAL'                1  26   NOCCDF (0 TO 1000 MILES)
*TYPE1OUT002    'ERL INJ/PRODROMAL VOMIT'      1  26   NOCCDF
*TYPE1OUT003    'ERL INJ/DIARRHEA'             1  26
*TYPE1OUT004    'ERL INJ/PNEUMONITIS'          1  26
*TYPE1OUT005    'ERL INJ/THYROIDITIS'          1  26
*TYPE1OUT006    'ERL INJ/HYPOTHYROIDISM'       1  26
*TYPE1OUT007    'ERL INJ/SKIN ERYTHEMA'        1  26
*TYPE1OUT008    'ERL INJ/TRANSEPIDERMAL'       1  26
*TYPE1OUT009    'CAN FAT/TOTAL'                1  26   NOCCDF
*TYPE1OUT010    'CAN FAT/LUNG'                 1  26
*TYPE1OUT011    'CAN FAT/THYROID'              1  26
*TYPE1OUT012    'CAN FAT/BREAST'               1  26
*TYPE1OUT013    'CAN FAT/GI'                   1  26
*TYPE1OUT014    'CAN FAT/LEUKEMIA'             1  26
*TYPE1OUT015    'CAN FAT/BONE'                 1  26
*TYPE1OUT016    'CAN FAT/OTHER'                1  26
*TYPE1OUT017    'CAN INJ/THYROID'              1  26
*TYPE1OUT018    'CAN INJ/BREAST'               1  26
*TYPE1OUT019    'CAN FAT/TOTAL'                1  19  CCDF  (0 TO 50 MILES)
*TYPE1OUT020    'ERL FAT/TOTAL'                1  12        (0 TO 10 MILES)
*TYPE1OUT021    'ERL INJ/PRODROMAL VOMIT'      1  12
*TYPE1OUT022    'ERL INJ/DIARRHEA'             1  12
*TYPE1OUT023    'ERL INJ/PNEUMONITIS'          1  12
*TYPE1OUT024    'ERL INJ/THYROIDITIS'          1  12
*TYPE1OUT025    'ERL INJ/HYPOTHYROIDISM'       1  12
*TYPE1OUT026    'ERL INJ/SKIN ERYTHEMA'        1  12
*TYPE1OUT027    'ERL INJ/TRANSEPIDERMAL'       1  12
*TYPE1OUT028    'CAN FAT/TOTAL'                1  12
*
*******************************************************************************
* RESULT 2 OPTIONS BLOCK
* FURTHEST DISTANCE AT WHICH A GIVEN RISK OF EARLY DEATH IS EXCEEDED.
*
* NUMBER OF DESIRED RESULTS OF THIS TYPE
*
TYPE2NUMBER  0
*
*            FATALITY RISK THRESHOLD
*
*TYPE2OUT001  0.
*
*******************************************************************************
* RESULT 3 OPTIONS BLOCK
* NUMBER OF PEOPLE WHOSE DOSE TO A GIVEN ORGAN EXCEEDS A GIVEN THRESHOLD.
*
* NUMBER OF DESIRED RESULTS OF THIS TYPE
*
TYPE3NUMBER  1
*
*               ORGAN NAME    DOSE THRESHOLD (Sv)
*
*TYPE3OUT001     'A-RED MARR'          1.5
*TYPE3OUT002     'A-LUNGS'             5.0
TYPE3OUT001     'L-EFFECTIVE'        0.05
*
```

```
*******************************************************************************
* RESULT 4 OPTIONS BLOCK
* 360 DEGREE AVERAGE RISK OF A GIVEN EFFECT AT A GIVEN DISTANCE.
*
* POSSIBLE TYPES OF EFFECTS ARE:
*
*   'ERL FAT/TOTAL'
*   'ERL INJ/INJURY NAME'
*   'CAN FAT/CANCER NAME'
*   'CAN FAT/TOTAL'
*
* NUMBER OF DESIRED RESULTS OF THIS TYPE
*
TYPE4NUMBER  0
*
*            RADIAL INDEX    TYPE OF EFFECT
*
*TYPE4OUT001       1         'ERL FAT/TOTAL'
*TYPE4OUT002       2         'ERL FAT/TOTAL'
*TYPE4OUT003       3         'ERL FAT/TOTAL'
*TYPE4OUT004       4         'ERL FAT/TOTAL'
*TYPE4OUT005       5         'ERL FAT/TOTAL'
*
*******************************************************************************
* RESULT 5 OPTIONS BLOCK
*
* TOTAL POPULATION DOSE TO A GIVEN ORGAN BETWEEN TWO DISTANCES.
*
* NUMBER OF DESIRED RESULTS OF THIS TYPE
*
TYPE5NUMBER     2
*
*             ORGAN          I1DIS5     I2DIS5
*
TYPE5OUT001 'L-EFFECTIVE'     1          4            (0-10 MILES)
TYPE5OUT002 'L-EFFECTIVE'     1          9    NOCCDF  (0-50 MILES)
*
*******************************************************************************
* RESULT 6 OPTIONS BLOCK
*
* CENTERLINE DOSE TO AN ORGAN VS DIST BY PATHWAY, PATHWAY NAMES ARE AS FOLLOWS:
*
*  PATHWAY NAME:
*    'CLD'     - CLOUDSHINE
*    'GRD'     - GROUNDSHINE
*    'INH ACU' - "ACUTE DOSE EQUIVALENT" FROM DIRECT INHALATION OF THE CLOUD
*    'INH LIF' - "LIFETIME DOSE COMMITMENT" FROM DIRECT INHALATION OF THE CLOUD
*    'RES ACU' - "ACUTE DOSE EQUIVALENT" FROM RESUSPENSION INHALATION
*    'RES LIF' - "LIFETIME DOSE COMMITMENT" FROM RESUSPENSION INHALATION
*    'TOT ACU' - "ACUTE DOSE EQUIVALENT" FROM ALL PATHWAYS
*    'TOT LIF' - "LIFETIME DOSE COMMITMENT" FROM ALL PATHWAYS
*
* NUMBER OF DESIRED RESULTS OF THIS TYPE
*
TYPE6NUMBER     0
*
*             ORGNAM          PATHNM      I1DIS6   I2DIS6
*
```

```
*TYPE6OUT001  'A-RED MARR'    'TOT ACU'      1        9      (0-50 MILES)
*TYPE6OUT002  'A-LUNGS'       'TOT ACU'      1        9      (0-50 MILES)
*TYPE6OUT003  'L-EFFECTIVE'   'TOT LIF'      1        9      (0-50 MILES)
*
*******************************************************************************
* RESULT 7 OPTIONS BLOCK
*
* CENTERLINE RISK OF A GIVEN EFFECT VS DISTANCE
*
* NUMBER OF DESIRED RESULTS OF THIS TYPE
*
TYPE7NUMBER   0
*
*                    NAME           I1DIS7       I2DIS7
*
*TYPE7OUT001     'ERL FAT/TOTAL'        1            9       (0-50 MILES)
*TYPE7OUT002     'CAN FAT/TOTAL'        1            4       (0-10 MILES)
*
*******************************************************************************
* RESULT 8 OPTIONS BLOCK
*
* POPULATION WEIGHTED FATALITY RISK BETWEEN 2 DISTANCES
*
* NUMBER OF DESIRED RESULTS OF THIS TYPE
*
TYPE8NUMBER   0
*
*                NAME        I1DIS8  I2DIS8
*
*TYPE8OUT001 'ERL FAT/TOTAL'   1        2      NOCCDF  (0-EXCL ZONE + 1 MI)
*TYPE8OUT002 'CAN FAT/TOTAL'   1        9      NOCCDF  (0-50 MILES)
*
*******************************************************************************
* RESULT A OPTIONS BLOCK, LOADED BY INOUTA, STORED IN /INOUTA/
*
* PEAK DOSE TO A GIVEN ORGAN
*
*            NUMA
TYPEANUMBER   0
*
*              ORGNAM       I1DISA  I2DISA
*TYPEAOUT001 'L-EFFECTIVE'    1        9
.
*******************************************************************************
* EMERGENCY RESPONSE SCENARIO NUMBER 2
*******************************************************************************
* EVACUATION ZONE DATA BLOCK, LOADED BY EVNETW, STORED IN /NETWOR/, /EOPTIO/
*
* SPECIFIC DESCRIPTION OF THE EMERGENCY RESPONSE SCENARIO BEING USED
*
EZEANAM2001   'NO EVACUATION, RELOCATION MODELS APPLY EVERYWHERE'
*
* WEIGHTING FRACTION APPLICABLE TO THIS SCENARIO
*
EZWTFRAC001   0.05
*
* LAST RING IN THE MOVEMENT ZONE
*
```

```
EZLASMOV001      0    (A ZERO TURNS OFF THE EVACUATION MODEL)
```

Attachment F

MACCS2 CHRONC Input Deck for BVPS Unit 1

MACCS2 CHRONC Input Deck for BVPS Unit 1

```
*******************************************************************************
*
* GENERAL DESCRIPTIVE TITLE DESCRIBING THIS "CHRONC" INPUT FILE
*
CHCHNAME001 'BV1_3.INP, BVPS UNIT 1, BASE CASE, CHRONC INPUT'
*
*******************************************************************************
* EMERGENCY RESPONSE COST DATA BLOCK
*
* DAILY COST FOR A PERSON WHO IS EVACUATED (DOLLARS/PERSON-DAY)
*  Section8.1.1 of this Calc
*
CHEVACST001  49.42
*
* DAILY COST FOR A PERSON WHO IS RELOCATED (DOLLARS/PERSON-DAY)
*  Section8.1.2 of this Calc
*
CHRELCST001  49.42
*
*******************************************************************************
* LONG TERM PROTECTIVE ACTION DATA BLOCK
*
* Duration of the intermediate phase period--at version 1.11c TMIPND is no
* longer processed. The new input variable DUR_INTPHAS is the period's
* duration, not the time after plume arrival at which the period ends.
* MCCS2 Users Manual (NUREG/CR-6613, Vol 1, App C)
* No intermediate phase modeled.
*
DUR_INTPHAS   0.0    (in seconds)
*
* LONG-TERM PHASE DOSE PROJECTION PERIOD, THE DURATION OF THE EXPOSURE
* PERIOD OVER WHICH THE LONG-TERM DOSE CRITERION IS EVALUATED (SECONDS)
*  NISYS-1092-C0005 APP C
*
CHTMPACT001   9.46E8             (30 YEARS)
*
* DOSE CRITERION FOR INTERMEDIATE PHASE RELOCATION (Sv)
*  NISYS-1092-C0005 APP C
*
CHDSCRTI001   1.0E5              (NO INTERMEDIATE PHASE RELOCATION)
*
* DOSE CRITERION FOR LONG-TERM PHASE RELOCATION (Sv)
*  NISYS-1092-C0005 APP C
*
CHDSCRLT001    0.05
*
* CRITICAL ORGAN NAME FOR LONG-TERM ACTIONS  NISYS-1092-C0005 APP C
*
CHCRTOCR001 'L-EFFECTIVE'
*
* Long Term Exposure Period  NISYS-1092-C0005 APP C
*    MACCS2 allowable range is 3.15E7 to 1.E10
*
CHEXPTIM001    9.46E8             (30 YEARS)
*
*******************************************************************************
```

```
* DECONTAMINATION PLAN DATA BLOCK
*
* NUMBER OF LEVELS OF DECONTAMINATION  NISYS-1092-C0005 APP C
*
CHLVLDEC001  2
*
* DECONTAMINATION TIMES CORRESPONDING TO THE LVLDEC LEVELS OF DECONTAMINATION
*  (SECONDS)  NISYS-1092-C0005 APP C
*
CHTIMDEC001   5.184E6  1.0368E7    (60, 120 DAYS)
*
* DOSE REDUCTION FACTORS CORRESPONDING TO THE LVLDEC LEVELS OF DECONTAMINATION
*  NISYS-1092-C0005 APP C
*
CHDSRFCT001   3.0      15.0
*
* COST OF FARM DECONTAMINATION PER FARMLAND UNIT AREA (DOLLARS/HECTARE)
*  FOR THE VARIOUS LEVELS OF DECONTAMINATION  Section 8.1.3 this calc
*
CHCDFRM0001   1169.30   2598.45
*
* COST OF NONFARM DECONTAMINATION PER RESIDENT PERSON (DOLLARS/PERSON)
*  FOR THE VARIOUS LEVELS OF DECONTAMINATION  Section 8.1.4 this calc
*
CHCDNFRM001   6236.27   16630.05
*
* FRACTION OF FARMLAND DECONTAMINATION COST DUE TO LABOR
*  FOR THE VARIOUS DECONTAMINATION LEVELS  NISYS-1092-C0005 APP C
*
CHFRFDL0001  0.3      0.35
*
* FRACTION OF NON-FARM DECONTAMINATION COST DUE TO LABOR
*  FOR THE VARIOUS DECONTAMINATION LEVELS  NISYS-1092-C0005 APP C
*
CHFRNFDL001  0.7      0.5
*
* FRACTION OF TIME WORKERS IN FARM AREAS SPEND IN CONTAMINATED AREAS
*  FOR THE VARIOUS DECONTAMINATION LEVELS  NISYS-1092-C0005 APP C
*
CHTFWKF0001  0.10     0.33
*
* FRACTION OF TIME WORKERS IN NON-FARM AREAS SPEND IN CONTAMINATED AREAS
*  FOR THE VARIOUS DECONTAMINATION LEVELS  NISYS-1092-C0005 APP C
*
CHTFWKNF001  0.33     0.33
*
* AVERAGE COST OF DECONTAMINATION LABOR (DOLLARS/MAN-YEAR)
*  Section 8.1.5 this calc
*
CHDLBCST001   72756.48
*
*****************************************************************************
* INTERDICTION COST DATA BLOCK
*
* DEPRECIATION (DETERIORATION) RATE DURING INTERDICTION PERIOD (PER YEAR)
*  MCCS2 Users Manual (NUREG/CR-6613, Vol 1, App C)
*
CHDPRATE001    0.20
```

```
*
* INVESTMENT INCOME RETURN (DISCOUNT RATE) DURING INTERDICTION PERIOD (PER YEAR)
* THIS VALUE SHOULD BE DERIVED AS A REAL RETURN RATE ADJUSTED FOR INFLATION
*  MCCS2 Users Manual (NUREG/CR-6613, Vol 1, App C)
*
CHDSRATE001    0.12
*
* POPULATION RELOCATION COST (DOLLARS/PERSON):
*  ALTERNATIVE HOUSING, MOVING COSTS, AND LOST INCOME FOR PEOPLE IN
*  AREAS WHICH REQUIRE DECONTAMINATION, INTERDICTION, OR CONDEMNATION
*  Section 8.1.6 this calc
*
CHPOPCST001   13727.19
*
*******************************************************************************
* GROUNDSHINE WEATHERING DEFINITION DATA BLOCK
*
* NUMBER OF TERMS IN THE GROUNDSHINE WEATHERING RELATIONSHIP (EITHER 1 OR 2)
*  NISYS-1092-C0005 APP C
*
CHNGWTRM001   2
*
* GROUNDSHINE WEATHERING COEFFICIENTS
*  MCCS2 Users Manual (NUREG/CR-6613, Vol 1, App C)
*
CHGWCOEF001   0.5   0.5
*
* HALF LIVES CORRESPONDING TO THE GROUNDSHINE WEATHERING COEFFICIENTS (S)
*  MCCS2 Users Manual (NUREG/CR-6613, Vol 1, App C)
*
CHTGWHLF001   1.6E7  2.8E9
*
*******************************************************************************
* RESUSPENSION WEATHERING DEFINITION DATA BLOCK
*
* NUMBER OF TERMS IN THE RESUSPENSION WEATHERING RELATIONSHIP
*  NISYS-1092-C0005 APP C
*
CHNRWTRM001    3
*
* RESUSPENSION CONCENTRATION COEFFICIENTS   (/ METER)
*  RELATIONSHIP BETWEEN GROUND CONCENTRATION AND INSTANTANEOUS AIR CONC
*  MCCS2 Users Manual (NUREG/CR-6613, Vol 1, App C)
*
CHRWCOEF001  1.0E-5   1.0E-7   1.0E-9
*
* HALF-LIVES CORRESPONDING TO THE RESUSPENSION CONCENTRATION COEFFICIENTS (S)
*  MCCS2 Users Manual (NUREG/CR-6613, Vol 1, App C)
*
CHTRWHLF001  1.6E7    1.6E8    1.6E9   (6 MONTHS, 5 YEARS, 50 YEARS)
*
*******************************************************************************
* SITE REGION DESCRIPTION DATA BLOCK
*
* FRACTION OF AREA THAT IS LAND IN THE REGION
*
CHFRACLD001   0.95   (DUMMY VALUE, SITE FILE OVERRIDES THIS VALUE)
*
```

```
* FRACTION OF LAND DEVOTED TO FARMING IN THE REGION
*
CHFRCFRM001   0.382  (DUMMY VALUE, SITE FILE OVERRIDES THIS VALUE)
*
* AVERAGE VALUE OF ANNUAL FARM PRODUCTION IN THE REGION (DOLLARS/HECTARE)
*  (CASH RECEIPTS FROM FARMING PLUS VALUE OF HOME CONSUMPTION)/(LAND IN FARMS)
*
CHFRMPRD001   371.0  (DUMMY VALUE, SITE FILE OVERRIDES THIS VALUE)
*
* FRACTION OF FARM PRODUCTION RESULTING FROM DAIRY PRODUCTION IN THE REGION
*  (VALUE OF MILK PRODUCED)/(CASH RECEIPTS FROM FARMING PLUS HOME CONSUMPTION)
*
CHDPFRCT001   0.198  (DUMMY VALUE, SITE FILE OVERRIDES THIS VALUE)
*
* VALUE OF FARM WEALTH (DOLLARS/HECTARE)
*  Section 8.1.8 this calc
*
CHVALWF0001   6957.0
*
* FRACTION OF FARM WEALTH IN IMPROVEMENTS FOR THE REGION
*  Section 8.1.9 this calc
*
CHFRFIM0001   0.369
*
* NON-FARM WEALTH, PROPERTY AND IMPROVEMENTS FOR THE REGION (DOLLARS/PERSON)
*  THE VALUE OF ALL RESIDENTIAL, BUSINESS, AND PUBLIC ASSETS WHICH WOULD BE
*  LOST IN THE EVENT OF PERMANENT INTERDICTION (CONDEMNATION) OF THE AREA
*  Section 8.1.7 this calc
*
CHVALWNF001   181881.0
*
* FRACTION OF NON-FARM WEALTH IN IMPROVEMENTS FOR THE REGION
*  NISYS-1092-C0005 APP C
*
CHFRNFIM001   0.9
*
****************************************************************************
*  NISYS-1092-C0005 APP C
CHFDPATH001 'NEW'
*
* NAME OF THE COMIDA2 BINARY OUTPUT FILE  NISYS-1092-C0005 APP C
*
BIN_FILE001 'SAMP_D.BIN'
*
* Dose limits triggering first year crop disposal of the separate
* milk and non-milk components of the diet  NISYS-1092-C0005 APP C
*
*             effective     thyroid  (doses in sieverts)
DOSEMILK001    0.005          0.015
DOSEOTHR001    0.005          0.015
*
* Annual dose limits for the subsequent year's (i.e., after the first year)
* interdiction of BOTH the milk and non-milk (combined) components of the diet
*  NISYS-1092-C0005 APP C
*
*             effective     thyroid  (doses in sieverts)
DOSELONG001    0.005          0.015
*
```

```
* NUMBER OF NUCLIDES IN THE WATER INGESTION PATHWAY MODEL
*  NISYS-1092-C0005 APP C
*
CHNUMWPI001    4
*
* TABLE OF NUCLIDE DEFINITIONS IN THE WATER INGESTION PATHWAY MODEL
* DUMMY DATA FILE, THE DATA DEFINING THE WATERSHED INGESTION
*  FACTOR IS SUPERSEDED BY THE CORRESPONDING DATA IN THE SITE DATA FILE
*
*                         INITIAL     ANNUAL    INGESTION FACTOR
*             WATER       WASHOFF     WASHOFF    ((Bq INGESTED)/
*            NUCLIDE      FRACTION     RATE       (Bq IN WATER))
*
*             NAMWPI       WSHFRI      WSHRTA         WINGF
CHWTRISO001   Sr-89         0.01        0.004          5.0E-6
CHWTRISO002   Sr-90         0.01        0.004          5.0E-6
CHWTRISO003   Cs-134        0.005       0.001          5.0E-6
CHWTRISO004   Cs-137        0.005       0.001          5.0E-6
*
*******************************************************************************
* SPECIAL OPTIONS DATA BLOCK
*
* DETAILED PRINT OPTION CONTROL SWITCHES, LOOK AT THE CODE BEFORE TURNING ON!!
*    NISYS-1092-C0005 APP C
*
CHKSWTCH001   0
*
*******************************************************************************
* DEFINE THE TYPE 9 RESULTS
*
* LONG-TERM POPULATION DOSE IN A GIVEN REGION BROKEN DOWN BY THE 12 PATHWAYS
*
* NUMBER OF RESULTS OF THIS TYPE THAT ARE BEING REQUESTED
* FOR EACH RESULT YOU REQUEST, THE CODE WILL PRODUCE A SET OF 12
*
TYPE9NUMBER   1      (UP TO 10 ALLOWED)
*
*              ORGNAM          INNER      OUTER
*
TYPE9OUT001   'L-EFFECTIVE'      1          9
*
*******************************************************************************
* ECONOMIC COST RESULTS IN A REGION BROKEN DOWN BY 12 TYPES OF COSTS
*
* NUMBER OF RESULTS OF THIS TYPE THAT ARE BEING REQUESTED
* FOR EACH RESULT YOU REQUEST, THE CODE WILL PRODUCE A SET OF 12
*
TYP10NUMBER   1      (UP TO 10 ALLOWED)
*
*              INNER      OUTER
*
TYP10OUT001      1          9
*
*******************************************************************************
* DEFINE A FLAG THAT CONTROLS THE PRODUCTION OF THE ACTION DISTANCE RESULTS
*
* SPECIFYING A VALUE OF .TRUE. TURNS ON ALL 8 OF THE ACTION DISTANCE RESULTS,
* A VALUE OF .FALSE. WILL ELIMINATE THE ACTION DISTANCE RESULTS FROM THE OUTPUT.
```

```
*
TYP11FLAG11   .FALSE.
*
*******************************************************************************
* IMPACTED AREA/POPULATION RESULTS IN A REGION BROKEN DOWN BY 6 TYPES OF IMPACTS
*
* NUMBER OF RESULTS OF THIS TYPE THAT ARE BEING REQUESTED
* FOR EACH RESULT YOU REQUEST, THE CODE WILL PRODUCE A SET OF 8
*
TYP12NUMBER    0       (UP TO 10 ALLOWED)
*
*               INNER       OUTER
*
*TYP12OUT001       1           9
*
*******************************************************************************
* Maximal annual food ingestion dose to an individual, requested by IXOT13
*
* This result is calculated after accounting for temporary or
* permanent interdiction.  It is only available for the "new" food model.
*
* NUMBER OF RESULTS OF THIS TYPE THAT ARE BEING REQUESTED
*
TYP13NUMBER    0    (UP TO 10 ALLOWED)
*
* IRAD13 is the radial spatial interval at which results are requested
*
* ORGN13 is the name of the organ for which results are requested
*   (allowable values for ORGN13 are 'EFFECTIVE' or 'THYROID')
*
*           IRAD13    ORGN13
*
*TYP13OUT001    2     EFFECTIVE
*TYP13OUT002    4     EFFECTIVE
*TYP13OUT003    6     EFFECTIVE
*TYP13OUT004    8     EFFECTIVE
*TYP13OUT005   10     EFFECTIVE
*TYP13OUT006   12     EFFECTIVE
*TYP13OUT007   14     EFFECTIVE
*TYP13OUT008   16     EFFECTIVE
*TYP13OUT009   18     EFFECTIVE
*TYP13OUT010   20     EFFECTIVE
*TYP13OUT011    2     THYROID
*TYP13OUT012    4     THYROID
*TYP13OUT013    6     THYROID
*TYP13OUT014    8     THYROID
*TYP13OUT015   10     THYROID
*TYP13OUT016   12     THYROID
*TYP13OUT017   14     THYROID
*TYP13OUT018   16     THYROID
*TYP13OUT019   18     THYROID
*TYP13OUT020   20     THYROID
```

Attachment G

SECPOP2000 Input - County Data File

C:\Proj-Dom 01\
Beaver Valley\Level 3

Attachment H

Population Distribution

From Radius	To Radius	Direction	Code	2000 Population	2047 Population
0	1	N	1	0	0
0	1	NNE	2	0	0
0	1	NE	3	93	110
0	1	ENE	4	38	45
0	1	E	5	88	104
0	1	ESE	6	0	0
0	1	SE	7	7	8
0	1	SSE	8	0	0
0	1	S	9	0	0
0	1	SSW	10	0	0
0	1	SW	11	2	2
0	1	WSW	12	0	0
0	1	W	13	0	0
0	1	WNW	14	0	0
0	1	NW	15	132	156
0	1	NNW	16	53	63
1	2	N	17	197	232
1	2	NNE	18	62	73
1	2	NE	19	4	5
1	2	ENE	20	7	8
1	2	E	21	74	87
1	2	ESE	22	64	76
1	2	SE	23	116	137
1	2	SSE	24	22	26
1	2	S	25	18	21
1	2	SSW	26	35	41
1	2	SW	27	25	30
1	2	WSW	28	73	86
1	2	W	29	141	166
1	2	WNW	30	0	0
1	2	NW	31	1,651	1,948
1	2	NNW	32	470	555
2	5	N	33	835	985
2	5	NNE	34	1,016	1,199
2	5	NE	35	1,130	1,333
2	5	ENE	36	683	806
2	5	E	37	1,039	1,226
2	5	ESE	38	713	841
2	5	SE	39	284	335
2	5	SSE	40	637	752
2	5	S	41	486	573
2	5	SSW	42	742	876
2	5	SW	43	619	730
2	5	WSW	44	217	256
2	5	W	45	723	853
2	5	WNW	46	802	946
2	5	NW	47	1,753	2,069
2	5	NNW	48	573	676
5	10	N	49	2,317	2,734
5	10	NNE	50	3,875	4,573
5	10	NE	51	18,262	21,549

From Radius	To Radius	Direction	Code	2000 Population	2047 Population
5	10	ENE	52	14,995	17,694
5	10	E	53	19,461	22,964
5	10	ESE	54	7,307	8,606
5	10	SE	55	1,589	1,840
5	10	SSE	56	1,777	2,090
5	10	S	57	4,734	5,586
5	10	SSW	58	1,284	1,512
5	10	SW	59	3,604	3,875
5	10	WSW	60	1,886	1,918
5	10	W	61	19,534	21,213
5	10	WNW	62	7,332	8,652
5	10	NW	63	2,156	2,544
5	10	NNW	64	1,283	1,514
10	15	N	65	4,297	5,070
10	15	NNE	66	20,102	23,720
10	15	NE	67	18,866	22,262
10	15	ENE	68	13,403	15,810
10	15	E	69	18,133	20,507
10	15	ESE	70	31,028	31,750
10	15	SE	71	5,136	5,187
10	15	SSE	72	1,105	1,132
10	15	S	73	1,064	1,099
10	15	SSW	74	5,120	5,285
10	15	SW	75	9,357	9,802
10	15	WSW	76	1,931	2,095
10	15	W	77	6,926	7,980
10	15	WNW	78	3,491	4,119
10	15	NW	79	2,716	3,205
10	15	NNW	80	1,975	2,331
15	20	N	81	2,679	3,161
15	20	NNE	82	19,651	23,188
15	20	NE	83	8,256	10,097
15	20	ENE	84	26,225	35,104
15	20	E	85	20,890	21,130
15	20	ESE	86	32,047	32,367
15	20	SE	87	20,102	20,303
15	20	SSE	88	5,210	5,342
15	20	S	89	5,479	5,643
15	20	SSW	90	23,299	23,522
15	20	SW	91	6,325	7,364
15	20	WSW	92	1,568	1,850
15	20	W	93	1,535	1,811
15	20	WNW	94	3,151	3,718
15	20	NW	95	5,793	6,836
15	20	NNW	96	9,801	11,565
20	30	N	97	40,448	47,729
20	30	NNE	98	25,927	31,193
20	30	NE	99	11,544	15,668
20	30	ENE	100	26,859	36,797
20	30	E	101	73,055	77,064
20	30	ESE	102	410,196	414,298
20	30	SE	103	227,938	230,716

From Radius	To Radius	Direction	Code	2000 Population	2047 Population
20	30	SSE	104	39,083	40,229
20	30	S	105	5,494	5,656
20	30	SSW	106	38,710	41,558
20	30	SW	107	20,523	24,217
20	30	WSW	108	5,090	6,155
20	30	W	109	4,182	5,480
20	30	WNW	110	10,727	12,776
20	30	NW	111	33,243	39,227
20	30	NNW	112	38,242	45,126
30	40	N	113	27,393	32,324
30	40	NNE	114	14,394	17,649
30	40	NE	115	20,468	28,041
30	40	ENE	116	52,734	72,065
30	40	E	117	88,641	97,229
30	40	ESE	118	343,130	347,829
30	40	SE	119	114,676	116,792
30	40	SSE	120	49,039	50,510
30	40	S	121	10,274	10,553
30	40	SSW	122	35,720	38,675
30	40	SW	123	10,554	12,454
30	40	WSW	124	6,314	8,164
30	40	W	125	15,333	21,441
30	40	WNW	126	25,741	30,543
30	40	NW	127	19,379	22,864
30	40	NNW	128	218,945	258,355
40	50	N	129	67,035	79,101
40	50	NNE	130	26,361	31,533
40	50	NE	131	9,705	13,035
40	50	ENE	132	31,197	37,772
40	50	E	133	43,404	48,911
40	50	ESE	134	115,071	120,818
40	50	SE	135	79,774	83,809
40	50	SSE	136	21,216	21,842
40	50	S	137	5,221	5,321
40	50	SSW	138	72,617	79,681
40	50	SW	139	12,337	14,558
40	50	WSW	140	9,276	11,210
40	50	W	141	19,628	24,920
40	50	WNW	142	83,296	97,999
40	50	NW	143	26,594	30,210
40	50	NNW	144	123,093	145,250
			Total	**3,273,502**	**3,607,001**

Attachment I

MACCS2 Input – MACCS2 Site Data File

```
SECPOP2000 V3.12  MACCS2 Site Data File for Beaver Valley  (C:\Program
Files\SECPOP\SITES\Beaver Valley.sit)
 Lat: 40d37'19'' Long:  80d26' 2'' Population multiplier: 1.0000   07/12/2007
   9 SPATIAL INTERVALS
  16 WIND DIRECTIONS
   7 CROP CATEGORIES
   4 WATER PATHWAY ISOTOPES
   1 WATERSHEDS
  82 ECONOMIC REGIONS
 SPATIAL DISTANCES     KILOMETERS
    1.6093    3.2187    8.0467   16.0935   24.1402   32.1869   48.2804   64.3739
   80.4674
 POPULATION
        0.      232.      985.     2734.     5070.     3161.    47729.    32324.
    79101.
        0.       73.     1199.     4573.    23720.    23188.    31193.    17649.
    31533.
      110.        5.     1333.    21549.    22262.    10097.    15668.    28041.
    13035.
       45.        8.      806.    17694.    15810.    35104.    36797.    72065.
    37772.
      104.       87.     1226.    22964.    20507.    21130.    77064.    97229.
    48911.
        0.       76.      841.     8606.    31750.    32367.   414298.   347829.
   120818.
        8.      137.      335.     1840.     5187.    20303.   230716.   116792.
    83809.
        0.       26.      752.     2090.     1132.     5342.    40229.    50510.
    21842.
        0.       21.      573.     5586.     1099.     5643.     5656.    10553.
     5321.
        0.       41.      876.     1512.     5285.    23522.    41558.    38675.
    79681.
        2.       30.      730.     3875.     9802.     7364.    24217.    12454.
    14558.
        0.       86.      256.     1918.     2095.     1850.     6155.     8164.
    11210.
        0.      166.      853.    21213.     7980.     1811.     5480.    21441.
    24920.
        0.        0.      946.     8652.     4119.     3718.    12776.    30543.
    97999.
      156.     1948.     2069.     2544.     3205.     6836.    39227.    22864.
    30210.
       63.      555.      676.     1514.     2331.    11565.    45126.   258355.
   145250.
 LAND FRACTION
 0.98 0.98 0.98 0.98 0.98 0.99 0.99 0.99 0.98
 0.98 0.98 0.98 0.98 0.98 0.99 0.99 0.99 0.99
 0.98 0.98 0.98 0.98 0.98 0.98 0.99 0.99 0.99
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 0.00 0.98 0.98 0.98 1.00 1.00 0.99 0.99 0.99
 0.98 0.98 0.98 0.98 0.96 0.96 0.98 0.98 0.99
 0.98 0.98 0.98 0.95 0.96 1.00 1.00 0.99 0.99
 0.00 0.98 0.97 0.94 0.98 1.00 0.99 0.99 0.99
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0.98 0.98 0.96 0.97 0.99 1.00 0.99 0.99 0.99
0.98 0.00 0.98 0.99 0.99 0.99 0.99 0.99 0.99
0.98 0.98 0.98 0.99 0.99 0.99 0.99 0.98 0.97
0.98 0.98 0.98 0.98 0.99 0.99 0.98 0.98 0.97
REGION INDEX
1 2 2 2 2 3 4 5 6
1 2 2 2 2 7 8 910
1 2 2 2 211121314
1 2 2 21516171819
1 2 2 22021222324
1 2 2252621212728
1 2 2292121303132
1 2 2333435363738
1 2 2 23937404142
1 2 2434445464748
1 2 2495051525354
1 2 2555657585960
1 2 2616263646566
1 2 2676869707172
1 2 2736869747576
1 2 2777879808182
WATERSHED INDEX
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1
CROP SEASON AND SHARE
  1 PASTURE                90. 270.  0.4100
  2 STORED FORAGE         150. 240.  0.1300
  3 GRAINS                150. 240.  0.2100
  4 GRN LEAFY VEGETABLES  150. 240.  0.0020
  5 OTHER FOOD CROPS      150. 240.  0.0040
  6 LEGUMES AND SEEDS     150. 240.  0.1500
  7 ROOTS AND TUBERS      150. 240.  0.0030
WATERSHED DEFINITION  -- INITIAL AND ANNUAL WASHOFF AND INGESTION FACTORS
  1 Sr-89                          5.00E-06       0.0
  2 Sr-90                          5.00E-06       0.0
  3 Cs-134                         5.00E-06       0.0
  4 Cs-137                         5.00E-06       0.0
REGIONAL ECONOMIC DATA
  1 EXCLUSION      0.2260.436     426.0    8295.0  159796.0
  2 REGION_02      0.2250.431     423.7    8275.6  159686.1
  3 REGION_03      0.3500.526     598.1    8818.0  150946.1
  4 REGION_04      0.3710.534     651.2    8920.2  149736.3
  5 REGION_05      0.3660.477     663.4    7569.5  150526.6
  6 REGION_06      0.3660.428     643.1    6635.4  150736.5
```

7	REGION_07	0.3060.494	537.0	8632.2	154090.1
8	REGION_08	0.3720.531	630.8	9037.1	150832.5
9	REGION_09	0.3600.470	627.5	8285.0	155489.4
10	REGION_10	0.3470.474	605.7	6020.1	150927.7
11	REGION_11	0.2340.414	443.4	8642.2	162737.6
12	REGION_12	0.2910.304	558.4	10622.0	178087.5
13	REGION_13	0.2850.273	557.0	10905.0	181910.9
14	REGION_14	0.2760.285	546.6	10269.0	178871.2
15	REGION_15	0.2260.436	426.0	8295.0	159796.0
16	REGION_16	0.2650.303	531.4	10381.8	178402.8
17	REGION_17	0.2850.273	557.0	10905.0	181911.0
18	REGION_18	0.2850.273	557.0	10905.0	181910.9
19	REGION_19	0.3060.177	797.8	7626.6	161882.7
20	REGION_20	0.1990.365	472.0	9135.0	172282.9
21	REGION_21	0.0730.034	686.5	13054.6	230534.5
22	REGION_22	0.1050.070	667.2	12734.7	223254.3
23	REGION_23	0.1600.156	638.0	11408.3	206565.9
24	REGION_24	0.2760.234	747.3	7201.8	164564.6
25	REGION_25	0.2260.436	426.0	8295.0	159796.1
26	REGION_26	0.1010.110	637.4	12157.8	217216.5
27	REGION_27	0.0760.040	684.8	12958.3	229553.3
28	REGION_28	0.2280.345	581.6	8048.2	176970.0
29	REGION_29	0.2260.435	426.2	8298.7	159851.6
30	REGION_30	0.1280.069	631.4	12088.1	224121.9
31	REGION_31	0.2500.147	510.5	9968.5	209880.8
32	REGION_32	0.2990.304	473.5	7588.1	181320.4
33	REGION_33	0.2260.436	426.0	8295.0	159796.0
34	REGION_34	0.3290.206	428.5	8524.7	199200.5
35	REGION_35	0.3970.242	364.0	7399.8	192619.6
36	REGION_36	0.4690.288	292.4	6143.2	184176.7
37	REGION_37	0.4760.293	285.0	6014.0	183308.7
38	REGION_38	0.4440.253	237.7	5209.0	165827.3
39	REGION_39	0.4760.293	285.0	6014.0	183308.0
40	REGION_40	0.4700.293	281.0	5949.1	182386.6
41	REGION_41	0.4470.348	266.6	5548.7	182306.2
42	REGION_42	0.4250.230	167.8	4073.3	150703.1
43	REGION_43	0.2200.408	412.4	8190.7	159228.0
44	REGION_44	0.2710.133	248.4	6464.2	163926.5
45	REGION_45	0.2560.212	188.2	4950.7	154978.9
46	REGION_46	0.2510.313	186.1	4420.3	148024.1
47	REGION_47	0.3140.456	215.1	4311.1	162004.4
48	REGION_48	0.4170.328	191.5	3960.3	151174.5
49	REGION_49	0.1520.093	255.9	6993.6	152711.0
50	REGION_50	0.1870.154	227.3	6112.7	149576.8
51	REGION_51	0.2530.339	248.0	5477.3	148111.8
52	REGION_52	0.2720.338	251.8	5322.4	147259.6
53	REGION_53	0.4310.239	280.5	4018.6	139132.5
54	REGION_54	0.4720.248	277.5	4025.8	140645.8
55	REGION_55	0.1320.000	210.0	6642.0	150797.0
56	REGION_56	0.2120.222	235.3	5881.6	149031.6
57	REGION_57	0.2560.348	249.0	5447.0	148042.0
58	REGION_58	0.3180.327	290.2	5317.2	144679.6
59	REGION_59	0.5130.238	382.1	4415.3	134223.1
60	REGION_60	0.5080.253	436.2	4615.9	136128.5
61	REGION_61	0.2800.291	531.7	7674.7	144821.2
62	REGION_62	0.3950.516	780.9	8474.6	140192.2
63	REGION_63	0.3720.492	689.1	7932.0	141515.3
64	REGION_64	0.4500.363	529.0	6375.0	137108.7

65	REGION_65	0.4890.307	466.0	5717.0	134897.1
66	REGION_66	0.4440.343	791.5	8280.4	147724.6
67	REGION_67	0.3990.525	791.0	8507.0	140005.0
68	REGION_68	0.3990.525	791.0	8507.0	140005.0
69	REGION_69	0.3990.525	791.0	8507.0	140005.0
70	REGION_70	0.4070.508	764.8	8282.2	139593.5
71	REGION_71	0.3950.437	896.1	9309.0	148803.0
72	REGION_72	0.3900.290	1153.5	11596.7	166385.1
73	REGION_73	0.3600.505	707.6	8458.5	144529.2
74	REGION_74	0.3690.482	817.8	8581.5	145448.4
75	REGION_75	0.2980.382	877.5	8780.6	158127.4
76	REGION_76	0.3060.238	691.0	10782.6	165220.4
77	REGION_77	0.2430.444	461.1	8315.4	157893.8
78	REGION_78	0.3270.488	638.0	8418.1	148303.5
79	REGION_79	0.3900.522	763.3	8542.1	141792.3
80	REGION_80	0.2970.383	879.6	8757.5	158216.3
81	REGION_81	0.2950.346	828.2	8729.2	159141.2
82	REGION_82	0.3180.259	608.4	8553.7	156928.3

Attachment J

MACCS ATMOS Input Decks for All Release Categories

C:\Proj-Dom 01\
Beaver Valley\Level 3

ENCLOSURE B

Beaver Valley Power Station (BVPS) Unit Nos. 1 and 2

Letter L-08-081

Tabulation of Revisions to the
BVPS License Renewal Application,
Appendix E, "Applicant's Environmental Report –
Operating License Renewal Stage,"
Attachment C, "Severe Accident Mitigation Alternatives" (SAMAs)

Unit 1 Attachment C-1 SAMAs Affected

SAMA 73 – Table 6-1
SAMA 184 – Tables 7-1 and 8-1
SAMA 190 – Tables 5.6-1, 6-1, 7-1, and 8-1

Unit 2 Attachment C-2 SAMAs Affected

SAMA 90 – Table 6-1

The tabulation pages of the Enclosure list each revision to the BVPS License Renewal Application Environmental Report (ER) by Affected Severe Accident Mitigation Alternatives (SAMA) No., ER Table No., and ER Page No. Below each listing, the reason for the change is identified, and the affected table text is printed in italics with deleted text lined-out and added text underlined.

Unit 1 Severe Accident Mitigation Alternatives (SAMA) Revisions

ER Affected SAMA No.	ER Table No.	ER Page No.
SAMA 73	**Table 6-1**	**Page C.1-89**

The second sentence in Unit 1 Table 6-1 "Phase I Disposition" column for SAMA 73 incorrectly states, "During an SBO, no manual actions are needed for TDAFW operation," when, in fact, procedures do exist for local manual equipment operation. The Table 6-1 "Phase I Disposition" column entry for Unit 1 SAMA 73 should read in its entirety, "Already Implemented. Procedure exists." This revised entry would then match the entry contained in Unit 2 Table 6-1 for the identical Unit 2 SAMA 73. Cost and benefit analysis is not required since this SAMA is already implemented.

Table 6-1 is revised to read:

BV1 SAMA Number	Potential Improvement	Discussion	Screened Out Ph I ?	Screening Criteria	Phase I Disposition
73	Proceduralize local manual operation of auxiliary feedwater system when control power is lost.	Extended auxiliary feedwater availability during a station blackout. Also provides a success path should auxiliary feedwater control power be lost in non-station blackout sequences.	Yes	B - Intent Met	~~Intent Met. During an SBO, no manual actions are needed for TDAFW operation.~~ Already Implemented. Procedure exists.

ER Affected SAMA No.	ER Table No.	ER Page No.
SAMA 184	Table 7-1	Page C.1-116
	Table 8-1	Page C.1-125

A typographical error exists in the "Cost" column of Unit 1 Table 7-1 and Table 8-1 for SAMA 184. The Cost column entries read ">$2,000", but the entries in both tables should read ">$2,000K".

Table 7-1 is revised to read:

BV1 SAMA Number	Potential Improvement	Discussion	% Red. In CDF	% Red. In OS Dose	SAMA Case	SAMA Case Description	Benefit	Cost	Cost Basis	Evaluation	Basis for Evaluation
184	Reroute river water or auxiliary river water pump power and control cables	IPEEE fire issue for NS-1 fire, south wall.	1.03%	0.93%	FIRE04	This case eliminates the fires in zone NS-1 that cause total loss of river water.	$50.0K	~~>2,000~~ >$2,000K	Expert Panel	Not Cost-Beneficial	Cost exceeds benefit.

Table 8-1 is revised to read:

BV1 SAMA Number	Potential Improvement	Discussion	SAMA Case	Benefit	Benefit at 3% Disc Rate	Benefit at BE Disc Rate	Benefit at 25yrs	Benefit at UB	Cost	Cost Basis	Evaluation	Basis for Evaluation
184	Reroute river water or auxiliary river water pump power and control cables	IPEEE fire issue for NS-1 fire, south wall.	FIRE04	$50.0K	$72.2K	$44.7K	$59.2K	$96.1K	~~>2,000~~ >$2,000K	Expert Panel	Not Cost-Beneficial	Cost exceeds benefit.

ER Affected SAMA No.	ER Table No.	ER Page No.
SAMA 190	Table 5.6-1	Page C.1-80
	Table 6-1	Page C.1-103
	Table 7-1	Page C.1-
	Table 8-1	Page C.1-

Fire initiator CR-1 (control room fire) was inadvertently omitted from the SAMA evaluation. Analysis of this Unit 1 SAMA (denoted as SAMA 190) has subsequently been performed.

Table 5.6-1 is revised to read:

BV1 SAMA Number	Potential Improvement	Discussion	Focus of SAMA	Source
190	Reduce or eliminate the risk from control room fire CR1L1P. Provide fire barrier or mitigation inside connected control panels.	PRA fire issue. Procedures already exist for local control of the equipment impacted for this fire.	Fire	D

Table 6-1 is revised to read:

BV1 SAMA Number	Potential Improvement	Discussion	Screened Out Ph I ?	Screening Criteria	Phase I Disposition
190	Reduce or eliminate the risk from control room fire CR1L1P. Provide fire barrier or mitigation inside connected control panels.	PRA fire issue. Procedures already exist for local control of the equipment impacted for this fire.	No		Retain for Phase II Analysis.

Table 7-1 is revised to read:

BV1 SAMA Number	Potential Improvement	Discussion	% Red. In CDF	% Red. In OS Dose	SAMA Case	SAMA Case Description	Benefit	Cost	Cost Basis	Evaluation	Basis for Evaluation
190	Reduce or eliminate the risk from control room fire CR1L1P. Provide fire barrier or mitigation inside connected control panels.	PRA fire issue. Procedures already exist for local control of the equipment impacted for this fire.	2.35%	0.69%	FIRE05	Eliminate fire initiator CR1L1P	$48K	$200K	Expert Panel	Not Cost-Beneficial	Cost exceeds benefit.

Table 8-1 is revised to read:

BV1 SAMA Number	Potential Improvement	Discussion	SAMA Case	Benefit	Benefit at 3% Disc Rate	Benefit at BE Disc Rate	Benefit at 25yrs	Benefit at UB	Cost	Cost Basis	Evaluation	Basis for Evaluation
190	Reduce or eliminate the risk from control room fire CR1L1P. Provide fire barrier or mitigation inside connected control panels.	PRA fire issue. Procedures already exist for local control of the equipment impacted for this fire.	FIRE05	$48.0K	$70.7K	$42.5K	$57.7K	$97.7K	$200K	Expert Panel	Not Cost-Beneficial	Cost exceeds benefit.

Unit 2 Severe Accident Mitigation Alternatives (SAMA) Revisions

ER Affected SAMA No.	ER Table No.	ER Page No.
SAMA 90	**Table 6-1**	**Page C.2-90**

The Unit 2 BV SAMA 90 was incorrectly screened. SAMA 90 screens out for both units, and the rationale for screening should be the same for both units. In both units, the cost associated with creating a new system would be prohibitively high. However, both unit Severe Accident Management Guidelines (SAMGs) provide guidance for the injection of multiple RWST volumes into the containment to flood the cavity in efforts to prevent or mitigate the consequences associated with core-concrete interactions. Furthermore, both unit containments have holes in the reactor cavity wall to allow water in the cavity to drain out to the sumps, but these holes would also allow water to flow into the cavity if multiple RWST volumes are injected inside the containment. The intent of SAMA 90 is, therefore, met for both units.

Table 6-1 is revised to read:

BV1 SAMA Number	Potential Improvement	Discussion	Screened Out Ph I ?	Screening Criteria	Phase I Disposition
90	Create a reactor cavity flooding system.	Enhanced debris cool ability, reduced core concrete interaction, and increased fission product scrubbing.	Yes	~~D - Excess Cost~~ B - Intent Met	~~Excessive Implementation Cost~~ Intent met. Implemented at BV2 using existing systems as directed by SAMGs.