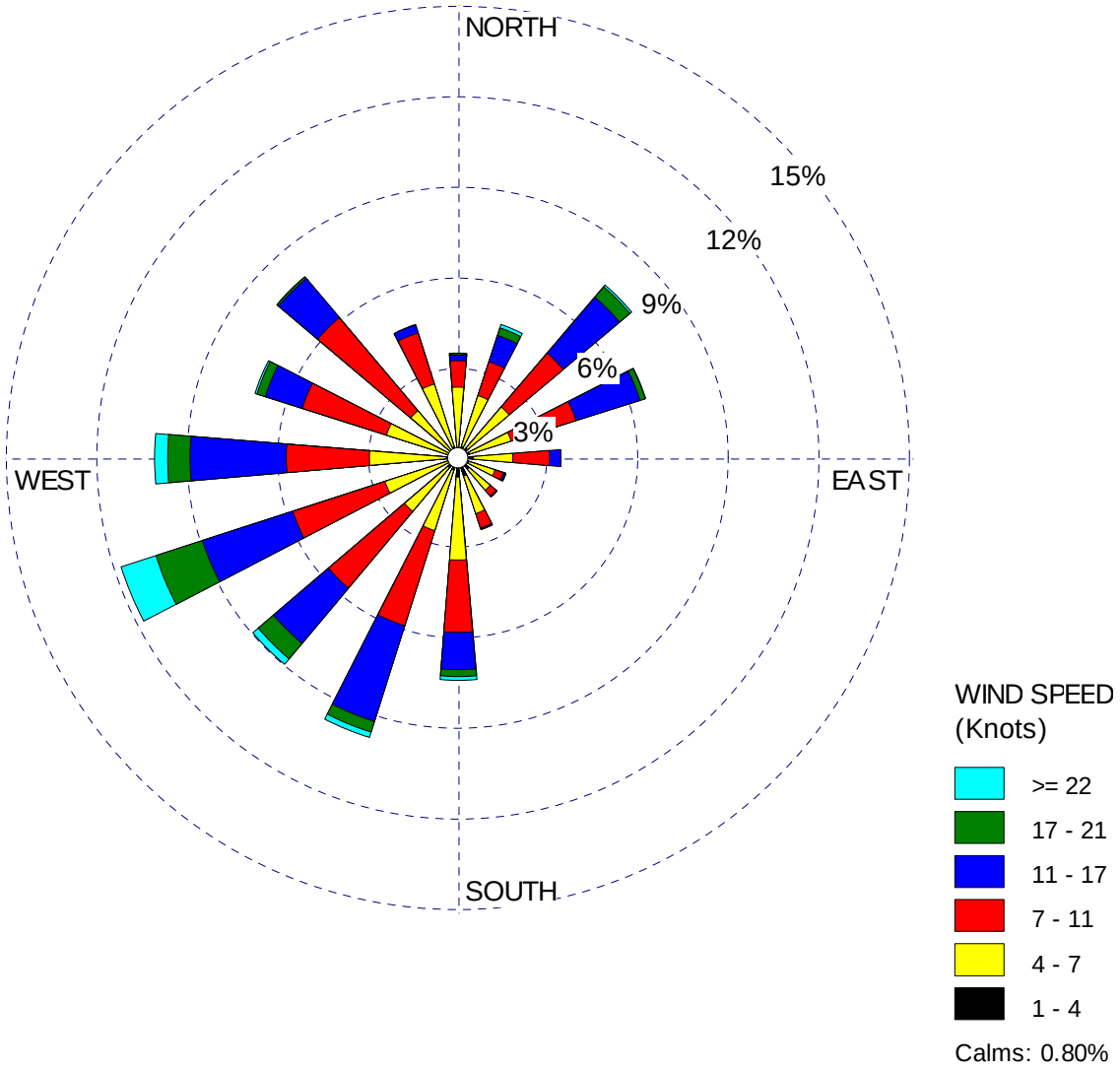
APPENDIX 5.1A

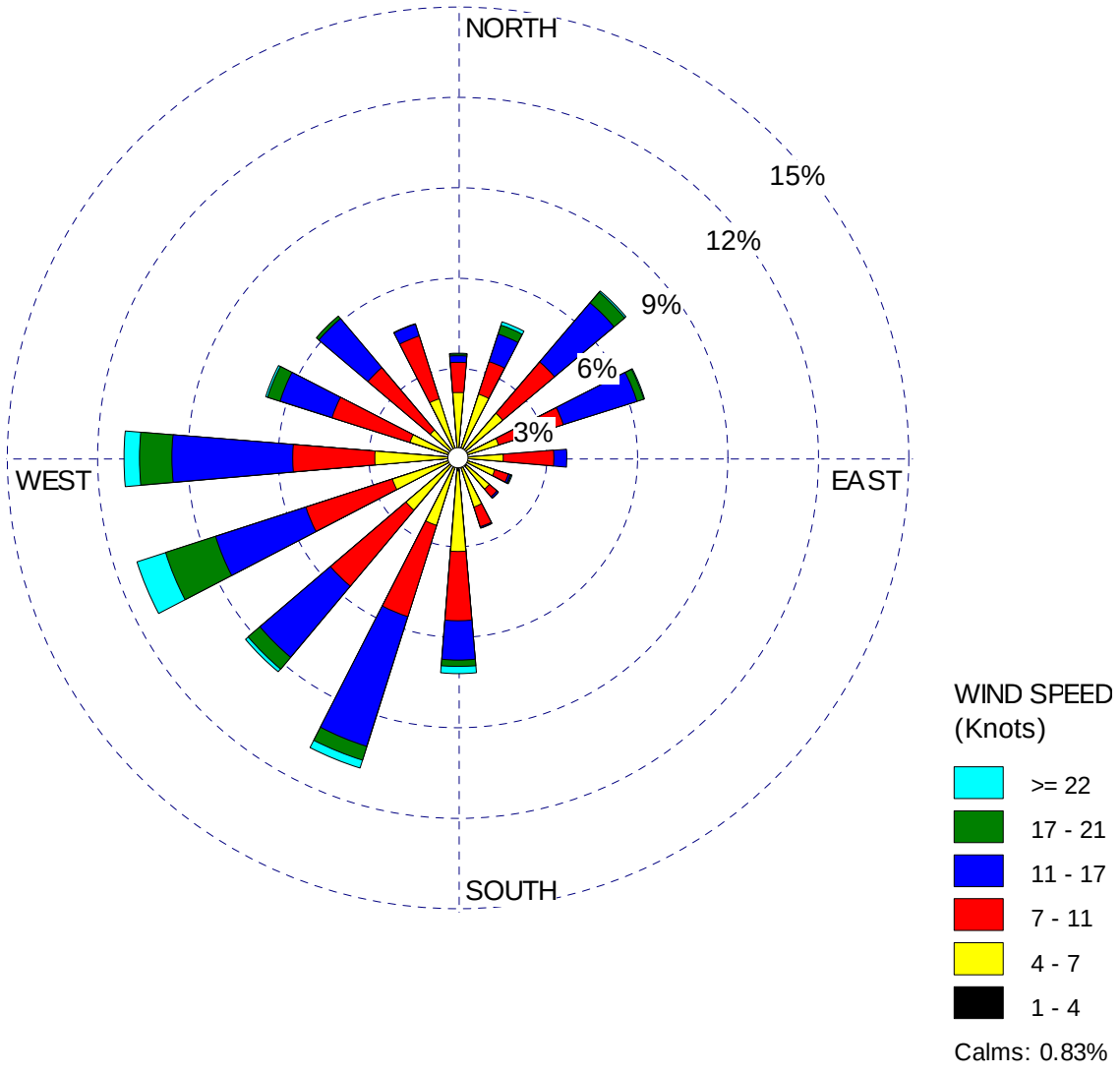
Quarterly Wind Roses and Wind Frequency Distributions

FIGURE 5.1A-1
TWO YEAR WIND ROSE, 2001-2002



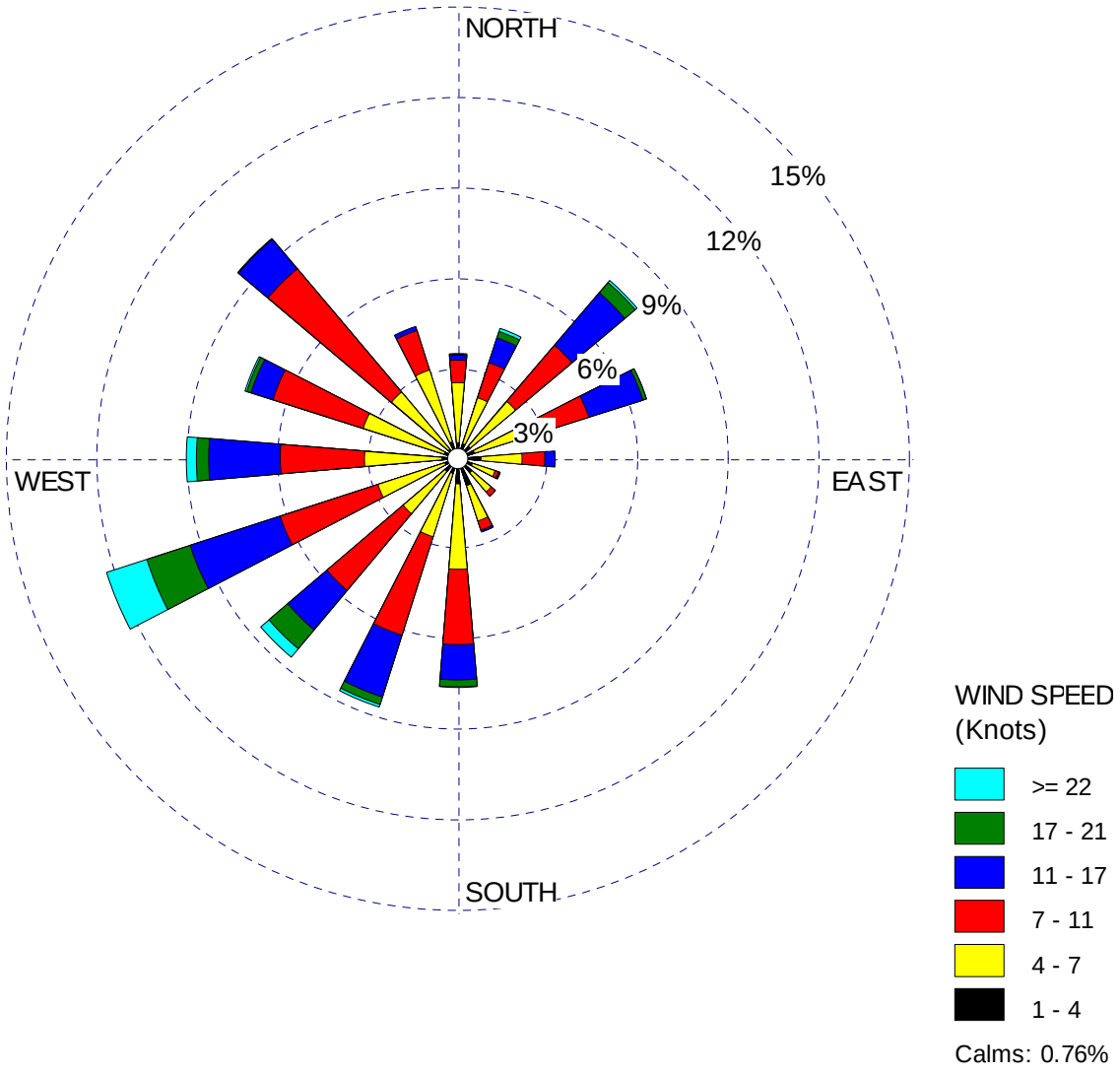
Jean 2001 – 2002 (Nellis AFB Upper Air)

FIGURE 5.1A-2
ANNUAL WIND ROSE, 2001



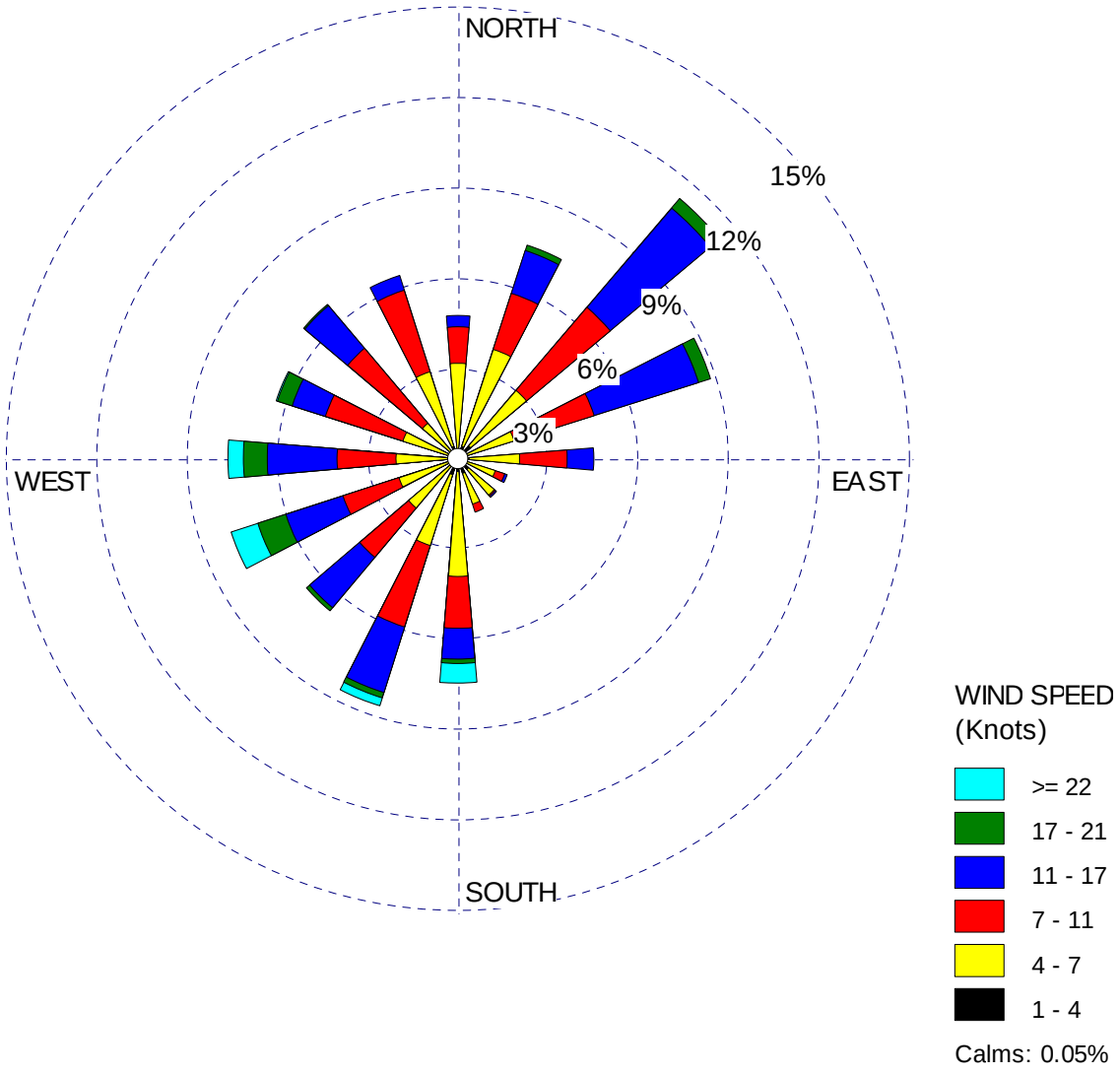
Jean 2001 (Nellis AFB Upper Air)

FIGURE 5.1A-3
ANNUAL WIND ROSE, 2002



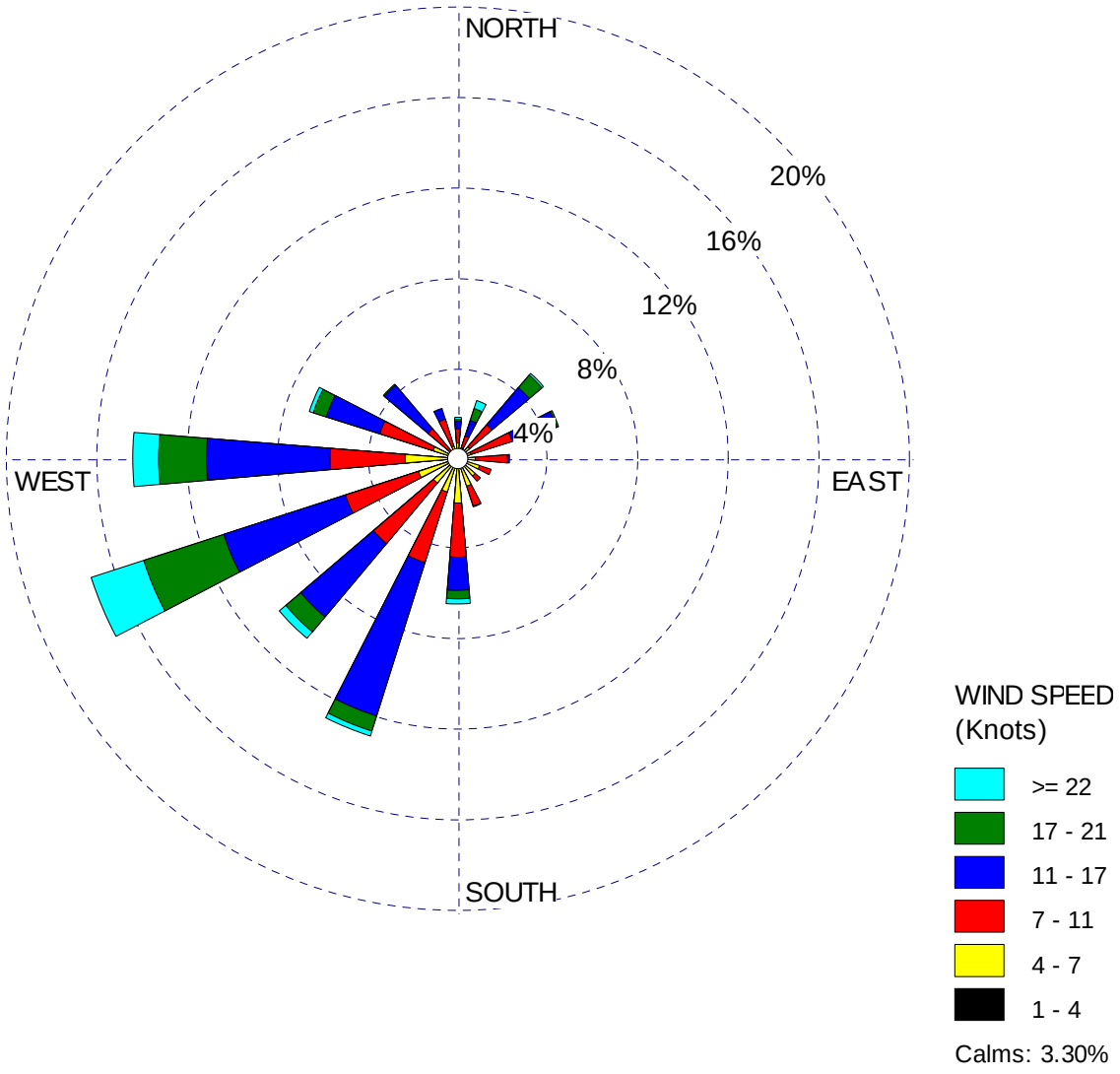
Jean 2002 (Nellis AFB Upper Air)

FIGURE 5.1A-4
FIRST QUARTER WIND ROSE, 2001



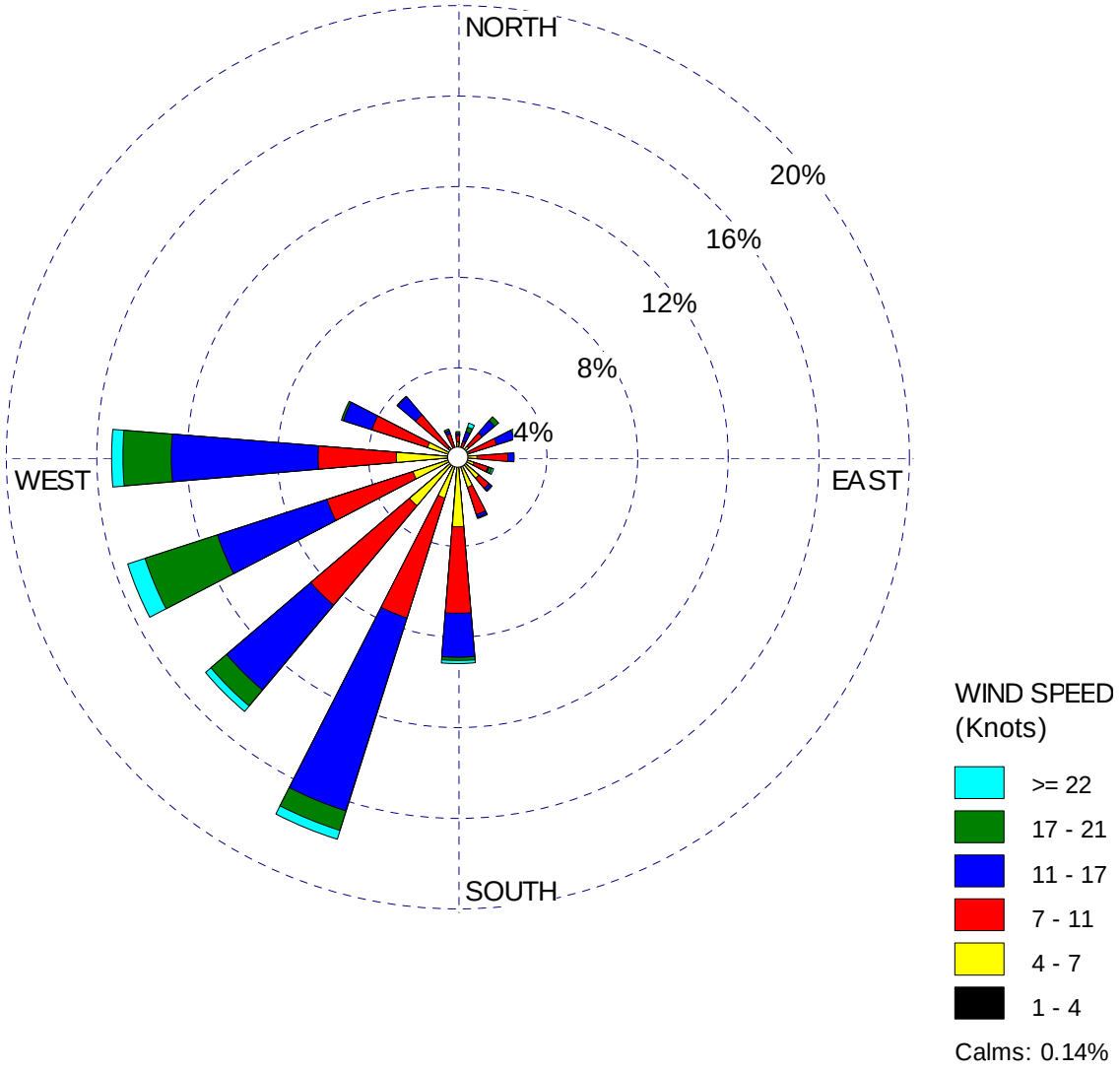
First Quarter Jean 2001 (Nellis AFB Upper Air)

FIGURE 5.1A-5
SECOND QUARTER WIND ROSE, 2001



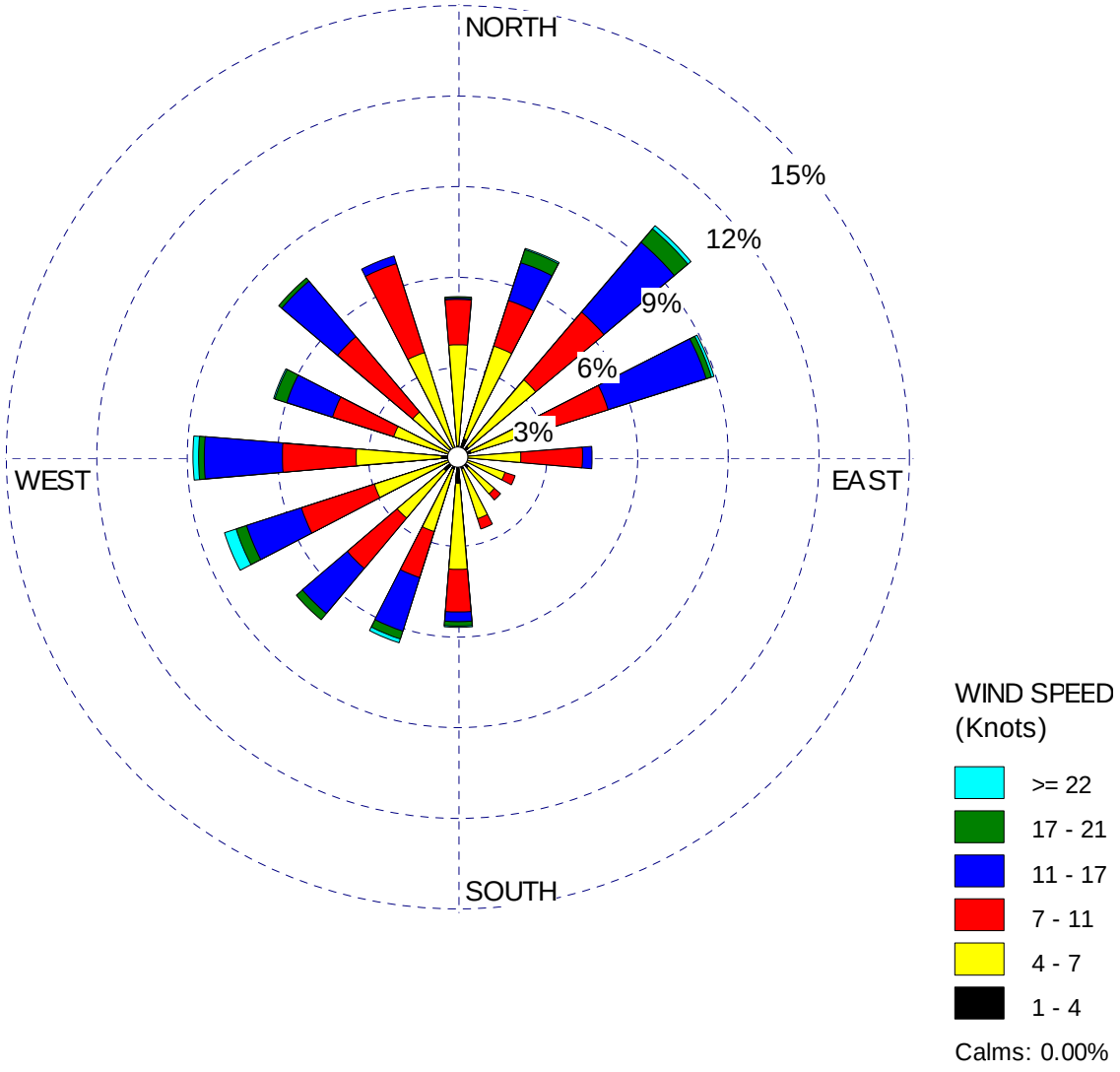
Second Quarter Jean 2001 (Nellis AFB Upper Air)

FIGURE 5.1A-6
THIRD QUARTER WIND ROSE, 2001



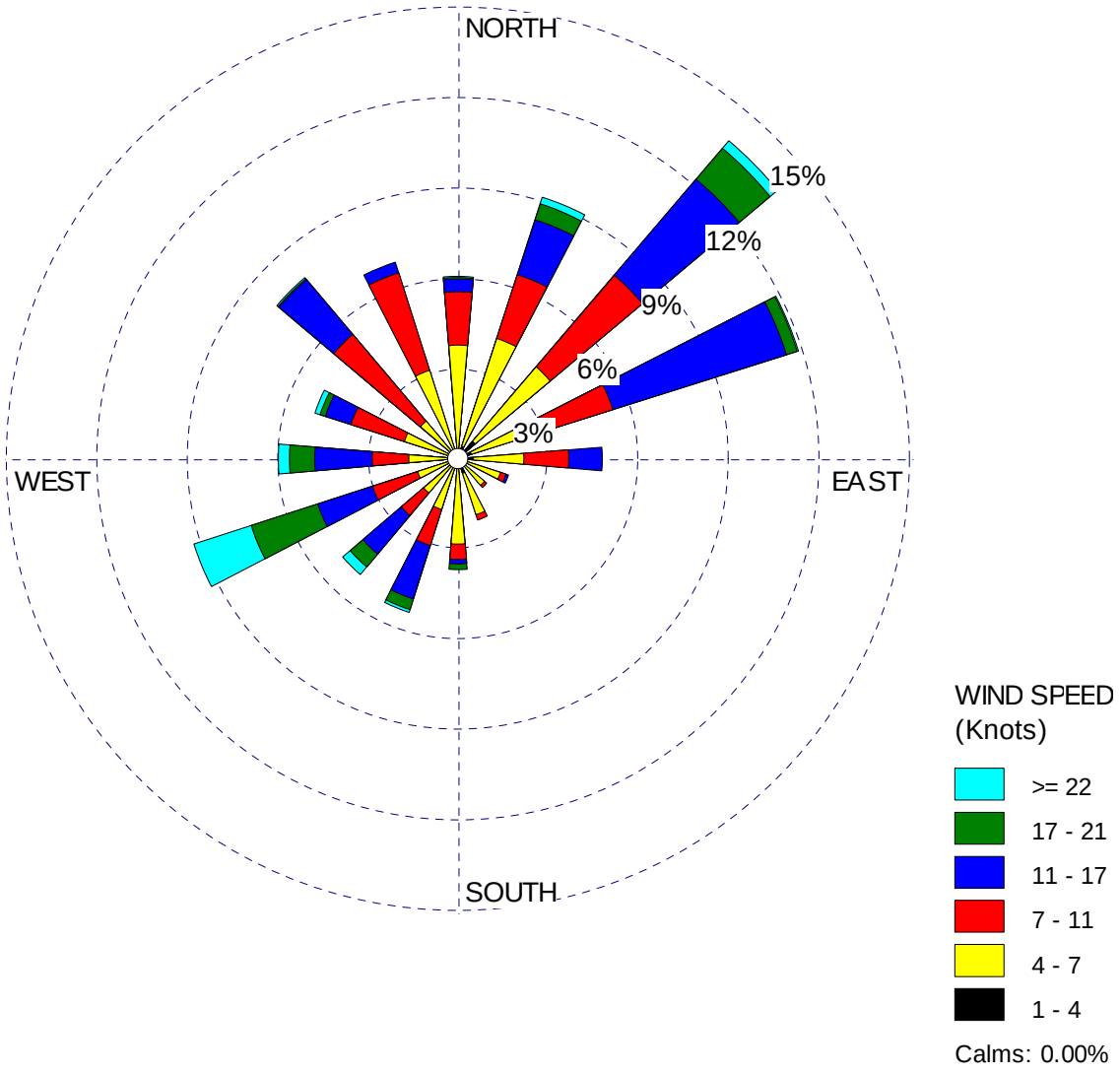
Third Quarter Jean 2001 (Nellis AFB Upper Air)

FIGURE 5.1A-7
FOURTH QUARTER WIND ROSE, 2001



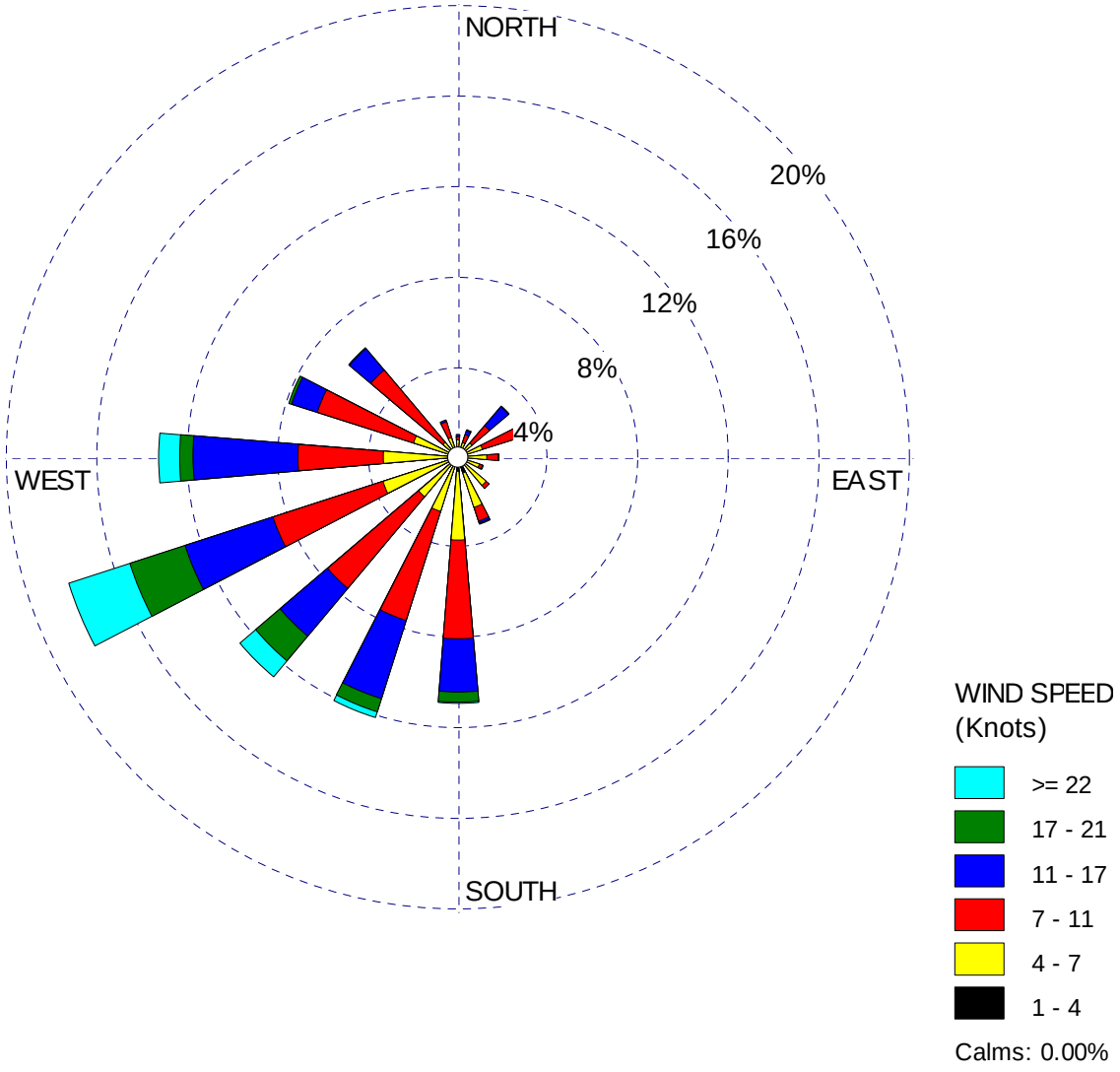
Fourth Quarter Jean 2001 (Nellis AFB Upper Air)

FIGURE 5.1A-8
FIRST QUARTER WIND ROSE, 2002



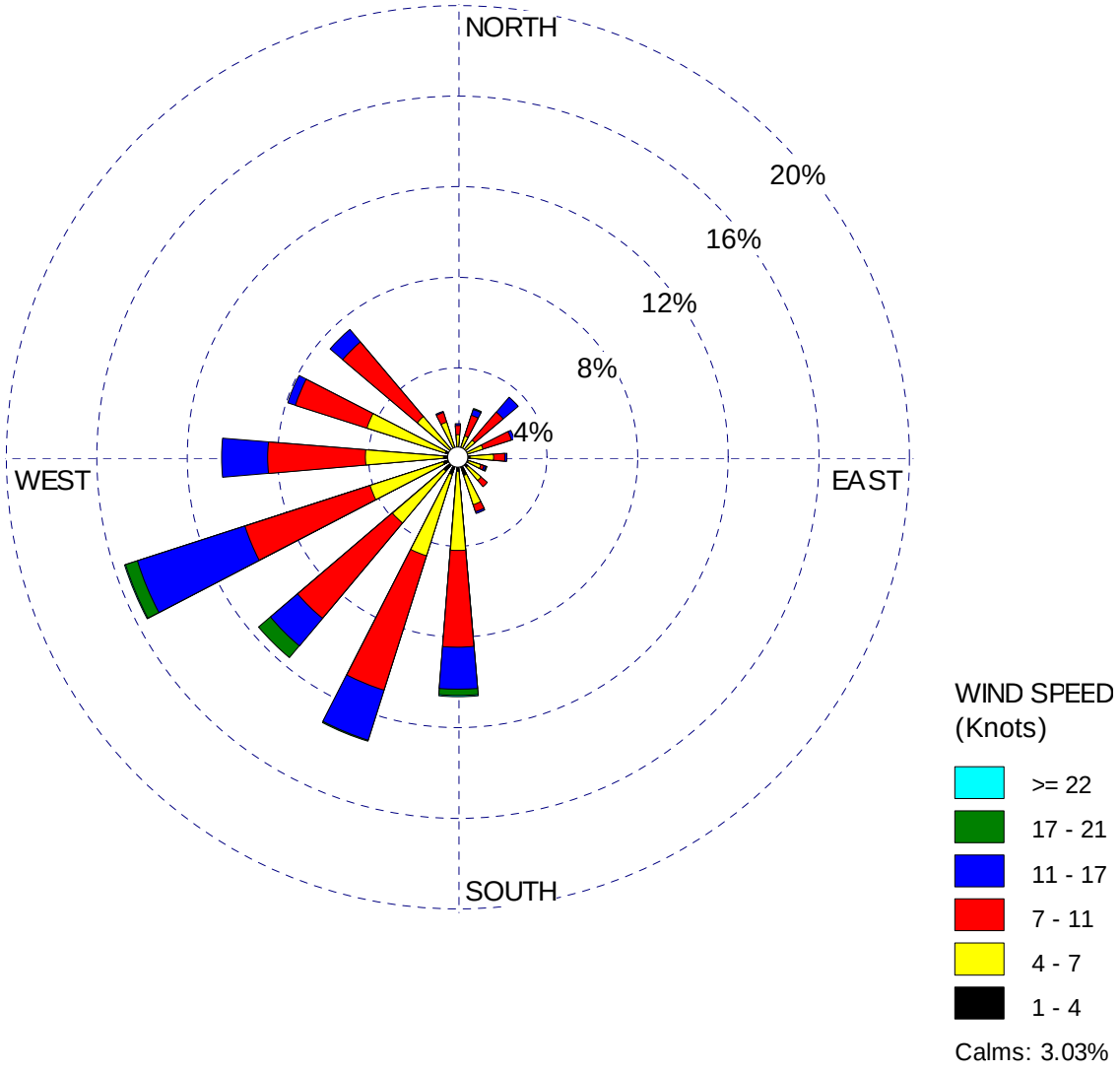
First Quarter Jean 2002 (Nellis AFB Upper Air)

FIGURE 5.1A-9
SECOND QUARTER WIND ROSE, 2002



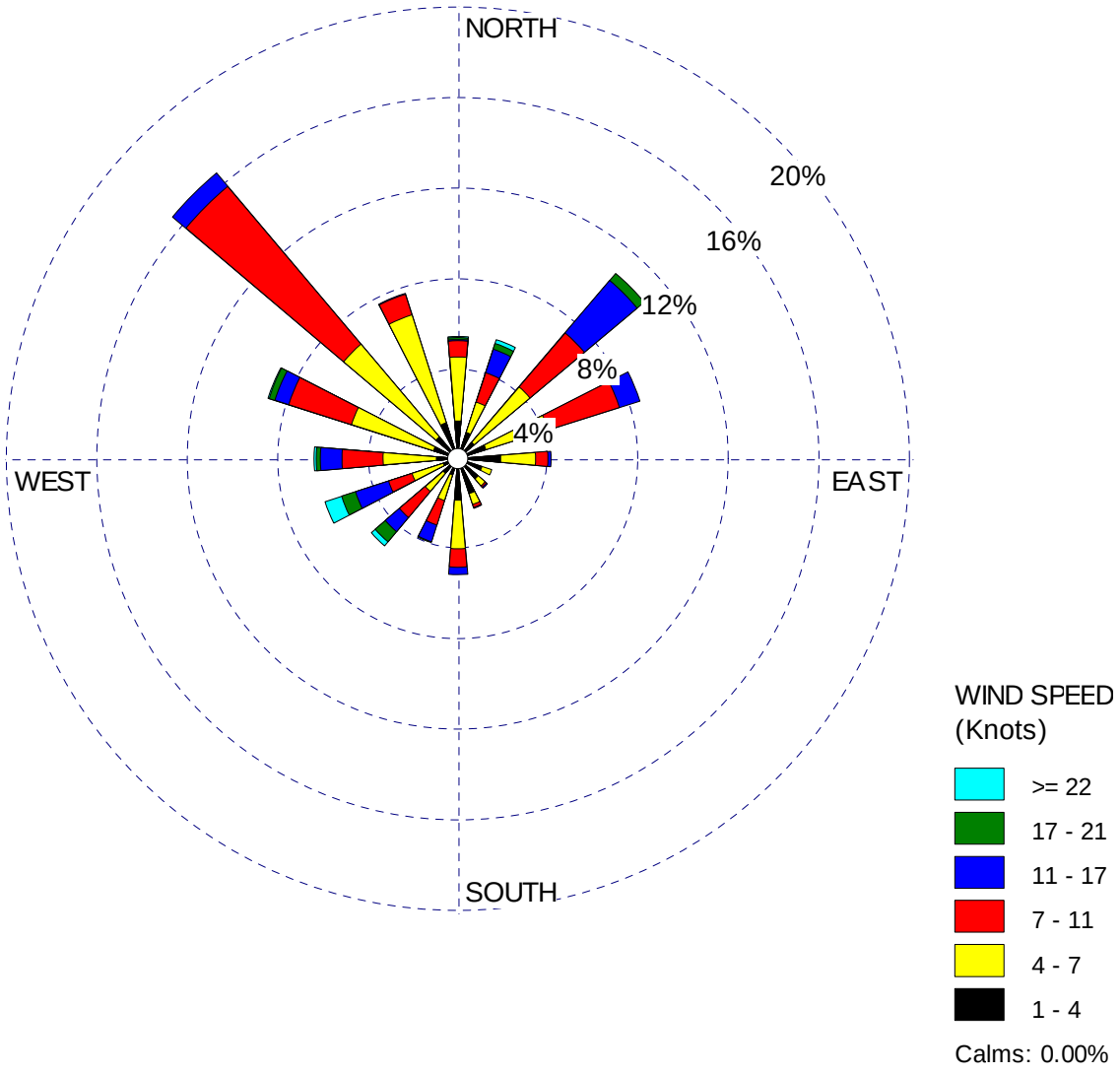
Second Quarter Jean 2002 (Nellis AFB Upper Air)

FIGURE 5.1A-10
THIRD QUARTER WIND ROSE, 2002



Third Quarter Jean 2002 (Nellis AFB Upper Air)

FIGURE 5.1A-11
FOURTH QUARTER WIND ROSE, 2002



Fourth Quarter Jean 2002 (Nellis AFB Upper Air)

APPENDIX 5.1B

Emissions and Operating Parameters

APPENDIX 5.1B

EMISSIONS AND OPERATING PARAMETERS

Emissions and operating parameters for the boilers are shown in Table 5.1B-1. Emissions and operating parameters for the emergency engines are shown in Table 5.1B-2. Emissions and operating parameters for the fire pump engines are shown in Table 5.1B-3.

The assumptions used in calculating maximum hourly, daily and annual emissions from the new facility are shown in Tables 5.1B-4 and 5.1B-5.
Emission factors for the criteria air pollutants (NOx, SOx, PM_{10}, $PM_{2.5}$, CO, ROG) were taken from project design criteria and manufacturer specification documentation.
Emission factors for Toxic Air Contaminants (TACs) were obtained from AP-42 (Table 1.4-3). As Diesel particulate matter is considered to be a TAC, all of the PM_{10} emissions from the Diesel fire pump engine are also included.

Detailed calculations of the TAC emissions from the boilers are shown in Appendix 5.1B, Table 5.1B-6 and 5.1 B-7. Detailed calculations of the Diesel particulate emissions are shown in Table 5.1B-5.

TABLE 5.1B-1
BOILER EMISSIONS AND OPERATING PARAMETERS

Pollutant	Ivanpah 1 & 2	Ivanpah 3
Ambient Temperature (F)	62	62
Ambient Humidity (%)	0.6	0.6
Steam Load	100%	100%
Boiler Fuel Flow Rates, kg/s	1.2995	2.5990
scfm	3,750	7,500
lb/hr as fired	10,314	20,627
lb/hr, dry, ash free	10,314	20,627
MMbtu/hr (HHV)	231.1	462.2
MMbtu/hr (LHV)	208.4	416.7
Exhaust Gas Parameters		
Exhaust Flow Rate (wacfm)	78,538	157,076
Exhaust Flow Rate (dscfm)	37,818	75,637
Exhaust Flow Rate (lbs/hr)	200,882	401,764
Stack Temperature (F)	430	430
O2 (%), wet basis	2.50%	2.50%
Reference O2 (%), dry basis	3.00%	3.00%
Pollutant Concentrations at Ref. O2		
NMHC as CH4, ppmvd	1.40	1.40
CH4, ppmvd		
THC as CH4, ppmvd	1.40	1.40
CO (short term), ppmvd	25.00	25.00
CO (long term), ppmvd	25.00	25.00
NOx (short term), ppmvd	9.00	9.00
NOx (long term), ppmvd	9.00	9.00
SOx, ppmvd	1.663	1.663
NH3, ppmvd	0.0	0.0
Emission Rates (lbs/hour)		
NMHC as CH4	0.14	0.27
THC as CH4	0.14	0.27
CO (short term)	4.23	8.46
CO (long term)	4.23	8.46
NOx (short term)	2.50	5.00
NOx (long term)	2.50	5.00
SOx	0.64	1.29
NH3	0	0
PM10	1.71	3.42

TABLE 5.1B-2
EMERGENCY ENGINE EMISSIONS AND OPERATING PARAMETERS

Caterpillar 3516C-HD TA Diesel-Fired Emergency Generator Engine

2,500	ekW output	Stack Data	
1.341	hp/Btu	921.90	°F
89.4%	efficient system	1.5	ft diameter
3,750	hp each	30	ft height
1	hours/day	19,048.70	acfm
50	hours/year	179.66	ft/s
173.30	gallons/hour	54.8	m/s
0.139	MMBtu/gal	122.5	mph

Pollutant	Emission Factor lb/hp-hr	g/hp-hr	Ref		Emission Rate lb/hr	lb/day[1]	tons/yr
NO_x		5.1	Caterpillar[2]		41.75	41.75	1.044
CO		0.41			3.39	3.39	0.085
VOC		0.10			0.83	0.83	0.021
PM_{10}		0.036			0.30	0.30	0.007
SO_2	0.0000099	0.00451	15	ppmw S	0.037[3]	0.037	0.00093

1. Peak daily emission rate .
2. Caterpillar 3516C-HD (Tier 2).
3. Assumes specific gravity of diesel fuel = 0.86

TABLE 5.1B-3
EMERGENCY FIRE PUMP ENGINE EMISSIONS AND OPERATING PARAMETERS

Emergency Fire Water Pump Engine (Clarke JU6H-UF62 California ATCM Tier 2) (1 EACH FOR IVANPAH 1, 2, & 3)

Assume 1 hour of testing and maintenance each week (50 hours per year)

Rating (bhp)	240			
Fuel	Diesel			
Fuel Consumption (gal/hr)	10.3	, hence	10.3	gal/hr each week
Exhaust Temperature (F)	848			
Exhaust Diameter (inches)	6			
Exhaust Flow Rate (acfm)	1,484			
Exhaust Velocity (ft/sec)	126			
Stack height (ft AGL)	20			

	NOx	CO	VOC	SOx	PM10
Emission Factor (g/bhp-hr)	4.41	0.61	0.49	0.00499	0.09
Hourly Emissions (lbs/hr)	2.33	0.32	0.26	0.0026	0.048

TABLE 5.1B-4
DETAILED CALCULATIONS FOR HOURLY, DAILY, AND ANNUAL OPERATING EMISSIONS (BOILERS)

	NOx			SOx			CO			VOC			PM10/PM2.5		
Equipment	**Max lb/hr**	**Max lb/day**	**Total tpy**	**Max lb/hr**	**Max lb/day**	**Total tpy**	**Max lb/hr**	**Max lb/day**	**Total tpy**	**Max lb/hr**	**Max lb/day**	**Total tpy**	**Max lb/hr**	**Max lb/day**	**Total tpy**
Ivanpah 1	2.5	10.0	0.6	0.6	2.6	0.2	4.2	16.9	1.1	0.1	0.5	0.0	1.7	6.8	0.4
Ivanpah 2	2.5	10.0	0.6	0.6	2.6	0.2	4.2	16.9	1.1	0.1	0.5	0.0	1.7	6.8	0.4
Ivanpah 3	5.0	20.0	1.3	1.3	5.1	0.3	8.5	33.8	2.2	0.3	1.1	0.1	3.4	13.7	0.9
Total	10.0	40.0	2.6	2.6	10.3	0.7	16.9	67.7	4.4	0.5	2.2	0.1	6.8	27.4	1.8
	lb/hr	lb/day	tpy	lb/hr	lb/day	tpy	lb/hr	lb/day	tpy	lb/hr	lb/day	tpy	lb/hr	lb/day	Tpy

1. Daily emissions based on 4 hours per day
2. Annual emissions based on fuel use = 5% of solar input (120,000 MMBTU)

TABLE 5.1B-5
DETAILED CALCULATIONS FOR HOURLY, DAILY, AND ANNUAL EMISSIONS (ENGINES)

	NOx			SOx			CO			VOC			$PM_{10}/PM_{2.5}$		
Equipment	**Max lb/hr**	**Max[2] lb/day**	**Total tpy**	**Max lb/hr**	**Max lb/day**	**Total tpy**	**Max lb/hr**	**Max lb/day**	**Total tpy**	**Max lb/hr**	**Max lb/day**	**Total tpy**	**Max lb/hr**	**Max lb/day**	**Total tpy**
Ivanpah 1 Emergency Engine	41.75	41.75	1.044	0.04	0.04	0.085	3.39	3.39	0.085	0.83	0.83	0.021	0.30	0.30	0.007
Ivanpah 2 Emergency Engine	41.75	41.75	1.044	0.04	0.04	0.085	3.39	3.39	0.085	0.83	0.83	0.021	0.30	0.30	0.007
Ivanpah 3A Emergency Engine	41.75	41.75	1.044	0.04	0.04	0.085	3.39	3.39	0.085	0.83	0.83	0.021	0.30	0.30	0.007
Ivanpah 3B Emergency Engine	41.75	41.75	1.044	0.04	0.04	0.085	3.39	3.39	0.085	0.83	0.83	0.021	0.30	0.30	0.007
Ivanpah 1 Fire pump Engine	2.33	2.33	0.058	0.002	0.002	0.000	0.32	0.32	0.008	0.26	0.26	0.006	0.05	0.05	0.001
Ivanpah 2 Fire pump Engine	2.33	2.33	0.058	0.002	0.002	0.000	0.32	0.32	0.008	0.26	0.26	0.006	0.05	0.05	0.001
Ivanpah 3 Fire pump Engine	2.33	2.33	0.058	0.002	0.002	0.000	0.32	0.32	0.008	0.26	0.26	0.006	0.05	0.05	0.001
Total[1]	41.75	174.0	4.351	0.16	0.16	0.339	14.53	14.53	0.36	4.08	4.08	0.102	1.33	1.33	0.033
	lb/hr	lb/day	tpy	lb/hr	lb/day	tpy	lb/hr	lb/day	tpy	lb/hr	lb/day	tpy	lb/hr	lb/day	Tpy

1. Hourly emissions based on proposal to limit engine testing to one engine at any time.
2. Daily emissions based on 1 hour per day
3. Annual emissions based on 50 hours per year for testing

TABLE 5.1-B6
ANNUAL AND MAXIMUM HOURLY TOXIC AIR CONTAMINANT EMISSIONS FROM IVANPAH 1 & 2 BOILERS (per unit)

Pollutant	Emission Factor lb/MM Cu Ft	Boiler Max Firing Rate MM Cu Ft/hr	Boiler Fuel Use MM Cu Ft/yr	Boiler Emissions lbs/hr	Boiler Emissions tons/yr	Hourly Emission Rate g/sec	Annual Emission Rate g/sec
Benzene	2.10E-03	0.225	117	4.73E-04	2.76E-05	5.95E-05	7.94E-07
Formaldehyde	7.50E-02	0.225	117	1.69E-02	9.86E-04	2.13E-03	2.84E-05
Hexane	1.80E+00	0.225	117	4.05E-01	2.37E-02	5.10E-02	6.81E-04
Naphthalene	6.10E-04	0.225	117	1.37E-04	8.02E-06	1.73E-05	2.31E-07
PAHs – Total	1.00E-04	0.225	117	2.25E-05	1.31E-06	2.84E-06	3.78E-08
Toluene	3.40E-03	0.225	117	7.65E-04	4.47E-05	9.64E-05	1.29E-06

TABLE 5.1-B7
ANNUAL AND MAXIMUM HOURLY TOXIC AIR CONTAMINANT EMISSIONS FROM IVANPAH 3 BOILERS

Pollutant	Emission Factor lb/MM Cu Ft	Boiler Max firing rate MM Cu Ft/hr	Boiler Fuel Use MM Cu Ft/yr	Boiler Emissions lbs/hr	Boiler Emissions tons/yr	Hourly Emission Rate g/sec	Annual Emission Rate g/sec
Benzene	2.10E-03	0.450	234	9.45E-04	1.10E-04	1.19E-04	3.18E-06
Formaldehyde	7.50E-02	0.450	234	3.38E-02	3.94E-03	4.25E-03	1.13E-04
Hexane	1.80E+00	0.450	234	8.10E-01	9.46E-02	1.02E-01	2.72E-03
Naphthalene	6.10E-04	0.450	234	2.75E-04	3.21E-05	3.46E-05	9.23E-07
PAHs – Total	1.00E-04	0.450	234	4.50E-05	5.26E-06	5.67E-06	1.51E-07
Toluene	3.40E-03	0.450	234	1.53E-03	1.79E-04	1.93E-04	5.14E-06

APPENDIX 5.1C

Top-Down Elevation of Best Available Control Technology

APPENDIX 5.1C

TOP-DOWN EVALUATION OF BEST AVAILABLE CONTROL TECHNOLOGY

Best Available Control Technology is not triggered for any of the sources in this project.

APPENDIX 5.1D

Modeling Analysis

APPENDIX 5.1D

MODELING ANALYSIS

TABLE 5.1D-1
DIMENSIONS OF ON-SITE STRUCTURES

Feature	Height (feet)	Length (feet)	Width (feet)	Diameter (feet)
Ivanpah 1 condenser	27.2	52	52	--
Ivanpah 1 Reheat Tower	95	--	--	10
Ivanpah 1 Electrical Building	8.8	20	42.4	--
Ivanpah 1 Deaerator	16	3.2	9.6	--
Ivanpah 1 Boiler Annex	6.5	6.9	15	--
Ivanpah 2 condenser	27.2	52	52	--
Ivanpah 2 Reheat Tower	95	--	--	10
Ivanpah 2 Electrical Building	8.8	20	42.4	--
Ivanpah 2 Deaerator	16	3.2	9.6	--
Ivanpah 2 Boiler Annex	6.5	6.9	15	--
Ivanpah 3 condenser	36	73.1	74.2	--
Ivanpah 3 Reheat Tower	140	--	--	14
Ivanpah 3 Electrical Building	11.7	20.1	42.4	--
Ivanpah 3 Deaerator	16	3.7	11.7	--
Ivanpah 3 Boiler Annex	6.5	6.9	15	--

TABLE 5.1D-2

EMISSION RATES AND STACK PARAMETERS FOR REFINED MODELING

Equipment	Stack Diam, m	Stack Height m	Temp, deg K	Exhaust Flow, m^3/s	Exhaust Velocity, m/s	Emission Rates, g/s NOx	SOx	CO	PM_{10}	Stack Diam, ft	Stack Height ft	Exh Temp, Deg F	Exh Flow Rate, ft^3/min	Exhaust Velocity, ft/s	Emission Rates, lb/hr NOx	SOx	CO	PM10
Averaging Period: 1-hour																		
Ivanpah 1 Boiler	1.02	39.62	494.26	37.07	45.72	0.3152	0.0811	0.5330	0.2155	3.3	130	430	78,538	150	2.50	0.64	4.23	1.71
Ivanpah 1 Emergency Engine	0.46	9.15	767.54	8.99	54.76	5.2605	0.0047	0.4271	0.0375	1.5	30	922	19,049	180	41.75	0.04	3.39	0.30
Ivanpah 1 Fire Pump	0.15	6.10	726.48	0.70	38.39	0.2940	0.0003	0.0407	0.0060	0.5	20	848	1,484	126	2.33	0.00	0.32	0.05
Ivanpah 2 Boiler	1.02	39.62	494.26	37.07	45.72	0.3152	0.0811	0.5330	0.2155	3.3	130	430	78,538	150	2.50	0.64	4.23	1.71
Ivanpah 2 Emergency Engine	0.46	9.15	767.54	8.99	54.76	5.2605	0.0047	0.4271	0.0375	1.5	30	922	19,049	180	41.75	0.04	3.39	0.30
Ivanpah 2 Fire Pump	0.15	6.10	726.48	0.70	38.39	0.2940	0.0003	0.0407	0.0060	0.5	20	848	1,484	126	2.33	0.00	0.32	0.05
Ivanpah 3 Boiler	1.52	39.62	494.26	74.13	40.64	0.6304	0.1622	1.0661	0.4309	5.0	130	430	157,076	133	5.00	1.29	8.46	3.42
Ivanpah 3 Emergency Engine A	0.46	9.15	767.54	8.99	54.76	5.2605	0.0047	0.4271	0.0375	1.5	30	922	19,049	180	41.75	0.04	3.39	0.30
Ivanpah 3 Emergency Engine B	0.46	9.15	767.54	8.99	54.76	5.2605	0.0047	0.4271	0.0375	1.5	30	922	19,049	180	41.75	0.04	3.39	0.30
Ivanpah 3 Fire Pump	0.15	6.10	726.48	0.70	38.39	0.2940	0.0003	0.0407	0.0060	0.5	20	848	1,484	126	2.33	0.00	0.32	0.05
Averaging Period: 3-hour																		
Ivanpah 1 Boiler	1.02	39.62	494.26	37.07	45.72	0.3152	0.0811	0.5330	0.2155	3.3	130	430	78,538	150	2.50	0.64	4.23	1.71
Ivanpah 1 Emergency Engine	0.46	9.15	767.54	8.99	54.76	1.7535	0.0016	0.1424	0.0125	1.5	30	922	19,049	180	13.92	0.01	1.13	0.10
Ivanpah 1 Fire Pump	0.15	6.10	726.48	0.70	38.39	0.0980	0.0001	0.0136	0.0020	0.5	20	848	1,484	126	0.78	0.00	0.11	0.02
Ivanpah 2 Boiler	1.02	39.62	494.26	37.07	45.72	0.3152	0.0811	0.5330	0.2155	3.3	130	430	78,538	150	2.50	0.64	4.23	1.71
Ivanpah 2 Emergency Engine	0.46	9.15	767.54	8.99	54.76	1.7535	0.0016	0.1424	0.0125	1.5	30	922	19,049	180	13.92	0.01	1.13	0.10
Ivanpah 2 Fire Pump	0.15	6.10	726.48	0.70	38.39	0.0980	0.0001	0.0136	0.0020	0.5	20	848	1,484	126	0.78	0.00	0.11	0.02
Ivanpah 3 Boiler	1.52	39.62	494.26	74.13	40.64	0.6304	0.1622	1.0661	0.4309	5.0	130	430	157,076	133	5.00	1.29	8.46	3.42
Ivanpah 3 Emergency Engine	0.46	9.15	767.54	8.99	54.76	1.7535	0.0016	0.1424	0.0125	1.5	30	922	19,049	180	13.92	0.01	1.13	0.10
Ivanpah 3 Emergency Engine	0.46	9.15	767.54	8.99	54.76	1.7535	0.0016	0.1424	0.0125	1.5	30	922	19,049	180	13.92	0.01	1.13	0.10
Ivanpah 3 Fire Pump	0.15	6.10	726.48	0.70	38.39	0.0980	0.0001	0.0136	0.0020	0.5	20	848	1,484	126	0.78	0.00	0.11	0.02

TABLE 5.1D-2

EMISSION RATES AND STACK PARAMETERS FOR REFINED MODELING

Equipment	Stack Diam, m	Stack Height m	Temp, deg K	Exhaust Flow, m^3/s	Exhaust Velocity, m/s	Emission Rates, g/s NOx	SOx	CO	PM_{10}	Stack Diam, ft	Stack Height ft	Exh Temp, Deg F	Exh Flow Rate, ft^3/min	Exhaust Velocity, ft/s	Emission Rates, lb/hr NOx	SOx	CO	PM10
Averaging Period: 8-hour																		
Ivanpah 1 Boiler	1.02	39.62	494.26	37.07	45.72	0.1576	0.0405	0.2665	0.1077	3.3	130	430	78,538	150	1.25	0.32	2.12	0.86
Ivanpah 1 Emergency Engine	0.46	9.15	767.54	8.99	54.76	0.2192	0.0002	0.0178	0.0016	1.5	20	922	19,049	180	1.74	0.00	0.14	0.01
Ivanpah 1 Fire Pump	0.15	6.10	726.48	0.70	38.39	0.0123	0.0000	0.0017	0.0003	0.5	20	848	1,484	126	0.10	0.00	0.01	0.00
Ivanpah 2 Boiler	1.02	39.62	494.26	37.07	45.72	0.1576	0.0405	0.2665	0.1077	3.3	130	430	78,538	150	1.25	0.32	2.12	0.86
Ivanpah 2 Emergency Engine	0.46	9.15	767.54	8.99	54.76	0.2192	0.0002	0.0178	0.0016	1.5	20	922	19,049	180	1.74	0.00	0.14	0.01
Ivanpah 2 Fire Pump	0.15	6.10	726.48	0.70	38.39	0.0123	0.0000	0.0017	0.0003	0.5	20	848	1,484	126	0.10	0.00	0.01	0.00
Ivanpah 3 Boiler	1.52	39.62	494.26	74.13	40.64	0.3152	0.0811	0.5330	0.2155	5.0	130	430	157,076	133	2.50	0.64	4.23	1.71
Ivanpah 3 Emergency Engine	0.46	9.15	767.54	8.99	54.76	0.2192	0.0002	0.0178	0.0016	1.5	20	922	19,049	180	1.74	0.00	0.14	0.01
Ivanpah 3 Emergency Engine	0.46	9.15	767.54	8.99	54.76	0.2192	0.0002	0.0178	0.0016	1.5	20	922	19,049	180	1.74	0.00	0.14	0.01
Ivanpah 3 Fire Pump	0.15	6.10	726.48	0.70	38.39	0.0123	0.0000	0.0017	0.0003	0.5	20	848	1,484	126	0.10	0.00	0.01	0.00
Averaging Period: Annual																		
Ivanpah 1 Boiler	1.02	39.62	494.26	37.07	45.72	0.0093	0.0024	0.0158	0.0064	3.3	130	430	78,538	150	1.25	0.32	2.12	0.86
Ivanpah 1 Emergency Engine	0.46	9.15	767.54	8.99	54.76	0.0000	0.0000	0.0000	0.0000	1.5	20	922	19,049	180	0.01	0.00	0.00	0.00
Ivanpah 1 Fire Pump	0.15	6.10	726.48	0.70	38.39	0.0000	0.0000	0.0000	0.0000	0.5	20	848	1,484	126	0.00	0.00	0.00	0.00
Ivanpah 2 Boiler	1.02	39.62	494.26	37.07	45.72	0.0093	0.0024	0.0158	0.0064	3.3	130	430	78,538	150	1.25	0.32	2.12	0.86
Ivanpah 2 Emergency Engine	0.46	9.15	767.54	8.99	54.76	0.0000	0.0000	0.0000	0.0000	1.5	20	922	19,049	180	0.01	0.00	0.00	0.00
Ivanpah 2 Fire Pump	0.15	6.10	726.48	0.70	38.39	0.0000	0.0000	0.0000	0.0000	0.5	20	848	1,484	126	0.00	0.00	0.00	0.00
Ivanpah 3 Boiler	1.52	39.62	494.26	74.13	40.64	0.0187	0.0048	0.0316	0.0128	5.0	130	430	157,076	133	2.50	0.64	4.23	1.71
Ivanpah 3 Emergency Engine	0.46	9.15	767.54	8.99	54.76	0.0000	0.0000	0.0000	0.0000	1.5	20	922	19,049	180	0.01	0.00	0.00	0.00
Ivanpah 3 Emergency Engine	0.46	9.15	767.54	8.99	54.76	0.0000	0.0000	0.0000	0.0000	1.5	20	922	19,049	180	0.01	0.00	0.00	0.00
Ivanpah 3 Fire Pump	0.15	6.10	726.48	0.70	38.39	0.0000	0.0000	0.0000	0.0000	0.5	20	848	1,484	126	0.00	0.00	0.00	0.00

TABLE 5.1D-3
ANALYSIS OF IMPACTS DUE TO INVERSION BREAKUP FUMIGATION

	Boiler emission rates, g/s (max)			
	NOx	**CO**	**PM10**	**SO2**
Boiler 1	0.3152	0.5330	0.2155	0.0811
Boiler 2	0.3152	0.5330	0.2155	0.0811
Boiler 3	0.6304	1.0661	0.4309	0.1622

Inversion breakup modeling results from Screen3

	Unit Impacts, ug/m3 per g/s	Maximum one-hour Avg Impacts, ug/m3				Distance to Maximum (m)
		NOx	**CO**	**PM10**	**SO2**	
Boiler 1	4.1040	1.2935	2.1876	0.8842	0.3327	6,662
Boiler 2	4.1040	1.2935	2.1876	0.8842	0.3327	6,662
Boiler 3	2.6860	1.6931	2.8635	1.1574	0.4355	9,123

Flat Terrain modeling results

	Unit Impacts, ug/m3 per g/s	Maximum one-hour Avg Impacts, ug/m3				Distance to Maximum (m)
		NOx	**CO**	**PM10**	**SO2**	
Boiler 1	4.2630	1.3436	2.2724	0.9185	0.3456	859
Boiler 2	4.2630	1.3436	2.2724	0.9185	0.3456	859
Boiler 3	2.2710	1.4315	2.4211	0.9786	0.3683	1,044

Adjust unit impacts for longer averaging periods to account for 90-minute duration of fumigation

	1-hr unit	3-hr unit	8-hr unit	24-hr unit
Boiler 1	4.2630	4.2630	2.1315	0.7105
Boiler 2	4.2630	4.2630	2.1315	0.7105
Boiler 3	2.6860	2.4785	1.2133	0.4044

Calculation of fumigation for 3 units

	Maximum Impacts, ug/m3			
	NOx	**CO**	**PM10**	**SO2**
1-hour	4.3803	7.4082	-	1.1268
3-hr	-	-	-	0.9838
8-hr	-	2.4961	-	-
24-hr	-	-	0.1922	0.0723

NOTES TO TABLE 5.1D-3

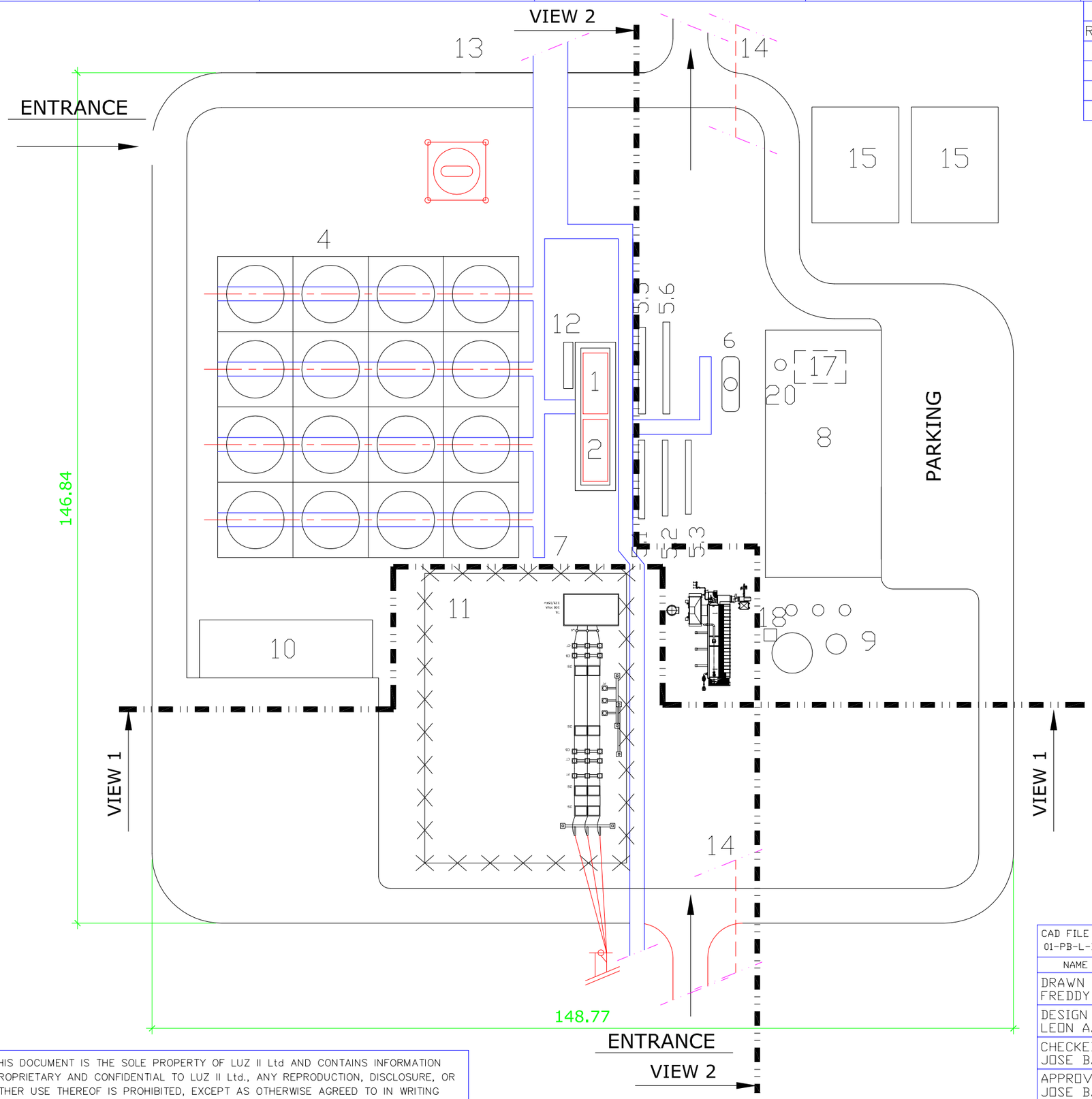
INVERSION BREAKUP FUMIGATION ANALYSIS

Inversion breakup fumigation is generally a short-term phenomenon and was evaluated here as persisting for up to 90 minutes. SCREEN3 was used to model one-hour unit impacts from the boilers under 2.5 m/s winds and F stability (for fumigation impacts) and under all meteorological conditions (shown in the table as "Inversion Breakup Modeling Results from SCREEN3").

For longer-term averaging periods, impacts were calculated using the highest modeled impact from SCREEN3 for the corresponding averaging period. A sample calculation for 24-hour average PM_{10} for Boiler 3 is as follows:

- For Boiler 3, 1-hour fumigation unit impact = 2.686 µg/m3 per g/s
- For Boiler 3, max. 1-hour average flat terrain unit impact from SCREEN3 = 2.271 µg/m3 per g/s
- For Boiler 1, the appropriate unit impact for the 24-hour averaging period is calculated as 1.5 hours of inversion breakup fumigation plus 2.5 hours of operation under typical conditions (from SCREEN3) plus 20 hours of no operation: [(1.5 * 2.686 µg/m3 per g/s) + (2.5 * 2.271 µg/m3 per g/s)] ÷ /24 hrs = 0.4044µg/m^3 per g/s
- The PM_{10} emission rate is 0.4309 g/s; the SCREEN3 persistence factor for converting 1-hour impacts to 24-hour impacts is 0.4
- 24-hour PM_{10} impact under fumigation conditions is calculated as 0.4044 µg/m^3 per g/s * 0.4309 g/s * 0.4 = 0.0697 µg/m^3

FIGURE 5.1D-1
BUILDING LAYOUT FOR GEP ANALYSIS (IVANPAH 1 & 2)



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REVISIONS					
REV	ECO.NO.	DESCRIPTION	BY	DATE	APPROVED
A		FOR INFORMATION	F.C	20.02.07	J.B
B		FOR PERMITTING	F.C	01.04.07	J.B
C		DELETE WELLS & DIESEL EXHAUST	F.C	01.05.07	A.A
D		ADD ENTRY	NM	17.05.07	A.A

LEGEND:

1- TURBINE
2- GENERATOR
3- BOILER
4- AIR COOLED CONDENSER
5- FEED WATER PREHEATER
6- DEAERATOR
7- STEAM DISTRIBUTOR
8- WATER TREATMENT PLANT ,ADMINISTRATION & ELECTRICAL BUILDING
9- WATER STORAGE TANKS
10- MAINTENANCE WING
11-SWITCH YARD
12-TURBINE LUBRICATION SYSTEM
13-PIPE BRIDGE
14-GAS PIPE
15-EVAPORATION PITS
16-[RESERVED]
17-EMERGENCY GENERATOR
18-DIESEL FIRE PUMP
19-REHEAT TOWER
20-EMERGENCY GENERATOR EXHAUST

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DRAWN : FREDDY C.		20.02.07
DESIGN : LEON A.		20.02.07
CHECKED JOSE B.		20.02.07
APPROVED JOSE B.		20.02.07
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TITLE:

IVANPAH 2
POWER BLOCK LAYOUT

PROJECT NO.	DOCUMENT NO.	REV
01	01-PB-L-D-001	D

SHEET: 1 of 3

FIGURE 5.1D-2
BUILDING LAYOUT FOR GEP ANALYSIS (IVANPAH 3)

REVISIONS					
REV	ECO.NO.	DESCRIPTION	BY	DATE	APPROVED
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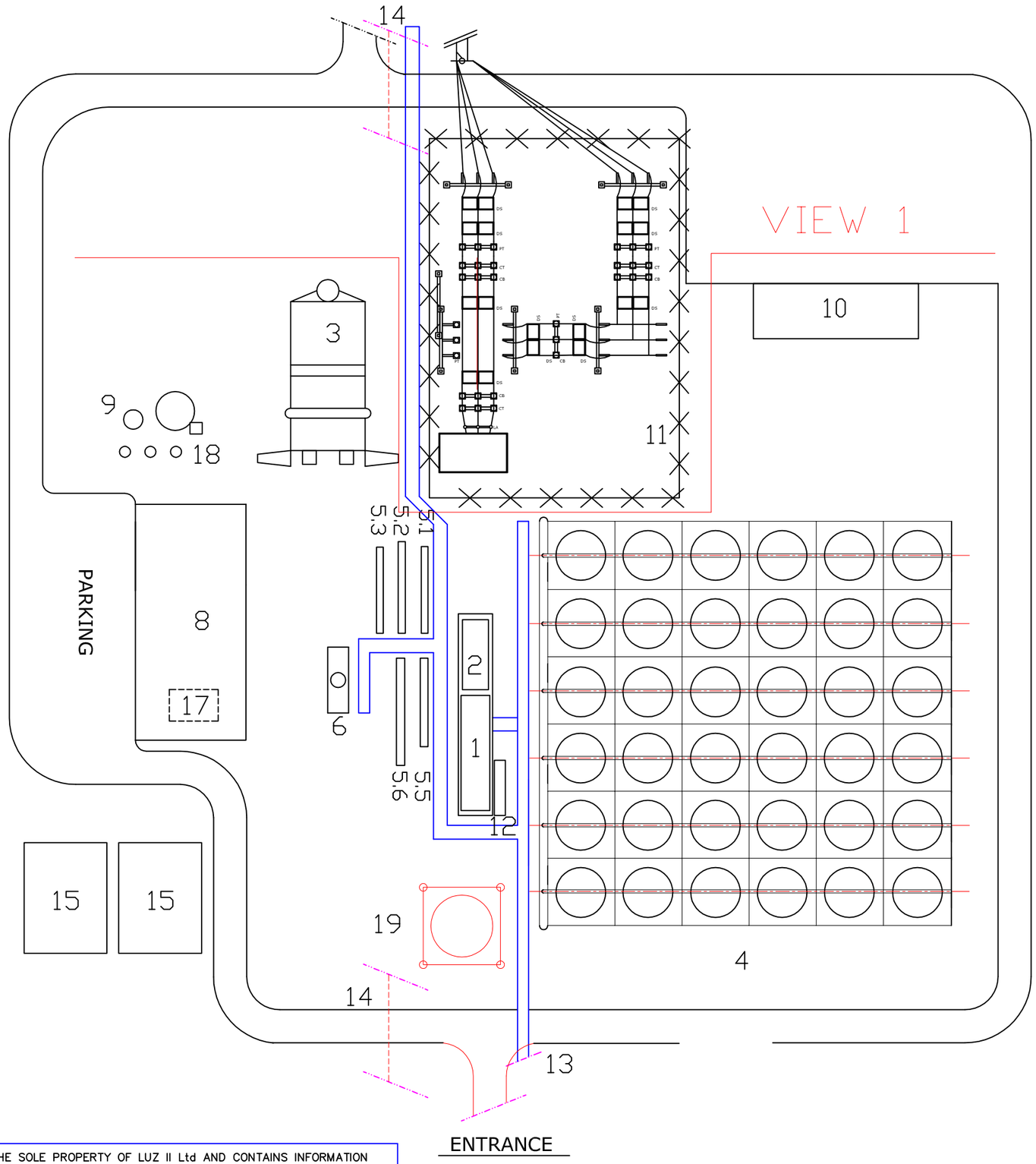
B		FOR PERMITTING	F.C	01.04.07	J.B



LEGEND:

1- TURBINE
2- GENERATOR
3- BOILER
4- AIR COOLED CONDENSER
5- FEED WATER PREHEATER
6- DEAERATOR
7- STEAM DISTRIBUTOR
8- WATER TREATMENT PLANT ,ADMINISTRATION & ELECTRICAL BUILDING
9- WATER STORAGE TANKS
10- MAINTENANCE WING
11-SWITCH YARD
12-TURBINE LUBRICATION SYSTEM
13-PIPE BRIDGE
14-GAS PIPE
15-EVAPORATION PITS
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17-EMERGENCY GENERATOR
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CHECKED JOSE B.		20.02.07
APPROVED JOSE B.		20.02.07
DOCUMENTATION		

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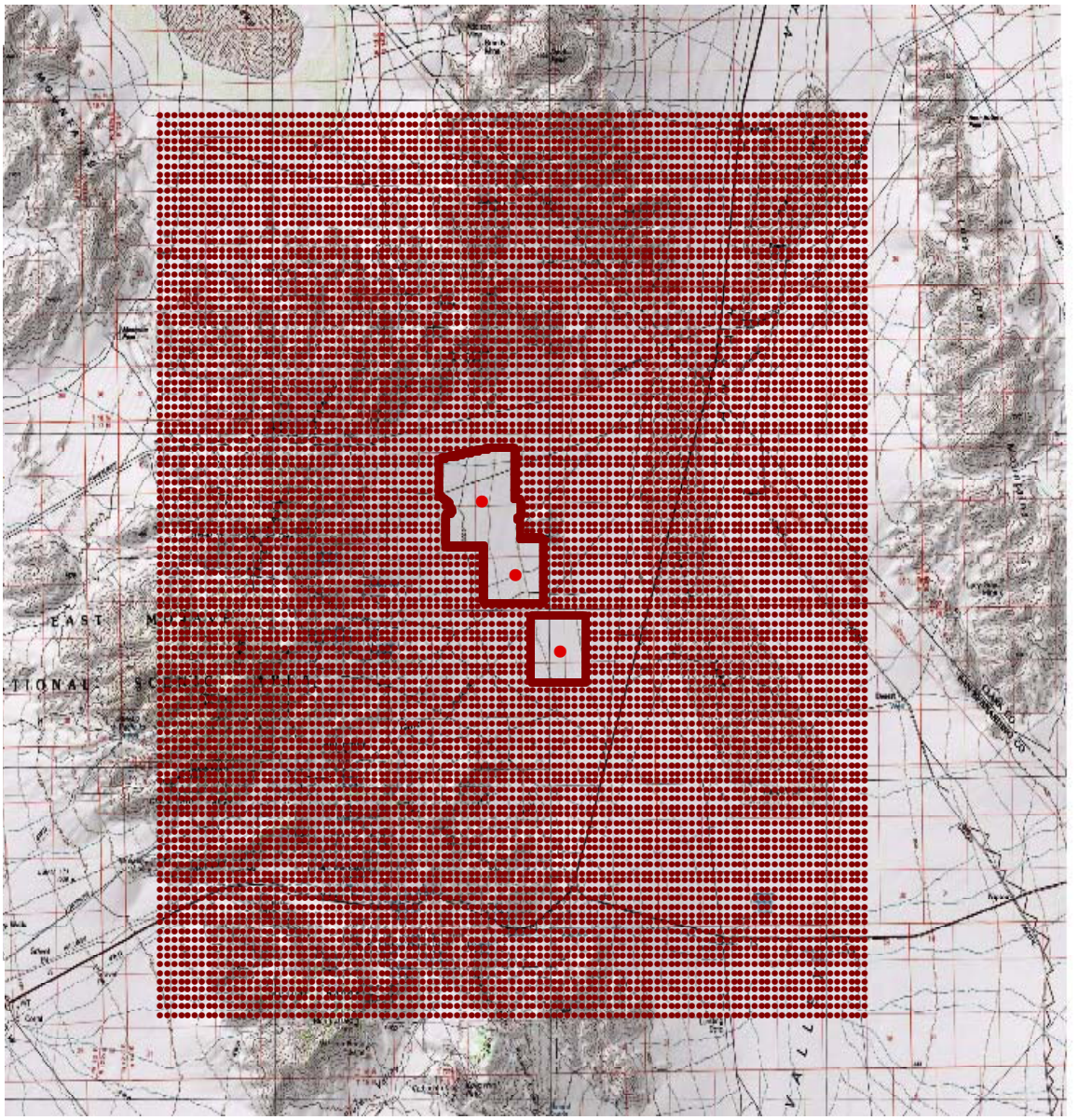
TITLE: IVANPAH LADWP
200 MW POWER BLOCK

PROJECT NO.	DOCUMENT NO.	REV
07	07-PB-L-D-001	B

SHEET: 1 of 2

FIGURE 5.1D-3
LAYOUT OF THE RECEPTOR GRIDS: AERMOD



- Receptor
- Stacks

APPENDIX 5.1E

Screening Health Risk Assessment

APPENDIX 5.1E

SCREENING HEALTH RISK ASSESSMENT (SHRA)

The SHRA has been prepared using CARB's Hotspots Analysis and Reporting Program (HARP) computer program and associated guidance in the OEHHA's *Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* (August 2003). The HARP model was used to assess potential cancer risk as well as chronic and acute risk impacts. The assessment shows that the potential cancer risks from the Ivanpah facility will be well below the significance level of 10 in one million, and the potential acute and chronic health hazard indices (HHI) will be well below the significance level of one. This appendix describes the procedures used to prepare this risk assessment.

5.1E.1 Modeling Inputs

The risk assessment module of the HARP model was run using unit ground-level impacts to obtain derived cancer risks for each non-criteria pollutant of interest.[1] Cancer risks were obtained for the derived (OEHHA) method, the derived (adjusted) method, average point estimate and high-end point estimate options. The HARP model output gives potential cancer risk by pollutant and route for each type of analysis, based on an exposure of 1.0 $\mu g/m^3$. The emission rates of the TACs (see Tables 5.1B-5, 5.1B-6, and 5.1B-7) were then combined with the HARP unit values to determine weighted input values that were used in the AERMOD model to determine actual cancer risk and hazard indices. HARP model output showing the calculated unit risks is included as Attachment 5.1E-1. Individual cancer risks are expressed in units of risk per $\mu g/m^3$ of exposure. To calculate the weighted risk for each source, the annual average emission rate in g/s for each pollutant was multiplied by the individual cancer risk for that pollutant in $(\mu g/m^3)^{-1}$. The resulting weighted cancer risks for each pollutant were then summed for the source. The same procedure was used to determine the acute and chronic health hazard indices associated with the proposed project.

Details of the calculations of risk "rates" for modeling are shown in Tables 5.1E-2 and 5.1E-3.

5.1E.2 Risk Analysis Method

The total weighted risk "rate" for each source was used in place of emission rates with AERMOD unit impact results to determine cancer risk and acute and chronic health hazard indices. The modeled value is total potential cancer risk or HHI, as appropriate, at each receptor. The modeling analysis for the health risk assessment was performed using the AERMOD model and Jean, Nevada meteorological data.

The contribution of each TAC to total cancer risk and total HHI for each analysis method was then determined using the individual contribution of each compound to the total weighted risk "rate."

The allocation for cancer risk is shown in the in Tables 5.1E-2 and 5.1E-3. The allocations for acute and chronic HHI are shown in Table 5.1E-4.

---

[1] Procedure is described in Part B of Topic 8 of the HARP How-To Guides: How to Perform Health Analyses Using a Ground Level Concentration.

5.1E.3 Summary of Results

The results of the SHRA are summarized in Table 5.1E-1. The significance of these results is discussed further in Section 5.9 of the AFC (Public Health).

TABLE 5.1E-1
SCREENING LEVEL RISK ASSESSMENT RESULTS

Risk Methodology	Modeled Risk
Modeled Cancer Risk for 70-Year Exposure (in one million)	
MEI: Derived (OEHHA) Method	0.084
MEI: Average Point Estimate	0.058
MEI: High-end Point Estimate	0.084
MEI: Derived (adjusted) Method	0.065
Modeled Worker Cancer Risk (in one million)	
Worker Exposure: Derived (OEHHA) Method	0.013
Modeled Acute and Chronic Impacts	
Acute HHI	0.013
Chronic HHI	0.00001

As shown in Table 5.1E-1, the potential cancer risk from the project is well below the significance level of 10 in one million. In addition, the potential acute and chronic HHIs are well below the significance level of one. Consequently, there are no significant public health impacts issues associated with the proposed project.

TABLE 5.1E-2

CANCER RISK ASSESSMENT MODELING INPUTS AND RESULTS FOR BOILERS[2]

		Derived (OEHHA) Method			Average Point Estimate			High-End Point Estimate			Derived (Adjusted) Method			Worker Exposure: Derived (OEHHA) Method		
Compound	**Annual Average Emissions, per Boiler (g/s)**	**Unit Risk (per ug/m3)**	**Cancer Risk Model Input (per ug/m3 per g/s)**	**Modeled Contribution to Cancer Risk**	**Unit Risk (per ug/m3)**	**Cancer Risk Model Input (per ug/m3 per g/s)**	**Modeled Contribution to Cancer Risk**	**Unit Risk (per ug/m3)**	**Cancer Risk Model Input (per ug/m3 per g/s)**	**Modeled Contribution to Cancer Risk**	**Unit Risk (per ug/m3)**	**Cancer Risk Model Input (per ug/m3 per g/s)**	**Modeled Contribution to Cancer Risk**	**Unit Risk (per ug/m3)**	**Cancer Risk Model Input (per ug/m3 per g/s)**	**Modeled Contribution to Cancer Risk**
Ivanpah 1 Boiler																
Benzene	3.53E-06	3.77E-05	1.33E-04	1.15E-05	2.60E-05	9.18E-05	8.05E-06	3.77E-05	1.33E-04	1.16E-05	2.90E-05	1.02E-04	8.90E-06	5.72E-06	2.02E-05	1.75E-06
Formaldehyde	1.26E-04	7.91E-06	9.97E-04	8.62E-05	5.46E-06	6.88E-04	6.04E-05	7.91E-06	9.97E-04	8.67E-05	6.08E-06	7.66E-04	6.66E-05	1.20E-06	1.51E-04	1.31E-05
Naphthalene	1.03E-06	4.52E-05	4.63E-05	4.01E-06	3.12E-05	3.20E-05	2.81E-06	4.52E-05	4.63E-05	4.03E-06	3.48E-05	3.57E-05	3.10E-06	6.86E-06	7.03E-06	6.11E-07
PAHs[3]	1.68E-07	3.98E-02	6.69E-03	5.78E-04	8.05E-03	1.35E-03	1.19E-04	4.02E-02	6.76E-03	5.88E-04	3.98E-02	6.69E-03	5.81E-04	1.47E-02	2.47E-03	2.15E-04
			7.87E-03	6.80E-04		2.16E-03	1.90E-04		7.93E-03	6.90E-04		7.59E-03	6.60E-04		2.65E-03	2.30E-04
			per µg/m3	in one million		per µg/m3	in one million		per µg/m3	in one million		per µg/m3	in one million		per µg/m3	in one million
Ivanpah 2 Boiler																
Benzene	3.53E-06	3.77E-05	1.33E-04	5.08E-07	2.60E-05	9.18E-05	4.24E-07	3.77E-05	1.33E-04	5.03E-07	2.90E-05	1.02E-04	4.04E-07	5.72E-06	2.02E-05	7.62E-08
Formaldehyde	1.26E-04	7.91E-06	9.97E-04	3.80E-06	5.46E-06	6.88E-04	3.18E-06	7.91E-06	9.97E-04	3.77E-06	6.08E-06	7.66E-04	3.03E-06	1.20E-06	1.51E-04	5.71E-07
Naphthalene	1.03E-06	4.52E-05	4.63E-05	1.77E-07	3.12E-05	3.20E-05	1.48E-07	4.52E-05	4.63E-05	1.75E-07	3.48E-05	3.57E-05	1.41E-07	6.86E-06	7.03E-06	2.65E-08
PAHs	1.68E-07	3.98E-02	6.69E-03	2.55E-05	8.05E-03	1.35E-03	6.25E-06	4.02E-02	6.76E-03	2.56E-05	3.98E-02	6.69E-03	2.64E-05	1.47E-02	2.47E-03	9.33E-06
			7.87E-03	3.00E-05		2.16E-03	1.00E-05		7.93E-03	3.00E-05		7.59E-03	3.00E-05		2.65E-03	1.00E-05
			per µg/m3	in one million		per µg/m3	in one million		per µg/m3	in one million		per µg/m3	in one million		per µg/m3	in one million
Ivanpah 3 Boiler																
Benzene	7.06E-06	3.77E-05	2.66E-04	2.03E-06	2.60E-05	1.84E-04	1.27E-06	3.77E-05	2.66E-04	2.01E-06	2.90E-05	2.05E-04	1.48E-06	5.72E-06	4.04E-05	3.05E-07
Formaldehyde	2.52E-04	7.91E-06	1.99E-03	1.52E-05	5.46E-06	1.38E-03	9.54E-06	7.91E-06	1.99E-03	1.51E-05	6.08E-06	1.53E-03	1.11E-05	1.20E-06	3.03E-04	2.28E-06
Naphthalene	2.05E-06	4.52E-05	9.27E-05	7.07E-07	3.12E-05	6.40E-05	4.43E-07	4.52E-05	9.27E-05	7.01E-07	3.48E-05	7.14E-05	5.17E-07	6.86E-06	1.41E-05	1.06E-07
PAHs	3.36E-07	3.98E-02	1.34E-02	1.02E-04	8.05E-03	2.71E-03	1.87E-05	4.02E-02	1.35E-02	1.02E-04	3.98E-02	1.34E-02	9.69E-05	1.47E-02	4.94E-03	3.73E-05
			1.57E-02	1.20E-04		4.33E-03	3.00E-05		1.59E-02	1.20E-04		1.52E-02	1.10E-04		5.30E-03	4.00E-05
			per µg/m3	in one million		per µg/m3	in one million		per µg/m3	in one million		per µg/m3	in one million		per µg/m3	in one million

[2] Risks in this table are the contribution from each source to the modeled offsite point of maximum impact.

[3] PAH risk is combined risk from all PAHs. Unit risk factor for Benzo(a)pyrene is used.

TABLE 5.1E-3

CANCER RISK ASSESSMENT MODELING INPUTS AND RESULTS FOR ENGINES[4]

		Derived (OEHHA) Method			Average Point Estimate			High-End Point Estimate			Derived (Adjusted) Method			Worker Exposure: Derived (OEHHA) Method		
Compound	**Annual Average Emissions, per Boiler (g/s)**	**Unit Risk (per ug/m3)**	**Cancer Risk Model Input (per ug/m3 per g/s)**	**Modeled Contribution to Cancer Risk (2)**	**Unit Risk (per ug/m3)**	**Cancer Risk Model Input (per ug/m3 per g/s)**	**Modeled Contribution to Cancer Risk (3)**	**Unit Risk (per ug/m3)**	**Cancer Risk Model Input (per ug/m3 per g/s)**	**Modeled Contribution to Cancer Risk (4)**	**Unit Risk (per ug/m3)**	**Cancer Risk Model Input (per ug/m3 per g/s)**	**Modeled Contribution to Cancer Risk (5)**	**Unit Risk (per ug/m3)**	**Cancer Risk Model Input (per ug/m3 per g/s)**	**Modeled Contribution to Cancer Risk (6)**
Ivanpah 1 Emergency Diesel Engine																
Diesel Particulate	2.14E-04	4.15E-04	8.88E-02 per µg/m3	5.94E-02 in one million	2.86E-04	6.12E-02 per µg/m3	4.09E-02 in one million	4.15E-04	8.88E-02 per µg/m3	5.94E-02 in one million	3.19E-04	6.83E-02 per µg/m3	5.46E-02 in one million	6.29E-05	1.35E-02 per µg/m3	9.11E-03 in one million
Ivanpah 2 Emergency Diesel Engines																
Diesel Particulate	2.14E-04	4.15E-04	8.88E-02 per µg/m3	6.30E-03 in one million	2.86E-04	6.12E-02 per µg/m3	4.34E-03 in one million	4.15E-04	8.88E-02 per µg/m3	6.30E-03 in one million	3.19E-04	6.83E-02 per µg/m3	5.80E-03 in one million	6.29E-05	1.35E-02 per µg/m3	9.67E-04 in one million
Ivanpah 3A Emergency Diesel Engines																
Diesel Particulate	2.14E-04	4.15E-04	8.88E-02 per µg/m3	1.63E-03 in one million	2.86E-04	6.12E-02 per µg/m3	1.12E-03 in one million	4.15E-04	8.88E-02 per µg/m3	1.63E-03 in one million	3.19E-04	6.83E-02 per µg/m3	1.50E-03 in one million	6.29E-05	1.35E-02 per µg/m3	2.49E-04 in one million
Ivanpah 3B Emergency Diesel Engines																
Diesel Particulate	2.14E-04	4.15E-04	8.88E-02 per µg/m3	1.63E-03 in one million	2.86E-04	6.12E-02 per µg/m3	1.12E-03 in one million	4.15E-04	8.88E-02 per µg/m3	1.63E-03 in one million	3.19E-04	6.83E-02 per µg/m3	1.50E-03 in one million	6.29E-05	1.35E-02 per µg/m3	2.49E-04 in one million
Ivanpah 1 Fire Pump Diesel Engines																
Diesel Particulate	3.42E-05	4.15E-04	1.42E-02 per µg/m3	1.15E-02 in one million	2.86E-04	9.78E-03 per µg/m3	7.91E-03 in one million	4.15E-04	1.42E-02 per µg/m3	1.15E-02 in one million	3.19E-04	1.09E-02 per µg/m3	1.06E-02 in one million	6.29E-05	2.15E-03 per µg/m3	1.76E-03 in one million
Ivanpah 2 Fire Pump Diesel Engines																
Diesel Particulate	3.42E-05	4.15E-04	1.42E-02 per µg/m3	2.11E-03 in one million	2.86E-04	9.78E-03 per µg/m3	1.45E-03 in one million	4.15E-04	1.42E-02 per µg/m3	2.11E-03 in one million	3.19E-04	1.09E-02 per µg/m3	1.94E-03 in one million	6.29E-05	2.15E-03 per µg/m3	3.23E-04 in one million
Ivanpah 3 Fire Pump Diesel Engines																
Diesel Particulate	3.42E-05	4.15E-04	1.42E-02 per µg/m3	9.00E-04 in one million	2.86E-04	9.78E-03 per µg/m3	6.20E-04 in one million	4.15E-04	1.42E-02 per µg/m3	9.00E-04 in one million	3.19E-04	1.09E-02 per µg/m3	8.30E-04 in one million	6.29E-05	2.15E-03 per µg/m3	1.38E-04 in one million

[4] Risks in this table are the contribution from each source to the modeled offsite point of maximum impact.

TABLE 5.1E-4

CALCULATION OF NON-CANCER ACUTE AND CHRONIC HEALTH HAZARD INDICES FROM BOILER AND EMERGENCY STANDBY GENERATOR ICES[5]

Toxic Air Contaminant	Max Hourly Emissions for Each Device, g/s	HARP Acute HI (per ug/m3)	Acute HHI Model Input (per ug/m3 per g/s)	Modeled Contribution to Acute HHI	Annual Average Emissions per Device, g/s	HARP Chronic HI (per ug/m3)	Chronic HHI Model Input (per ug/m3 per g/s)	Modeled Contribution to Chronic HHI
Ivanpah 1 Boiler								
Benzene	5.954E-05	7.69E-04	4.58E-08	1.82E-07	3.53E-06	1.67E-02	5.89E-08	<1E-06
Formaldehyde	2.126E-03	1.06E-02	2.25E-05	8.98E-05	1.26E-04	3.33E-01	4.20E-05	<1E-06
Hexane	5.103E-02	--	--	--	3.03E-03	1.43E-04	4.33E-07	<1E-06
Naphthalene	1.729E-05	--	--	--	1.03E-06	1.11E-01	1.14E-07	<1E-06
Polycyclic Aromatic Hydrocarbons	2.835E-06	--	--	--	1.68E-07	--	--	--
Toluene	9.639E-05	2.70E-05	2.60E-09	1.04E-08	5.71E-06	3.33E-03	1.90E-08	<1E-06
		Total =	2.26E-05	9.00E-05		Total =	4.26E-05	<1E-06
Ivanpah 2 Boiler								
Benzene	5.954E-05	7.69E-04	4.58E-08	4.05E-08	3.53E-06	1.67E-02	5.89E-08	<1E-06
Formaldehyde	2.126E-03	1.06E-02	2.25E-05	2.00E-05	1.26E-04	3.33E-01	4.20E-05	<1E-06
Hexane	5.103E-02	--	--	--	3.03E-03	1.43E-04	4.33E-07	<1E-06
Naphthalene	1.729E-05	--	--	--	1.03E-06	1.11E-01	1.14E-07	<1E-06
Polycyclic Aromatic Hydrocarbons	2.835E-06	--	--	--	1.68E-07	--	--	--
Toluene	9.639E-05	2.70E-05	2.60E-09	2.30E-09	5.71E-06	3.33E-03	1.90E-08	<1E-06
		Total =	2.26E-05	2.00E-05		Total =	4.26E-05	<1E-06

[5] Health hazard indices in this table are the contribution from each source to the modeled offsite points of maximum impact.

TABLE 5.1E-4

CALCULATION OF NON-CANCER ACUTE AND CHRONIC HEALTH HAZARD INDICES FROM BOILER AND EMERGENCY STANDBY GENERATOR ICES[5]

Toxic Air Contaminant	Max Hourly Emissions for Each Device, g/s	HARP Acute HI (per ug/m3)	Acute HHI Model Input (per ug/m3 per g/s)	Modeled Contribution to Acute HHI	Annual Average Emissions per Device, g/s	HARP Chronic HI (per ug/m3)	Chronic HHI Model Input (per ug/m3 per g/s)	Modeled Contribution to Chronic HHI
Ivanpah 3 Boiler								
Benzene	1.191E-04	7.69E-04	9.16E-08	6.08E-08	7.06E-06	1.67E-02	1.18E-07	1.38E-08
Formaldehyde	4.253E-03	1.06E-02	4.51E-05	1.80E-04	2.52E-04	3.33E-01	8.39E-05	9.85E-06
Hexane	1.021E-01	--	--	--	6.05E-03	1.43E-04	8.65E-07	1.02E-07
Naphthalene	3.459E-05	--	--	--	2.05E-06	1.11E-01	2.28E-07	2.67E-08
Polycyclic Aromatic Hydrocarbons	5.670E-06	--	--	--	3.36E-07	--	--	--
Toluene	1.928E-04	2.70E-05	5.21E-09	2.07E-08	1.14E-05	3.33E-03	3.81E-08	4.47E-09
		Total =	4.52E-05	3.00E-05		Total =	8.52E-05	1.00E-05
Emergency Standby Generator Engine (each)								
Acrolein	2.75E-05	5.26E+00	1.45E-04	1.14E-02	1.57E-07	1.67E+01	2.62E-06	<1E-06
Benzene	2.77E-04	7.69E-04	2.13E-07	1.68E-05	1.58E-06	1.67E-02	2.64E-08	<1E-06
1,3-Butadiene	1.16E-05	--	--	--	6.63E-08	5.00E-02	3.32E-09	<1E-06
Formaldehyde	3.51E-04	1.06E-02	3.72E-06	2.94E-04	2.00E-06	3.33E-01	6.67E-07	<1E-06
Toluene	1.22E-04	2.70E-05	3.28E-09	2.59E-07	6.94E-07	3.33E-03	2.31E-09	<1E-06
Xylene	8.47E-05	4.55E-05	3.85E-09	3.04E-07	4.84E-07	1.43E-03	6.91E-10	<1E-06
		Total =	1.49E-04	1.17E-02		Total =	3.32E-06	<1E-06
Firepump Engine (each)								
Acrolein	1.76E-06	5.26E+00	9.26E-06	2.53E-04	1.00E-08	1.67E+01	1.68E-07	<1E-06
Benzene	1.77E-05	7.69E-04	1.36E-08	3.73E-07	1.01E-07	1.67E-02	1.69E-09	<1E-06
1,3-Butadiene	7.44E-07	--	--	--	4.25E-09	5.00E-02	2.12E-10	<1E-06
Formaldehyde	2.24E-05	1.06E-02	2.38E-07	6.51E-06	1.28E-07	3.33E-01	4.27E-08	<1E-06
Toluene	7.78E-06	2.70E-05	2.10E-10	5.74E-09	4.44E-08	3.33E-03	1.48E-10	<1E-06
Xylene	5.42E-06	4.55E-05	2.47E-10	6.75E-09	3.09E-08	1.43E-03	4.43E-11	<1E-06
		Total =	9.51E-06	2.60E-04		Total =	2.12E-07	<1E-06

Attachment 5.1E-1

HARP Model Risk Assessment Module Output

This file: c:\HARP\projects\demo\PointEstimateRisk.txt

Created by HARP Version 1.3 Build 23.04.05
Uses ISC Version 99155
Uses BPIP (Dated: 04112)
Creation date: 7/14/2007 6:08:45 AM

EXCEPTION REPORT
   (there have been no changes or exceptions)

INPUT FILES:
   Source-Receptor file:
   Averaging period adjustment factors file: not applicable
   Emission rates file: none
   Site parameters file: C:\HARP\PROJECTS\DEMO\SDAPCD Rule 1200 pathways.sit

GLC DATA SOURCE:
  concentrations loaded from file C:\HARP\PROJECTS\DEMO\QVR.cml
  chemicals and/or concentrations have been edited by the user
  User memo:

Screening mode is OFF

Exposure Duration: 70 year (adult resident)
Analysis Method: Average Point Estimate
Health Effect: Cancer, Chronic and Acute

SITE PARAMETERS

DEPOSITION

   Deposition rate (m/s)   0.05

DRINKING WATER

*** Pathway disabled ***

FISH

*** Pathway disabled ***

PASTURE

*** Pathway disabled ***

HOME GROWN PRODUCE

*** Pathway disabled ***

PIGS, CHICKENS AND EGGS

*** Pathway disabled ***

DERMAL ABSORPTION

*** Pathway enabled ***

SOIL INGESTION

*** Pathway enabled ***

MOTHER'S MILK

*** Pathway enabled ***

CHEMICAL GROUND LEVEL CONCENTRATIONS (micrograms/m^3) (*** indicates not a multipathway chemical)

ABBREV	CAS	GLC Avrg	GLC Max	GLC Water	GLC Pasture	GLC Fish
Acetaldehyde	75070	1.000E+00	1.000E+00	***	***	***
Acrolein	107028	1.000E+00	1.000E+00	***	***	***
Ammonia	7664417	1.000E+00	1.000E+00	***	***	***
Benzene	71432	1.000E+00	1.000E+00	***	***	***
1,3-Butadiene	106990	1.000E+00	1.000E+00	***	***	***
DieselExhPM	9901	1.000E+00	1.000E+00	***	***	***
Formaldehyde	50000	1.000E+00	1.000E+00	***	***	***
Hexane	110543	1.000E+00	1.000E+00	***	***	***
B[a]anthracene	56553	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
B[a]P	50328	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
B[b]fluoranthen	205992	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
B[k]fluoranthen	207089	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
Chrysene	218019	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
In[1,2,3-cd]pyr	193395	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
Naphthalene	91203	1.000E+00	1.000E+00	***	***	***
Propylene	115071	1.000E+00	1.000E+00	***	***	***
Propylene Oxide	75569	1.000E+00	1.000E+00	***	***	***
Toluene	108883	1.000E+00	1.000E+00	***	***	***
Xylenes	1210	1.000E+00	1.000E+00	***	***	***
Ethyl Benzene	100414	1.000E+00	1.000E+00	***	***	***
Anthracene	120127	1.000E+00	1.000E+00	***	***	***
D[a,h]anthracen	53703	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
PM	11101	1.000E+00	1.000E+00	***	***	***
Methanol	67561	1.000E+00	1.000E+00	***	***	***

CHEMICAL CROSS-REFERENCE TABLE

CHEM	CAS	ABBREVIATION	POLLUTANT NAME	BACKGROUND (ug/m^3)
0001	75070	Acetaldehyde	Acetaldehyde	0.000E+00
0002	107028	Acrolein	Acrolein	0.000E+00
0003	7664417	Ammonia	Ammonia	0.000E+00
0004	71432	Benzene	Benzene	0.000E+00
0005	106990	1,3-Butadiene	1,3-Butadiene	0.000E+00
0006	9901	DieselExhPM	Diesel engine exhaust, particulate matter	0.000E+00
0007	50000	Formaldehyde	Formaldehyde	0.000E+00
0008	110543	Hexane	Hexane	0.000E+00
0009	56553	B[a]anthracene	Benz[a]anthracene	0.000E+00
0010	50328	B[a]P	Benzo[a]pyrene	0.000E+00
0011	205992	B[b]fluoranthen	Benzo[b]fluoranthene	0.000E+00
0012	207089	B[k]fluoranthen	Benzo[k]fluoranthene	0.000E+00
0013	218019	Chrysene	Chrysene	0.000E+00
0014	193395	In[1,2,3-cd]pyr	Indeno[1,2,3-cd]pyrene	0.000E+00
0015	91203	Naphthalene	Naphthalene	0.000E+00
0016	115071	Propylene	Propylene	0.000E+00
0017	75569	Propylene Oxide	Propylene oxide	0.000E+00
0018	108883	Toluene	Toluene	0.000E+00
0019	1210	Xylenes	Xylenes (mixed)	0.000E+00
0020	100414	Ethyl Benzene	Ethyl benzene	0.000E+00
0021	120127	Anthracene	Anthracene	0.000E+00
0022	53703	D[a,h]anthracen	Dibenz[a,h]anthracene	0.000E+00
0023	11101	PM	Particulate Matter	0.000E+00
0024	67561	Methanol	Methanol	0.000E+00

EMISSIONS DATA SOURCE:
CHEMICALS ADDED OR DELETED: none

EMISSIONS FOR FACILITY FAC= CO= DEV= PRO= STK= NAME=
SOURCE MULTIPLIER=

CAS	ABBREV	MULTIPLIER	BG (ug/m^3)	AVRG (lbs/yr)	MAX (lbs/hr)

0004	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0005	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0006	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0007	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0008	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0009	2.60E-04	1.66E-04	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0010	2.60E-04	1.66E-04	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0011	2.60E-04	1.66E-04	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0012	2.60E-04	1.66E-04	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0013	2.60E-04	1.66E-04	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0014	2.60E-04	1.66E-04	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0015	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0016	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0017	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0018	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0019	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0020	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0021	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	2.60E-04	1.66E-04	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0023	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

AVERAGE CANCER RISK

CHEM	INHAL	DERM	SOIL	MOTHER	FISH	WATER	VEG	DAIRY	BEEF	CHICK	PIG	EGG	MEAT	ORAL	TOTAL
0001	2.60E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.60E-06
0002	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0003	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0004	2.60E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.60E-05
0005	1.56E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E-04
0006	2.86E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.86E-04
0007	5.46E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.46E-06
0008	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0009	1.01E-04	1.99E-04	5.05E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.04E-04	8.05E-04
0010	1.01E-03	1.99E-03	5.05E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.04E-03	8.05E-03
0011	1.01E-04	1.99E-04	5.05E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.04E-04	8.05E-04
0012	1.01E-04	1.99E-04	5.05E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.04E-04	8.05E-04
0013	1.01E-05	1.99E-05	5.05E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.04E-05	8.05E-05
0014	1.01E-04	1.99E-04	5.05E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.04E-04	8.05E-04
0015	3.12E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.12E-05
0016	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0017	3.38E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.38E-06
0018	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0019	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0020	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0021	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	1.07E-03	6.80E-04	1.72E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.40E-03	3.47E-03
0023	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SUM	3.00E-03	3.49E-03	8.84E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.23E-02	1.53E-02

INHALATION CONCENTRATION (ug/m^3) AND AVERAGE DOSE BY PATHWAY (mg/(kg-d)) FOR CHRONIC CALCULATIONS

CHEM	INHAL	DERM	SOIL	MOTHER	FISH	WATER	VEG	DAIRY	BEEF	CHICK	PIG	EGG
0001	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0002	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0003	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0004	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0005	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0006	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0007	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0008	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0009	1.00E+00	5.00E-04	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0010	1.00E+00	5.00E-04	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0011	1.00E+00	5.00E-04	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0012	1.00E+00	5.00E-04	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0013	1.00E+00	5.00E-04	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0014	1.00E+00	5.00E-04	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

0015	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0016	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0017	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0018	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0019	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0020	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0021	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	1.00E+00	5.00E-04	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0023	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

AVERAGE CHRONIC HI

CHEM	CV	CNS	BONE	DEVEL	ENDO	EYE	GILV	IMMUN	KIDN	REPRO	RESP	SKIN	BLOOD	MAX
0001	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-01	0.00E+00	0.00E+00	1.11E-01
0002	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E+01	0.00E+00	0.00E+00	1.67E+01
0003	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-03	0.00E+00	0.00E+00	5.00E-03
0004	0.00E+00	1.67E-02	0.00E+00	1.67E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E-02	1.67E-02
0005	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-02	0.00E+00	0.00E+00	0.00E+00	5.00E-02
0006	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-01	0.00E+00	0.00E+00	2.00E-01
0007	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-01	0.00E+00	0.00E+00	3.33E-01
0008	0.00E+00	1.43E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-04
0009	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0010	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0011	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0012	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0013	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0014	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0015	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-01	0.00E+00	0.00E+00	1.11E-01
0016	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-04	0.00E+00	0.00E+00	3.33E-04
0017	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-02	0.00E+00	0.00E+00	3.33E-02
0018	0.00E+00	3.33E-03	0.00E+00	3.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-03	0.00E+00	0.00E+00	3.33E-03
0019	0.00E+00	1.43E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-03	0.00E+00	0.00E+00	1.43E-03
0020	0.00E+00	0.00E+00	0.00E+00	5.00E-04	5.00E-04	0.00E+00	5.00E-04	0.00E+00	5.00E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-04
0021	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0023	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	0.00E+00	0.00E+00	0.00E+00	2.50E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-04
SUM	0.00E+00	2.16E-02	0.00E+00	2.08E-02	5.00E-04	1.70E+01	5.00E-04	0.00E+00	5.00E-04	5.00E-02	1.75E+01	0.00E+00	1.67E-02	1.75E+01

ACUTE HI

CHEM	CV	CNS	BONE	DEVEL	ENDO	EYE	GILV	IMMUN	KIDN	REPRO	RESP	SKIN	BLOOD	MAX
0001	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0002	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E+00	0.00E+00	0.00E+00	5.26E+00
0003	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.13E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.13E-04	0.00E+00	0.00E+00	3.13E-04
0004	0.00E+00	0.00E+00	0.00E+00	7.69E-04	0.00E+00	0.00E+00	0.00E+00	7.69E-04	0.00E+00	7.69E-04	0.00E+00	0.00E+00	7.69E-04	7.69E-04
0005	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0006	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0007	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-02	0.00E+00	1.06E-02	0.00E+00	0.00E+00	1.06E-02	0.00E+00	0.00E+00	1.06E-02
0008	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0009	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0010	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0011	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0012	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0013	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0014	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0015	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0016	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0017	0.00E+00	0.00E+00	0.00E+00	3.23E-04	0.00E+00	3.23E-04	0.00E+00	0.00E+00	0.00E+00	3.23E-04	3.23E-04	0.00E+00	0.00E+00	3.23E-04
0018	0.00E+00	2.70E-05	0.00E+00	2.70E-05	0.00E+00	2.70E-05	0.00E+00	0.00E+00	0.00E+00	2.70E-05	2.70E-05	0.00E+00	0.00E+00	2.70E-05
0019	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.55E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.55E-05	0.00E+00	0.00E+00	4.55E-05
0020	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0021	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0023	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	0.00E+00	3.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-05
SUM	0.00E+00	6.27E-05	0.00E+00	1.12E-03	0.00E+00	5.27E+00	0.00E+00	1.14E-02	0.00E+00	1.12E-03	5.27E+00	0.00E+00	7.69E-04	5.27E+00

This file: c:\HARP\projects\demo\PointEstimateRisk.txt

Created by HARP Version 1.3 Build 23.04.05
Uses ISC Version 99155
Uses BPIP (Dated: 04112)
Creation date: 7/14/2007 7:13:15 AM

EXCEPTION REPORT
   (there have been no changes or exceptions)

INPUT FILES:
   Source-Receptor file:
   Averaging period adjustment factors file: not applicable
   Emission rates file: none
   Site parameters file: C:\HARP\PROJECTS\DEMO\SDAPCD Rule 1200 pathways.sit

GLC DATA SOURCE:
  concentrations loaded from file C:\HARP\PROJECTS\DEMO\QVR.cml
  chemicals and/or concentrations have been edited by the user
  User memo:

Screening mode is OFF

Exposure Duration: 70 year (adult resident)
Analysis Method: Derived (Adjusted) Method
Health Effect: Cancer

SITE PARAMETERS

DEPOSITION

   Deposition rate (m/s)   0.05

DRINKING WATER

*** Pathway disabled ***

FISH

*** Pathway disabled ***

PASTURE

*** Pathway disabled ***

HOME GROWN PRODUCE

*** Pathway disabled ***

PIGS, CHICKENS AND EGGS

*** Pathway disabled ***

DERMAL ABSORPTION

*** Pathway enabled ***

SOIL INGESTION

*** Pathway enabled ***

MOTHER'S MILK

*** Pathway enabled ***

CHEMICAL GROUND LEVEL CONCENTRATIONS (micrograms/m^3) (*** indicates not a multipathway chemical)

ABBREV	CAS	GLC Avrg	GLC Max	GLC Water	GLC Pasture	GLC Fish
Acetaldehyde	75070	1.000E+00	1.000E+00	***	***	***
Acrolein	107028	1.000E+00	1.000E+00	***	***	***
Ammonia	7664417	1.000E+00	1.000E+00	***	***	***
Benzene	71432	1.000E+00	1.000E+00	***	***	***
1,3-Butadiene	106990	1.000E+00	1.000E+00	***	***	***
DieselExhPM	9901	1.000E+00	1.000E+00	***	***	***
Formaldehyde	50000	1.000E+00	1.000E+00	***	***	***
Hexane	110543	1.000E+00	1.000E+00	***	***	***
B[a]anthracene	56553	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
B[a]P	50328	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
B[b]fluoranthen	205992	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
B[k]fluoranthen	207089	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
Chrysene	218019	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
In[1,2,3-cd]pyr	193395	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
Naphthalene	91203	1.000E+00	1.000E+00	***	***	***
Propylene	115071	1.000E+00	1.000E+00	***	***	***
Propylene Oxide	75569	1.000E+00	1.000E+00	***	***	***
Toluene	108883	1.000E+00	1.000E+00	***	***	***
Xylenes	1210	1.000E+00	1.000E+00	***	***	***
Ethyl Benzene	100414	1.000E+00	1.000E+00	***	***	***
Anthracene	120127	1.000E+00	1.000E+00	***	***	***
D[a,h]anthracen	53703	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
PM	11101	1.000E+00	1.000E+00	***	***	***
Methanol	67561	1.000E+00	1.000E+00	***	***	***

CHEMICAL CROSS-REFERENCE TABLE

CHEM	CAS	ABBREVIATION	POLLUTANT NAME	BACKGROUND (ug/m^3)
0001	75070	Acetaldehyde	Acetaldehyde	0.000E+00
0002	107028	Acrolein	Acrolein	0.000E+00
0003	7664417	Ammonia	Ammonia	0.000E+00
0004	71432	Benzene	Benzene	0.000E+00
0005	106990	1,3-Butadiene	1,3-Butadiene	0.000E+00
0006	9901	DieselExhPM	Diesel engine exhaust, particulate matter	0.000E+00
0007	50000	Formaldehyde	Formaldehyde	0.000E+00
0008	110543	Hexane	Hexane	0.000E+00
0009	56553	B[a]anthracene	Benz[a]anthracene	0.000E+00
0010	50328	B[a]P	Benzo[a]pyrene	0.000E+00
0011	205992	B[b]fluoranthen	Benzo[b]fluoranthene	0.000E+00
0012	207089	B[k]fluoranthen	Benzo[k]fluoranthene	0.000E+00
0013	218019	Chrysene	Chrysene	0.000E+00
0014	193395	In[1,2,3-cd]pyr	Indeno[1,2,3-cd]pyrene	0.000E+00
0015	91203	Naphthalene	Naphthalene	0.000E+00
0016	115071	Propylene	Propylene	0.000E+00
0017	75569	Propylene Oxide	Propylene oxide	0.000E+00
0018	108883	Toluene	Toluene	0.000E+00
0019	1210	Xylenes	Xylenes (mixed)	0.000E+00
0020	100414	Ethyl Benzene	Ethyl benzene	0.000E+00
0021	120127	Anthracene	Anthracene	0.000E+00
0022	53703	D[a,h]anthracen	Dibenz[a,h]anthracene	0.000E+00
0023	11101	PM	Particulate Matter	0.000E+00
0024	67561	Methanol	Methanol	0.000E+00

EMISSIONS DATA SOURCE:
CHEMICALS ADDED OR DELETED: none

EMISSIONS FOR FACILITY FAC= CO= DEV= PRO= STK= NAME=
SOURCE MULTIPLIER=

CAS	ABBREV	MULTIPLIER	BG (ug/m^3)	AVRG (lbs/yr)	MAX (lbs/hr)

EMISSIONS FOR FACILITY FAC= CO= DEV= PRO= STK= NAME=
SOURCE MULTIPLIER=

CAS	ABBREV	MULTIPLIER	BG (ug/m^3)	AVRG (lbs/yr)	MAX (lbs/hr)

EMISSIONS FOR FACILITY FAC= CO= DEV= PRO= STK= NAME=
SOURCE MULTIPLIER=

CAS	ABBREV	MULTIPLIER	BG (ug/m^3)	AVRG (lbs/yr)	MAX (lbs/hr)

DOMINANT PATHWAYS FOR CANCER

CHEM	INHAL	DERM	SOIL	MOTHER	FISH	WATER	VEG	DAIRY	BEEF	CHICK	PIG	EGG
0001	A	-	-	-	-	-	-	-	-	-	-	-
0002	-	-	-	-	-	-	-	-	-	-	-	-
0003	-	-	-	-	-	-	-	-	-	-	-	-

0004	A	-	-	-	-	-	-	-	-	-	-	-
0005	A	-	-	-	-	-	-	-	-	-	-	-
0006	A	-	-	-	-	-	-	-	-	-	-	-
0007	A	-	-	-	-	-	-	-	-	-	-	-
0008	-	-	-	-	-	-	-	-	-	-	-	-
0009	-	YES	YES	-	-	-	-	-	-	-	-	-
0010	-	YES	YES	-	-	-	-	-	-	-	-	-
0011	-	YES	YES	-	-	-	-	-	-	-	-	-
0012	-	YES	YES	-	-	-	-	-	-	-	-	-
0013	-	YES	YES	-	-	-	-	-	-	-	-	-
0014	-	YES	YES	-	-	-	-	-	-	-	-	-
0015	A	-	-	-	-	-	-	-	-	-	-	-
0016	-	-	-	-	-	-	-	-	-	-	-	-
0017	A	-	-	-	-	-	-	-	-	-	-	-
0018	-	-	-	-	-	-	-	-	-	-	-	-
0019	-	-	-	-	-	-	-	-	-	-	-	-
0020	-	-	-	-	-	-	-	-	-	-	-	-
0021	-	-	-	-	-	-	-	-	-	-	-	-
0022	-	YES	YES	-	-	-	-	-	-	-	-	-
0023	-	-	-	-	-	-	-	-	-	-	-	-
0024	-	-	-	-	-	-	-	-	-	-	-	-

DERIVED DOSE BY PATHWAY (mg/(kg-d)) FOR CANCER CALCULATIONS

CHEM	INHAL	DERM	SOIL	MOTHER	FISH	WATER	VEG	DAIRY	BEEF	CHICK	PIG	EGG
0001	2.90E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0002	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0003	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0004	2.90E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0005	2.90E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0006	2.90E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0007	2.90E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0008	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0009	2.60E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0010	2.60E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0011	2.60E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0012	2.60E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0013	2.60E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0014	2.60E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0015	2.90E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0016	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0017	2.90E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0018	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0019	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0020	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0021	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	2.60E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0023	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

DERIVED CANCER RISK

CHEM	INHAL	DERM	SOIL	MOTHER	FISH	WATER	VEG	DAIRY	BEEF	CHICK	PIG	EGG	MEAT	ORAL	TOTAL
0001	2.90E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-06
0002	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0003	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0004	2.90E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.90E-05
0005	1.74E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-04
0006	3.19E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.19E-04
0007	6.08E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.08E-06
0008	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0009	1.01E-04	3.37E-03	5.05E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-03	3.98E-03
0010	1.01E-03	3.37E-02	5.05E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-02	3.98E-02
0011	1.01E-04	3.37E-03	5.05E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-03	3.98E-03
0012	1.01E-04	3.37E-03	5.05E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-03	3.98E-03
0013	1.01E-05	3.37E-04	5.05E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-04	3.98E-04
0014	1.01E-04	3.37E-03	5.05E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-03	3.98E-03
0015	3.48E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.48E-05

0016	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0017	3.76E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.76E-06
0018	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0019	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0020	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0021	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	1.07E-03	1.15E-02	1.72E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-02	1.43E-02
0023	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SUM	3.06E-03	5.90E-02	8.84E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.79E-02	7.09E-02

This file: c:\HARP\projects\demo\PointEstimateRisk.txt

Created by HARP Version 1.3 Build 23.04.05
Uses ISC Version 99155
Uses BPIP (Dated: 04112)
Creation date: 7/14/2007 7:06:47 AM

EXCEPTION REPORT
   (there have been no changes or exceptions)

INPUT FILES:
   Source-Receptor file:
   Averaging period adjustment factors file: not applicable
   Emission rates file: none
   Site parameters file: C:\HARP\PROJECTS\DEMO\SDAPCD Rule 1200 pathways.sit

GLC DATA SOURCE:
  concentrations loaded from file C:\HARP\PROJECTS\DEMO\QVR.cml
  chemicals and/or concentrations have been edited by the user
  User memo:

Screening mode is OFF

Exposure Duration: 70 year (adult resident)
Analysis Method: Derived (OEHHA) Method
Health Effect: Cancer, Chronic and Acute

SITE PARAMETERS

DEPOSITION

   Deposition rate (m/s)   0.05

DRINKING WATER

*** Pathway disabled ***

FISH

*** Pathway disabled ***

PASTURE

*** Pathway disabled ***

HOME GROWN PRODUCE

*** Pathway disabled ***

PIGS, CHICKENS AND EGGS

*** Pathway disabled ***

DERMAL ABSORPTION

*** Pathway enabled ***

SOIL INGESTION

*** Pathway enabled ***

MOTHER'S MILK

*** Pathway enabled ***

CHEMICAL GROUND LEVEL CONCENTRATIONS (micrograms/m^3) (*** indicates not a multipathway chemical)

ABBREV	CAS	GLC Avrg	GLC Max	GLC Water	GLC Pasture	GLC Fish
Acetaldehyde	75070	1.000E+00	1.000E+00	***	***	***
Acrolein	107028	1.000E+00	1.000E+00	***	***	***
Ammonia	7664417	1.000E+00	1.000E+00	***	***	***
Benzene	71432	1.000E+00	1.000E+00	***	***	***
1,3-Butadiene	106990	1.000E+00	1.000E+00	***	***	***
DieselExhPM	9901	1.000E+00	1.000E+00	***	***	***
Formaldehyde	50000	1.000E+00	1.000E+00	***	***	***
Hexane	110543	1.000E+00	1.000E+00	***	***	***
B[a]anthracene	56553	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
B[a]P	50328	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
B[b]fluoranthen	205992	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
B[k]fluoranthen	207089	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
Chrysene	218019	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
In[1,2,3-cd]pyr	193395	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
Naphthalene	91203	1.000E+00	1.000E+00	***	***	***
Propylene	115071	1.000E+00	1.000E+00	***	***	***
Propylene Oxide	75569	1.000E+00	1.000E+00	***	***	***
Toluene	108883	1.000E+00	1.000E+00	***	***	***
Xylenes	1210	1.000E+00	1.000E+00	***	***	***
Ethyl Benzene	100414	1.000E+00	1.000E+00	***	***	***
Anthracene	120127	1.000E+00	1.000E+00	***	***	***
D[a,h]anthracen	53703	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
PM	11101	1.000E+00	1.000E+00	***	***	***
Methanol	67561	1.000E+00	1.000E+00	***	***	***

CHEMICAL CROSS-REFERENCE TABLE

CHEM	CAS	ABBREVIATION	POLLUTANT NAME	BACKGROUND (ug/m^3)
0001	75070	Acetaldehyde	Acetaldehyde	0.000E+00
0002	107028	Acrolein	Acrolein	0.000E+00
0003	7664417	Ammonia	Ammonia	0.000E+00
0004	71432	Benzene	Benzene	0.000E+00
0005	106990	1,3-Butadiene	1,3-Butadiene	0.000E+00
0006	9901	DieselExhPM	Diesel engine exhaust, particulate matter	0.000E+00
0007	50000	Formaldehyde	Formaldehyde	0.000E+00
0008	110543	Hexane	Hexane	0.000E+00
0009	56553	B[a]anthracene	Benz[a]anthracene	0.000E+00
0010	50328	B[a]P	Benzo[a]pyrene	0.000E+00
0011	205992	B[b]fluoranthen	Benzo[b]fluoranthene	0.000E+00
0012	207089	B[k]fluoranthen	Benzo[k]fluoranthene	0.000E+00
0013	218019	Chrysene	Chrysene	0.000E+00
0014	193395	In[1,2,3-cd]pyr	Indeno[1,2,3-cd]pyrene	0.000E+00
0015	91203	Naphthalene	Naphthalene	0.000E+00
0016	115071	Propylene	Propylene	0.000E+00
0017	75569	Propylene Oxide	Propylene oxide	0.000E+00
0018	108883	Toluene	Toluene	0.000E+00
0019	1210	Xylenes	Xylenes (mixed)	0.000E+00
0020	100414	Ethyl Benzene	Ethyl benzene	0.000E+00
0021	120127	Anthracene	Anthracene	0.000E+00
0022	53703	D[a,h]anthracen	Dibenz[a,h]anthracene	0.000E+00
0023	11101	PM	Particulate Matter	0.000E+00
0024	67561	Methanol	Methanol	0.000E+00

EMISSIONS DATA SOURCE:
CHEMICALS ADDED OR DELETED: none

EMISSIONS FOR FACILITY FAC= CO= DEV= PRO= STK= NAME=
SOURCE MULTIPLIER=

CAS	ABBREV	MULTIPLIER	BG (ug/m^3)	AVRG (lbs/yr)	MAX (lbs/hr)

0004	YES	-	-	-	-	-	-	-	-	-	-	-
0005	YES	-	-	-	-	-	-	-	-	-	-	-
0006	YES	-	-	-	-	-	-	-	-	-	-	-
0007	YES	-	-	-	-	-	-	-	-	-	-	-
0008	-	-	-	-	-	-	-	-	-	-	-	-
0009	-	YES	YES	-	-	-	-	-	-	-	-	-
0010	-	YES	YES	-	-	-	-	-	-	-	-	-
0011	-	YES	YES	-	-	-	-	-	-	-	-	-
0012	-	YES	YES	-	-	-	-	-	-	-	-	-
0013	-	YES	YES	-	-	-	-	-	-	-	-	-
0014	-	YES	YES	-	-	-	-	-	-	-	-	-
0015	YES	-	-	-	-	-	-	-	-	-	-	-
0016	-	-	-	-	-	-	-	-	-	-	-	-
0017	YES	-	-	-	-	-	-	-	-	-	-	-
0018	-	-	-	-	-	-	-	-	-	-	-	-
0019	-	-	-	-	-	-	-	-	-	-	-	-
0020	-	-	-	-	-	-	-	-	-	-	-	-
0021	-	-	-	-	-	-	-	-	-	-	-	-
0022	-	YES	YES	-	-	-	-	-	-	-	-	-
0023	-	-	-	-	-	-	-	-	-	-	-	-
0024	-	-	-	-	-	-	-	-	-	-	-	-

DERIVED DOSE BY PATHWAY (mg/(kg-d)) FOR CANCER CALCULATIONS

CHEM	INHAL	DERM	SOIL	MOTHER	FISH	WATER	VEG	DAIRY	BEEF	CHICK	PIG	EGG
0001	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0002	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0003	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0004	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0005	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0006	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0007	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0008	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0009	2.60E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0010	2.60E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0011	2.60E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0012	2.60E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0013	2.60E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0014	2.60E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0015	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0016	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0017	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0018	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0019	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0020	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0021	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	2.60E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0023	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	2.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

DERIVED CANCER RISK

CHEM	INHAL	DERM	SOIL	MOTHER	FISH	WATER	VEG	DAIRY	BEEF	CHICK	PIG	EGG	MEAT	ORAL	TOTAL
0001	3.77E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-06
0002	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0003	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0004	3.77E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-05
0005	2.26E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.26E-04
0006	4.15E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.15E-04
0007	7.91E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.91E-06
0008	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0009	1.01E-04	3.37E-03	5.05E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-03	3.98E-03
0010	1.01E-03	3.37E-02	5.05E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-02	3.98E-02
0011	1.01E-04	3.37E-03	5.05E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-03	3.98E-03
0012	1.01E-04	3.37E-03	5.05E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-03	3.98E-03
0013	1.01E-05	3.37E-04	5.05E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-04	3.98E-04
0014	1.01E-04	3.37E-03	5.05E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-03	3.98E-03
0015	4.52E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.52E-05

0016	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0017	4.90E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.90E-06
0018	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0019	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0020	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0021	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	1.07E-03	1.15E-02	1.72E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-02	1.43E-02
0023	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SUM	3.23E-03	5.90E-02	8.84E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.79E-02	7.11E-02

DOMINANT PATHWAYS FOR CHRONIC

CHEM	INHAL	DERM	SOIL	MOTHER	FISH	WATER	VEG	DAIRY	BEEF	CHICK	PIG	EGG
0001	YES	-	-	-	-	-	-	-	-	-	-	-
0002	YES	-	-	-	-	-	-	-	-	-	-	-
0003	YES	-	-	-	-	-	-	-	-	-	-	-
0004	YES	-	-	-	-	-	-	-	-	-	-	-
0005	YES	-	-	-	-	-	-	-	-	-	-	-
0006	YES	-	-	-	-	-	-	-	-	-	-	-
0007	YES	-	-	-	-	-	-	-	-	-	-	-
0008	YES	-	-	-	-	-	-	-	-	-	-	-
0009	YES	YES	YES	-	-	-	-	-	-	-	-	-
0010	YES	YES	YES	-	-	-	-	-	-	-	-	-
0011	YES	YES	YES	-	-	-	-	-	-	-	-	-
0012	YES	YES	YES	-	-	-	-	-	-	-	-	-
0013	YES	YES	YES	-	-	-	-	-	-	-	-	-
0014	YES	YES	YES	-	-	-	-	-	-	-	-	-
0015	YES	-	-	-	-	-	-	-	-	-	-	-
0016	YES	-	-	-	-	-	-	-	-	-	-	-
0017	YES	-	-	-	-	-	-	-	-	-	-	-
0018	YES	-	-	-	-	-	-	-	-	-	-	-
0019	YES	-	-	-	-	-	-	-	-	-	-	-
0020	YES	-	-	-	-	-	-	-	-	-	-	-
0021	YES	-	-	-	-	-	-	-	-	-	-	-
0022	YES	YES	YES	-	-	-	-	-	-	-	-	-
0023	-	-	-	-	-	-	-	-	-	-	-	-
0024	YES	-	-	-	-	-	-	-	-	-	-	-

INHALATION CONCENTRATION (ug/m^3) AND DERIVED DOSE BY PATHWAY (mg/(kg-d)) FOR CHRONIC CALCULATIONS

CHEM	INHAL	DERM	SOIL	MOTHER	FISH	WATER	VEG	DAIRY	BEEF	CHICK	PIG	EGG
0001	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0002	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0003	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0004	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0005	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0006	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0007	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0008	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0009	1.00E+00	2.93E-03	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0010	1.00E+00	2.93E-03	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0011	1.00E+00	2.93E-03	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0012	1.00E+00	2.93E-03	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0013	1.00E+00	2.93E-03	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0014	1.00E+00	2.93E-03	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0015	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0016	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0017	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0018	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0019	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0020	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0021	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	1.00E+00	2.93E-03	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0023	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

DERIVED CHRONIC HI

CHEM	CV	CNS	BONE	DEVEL	ENDO	EYE	GILV	IMMUN	KIDN	REPRO	RESP	SKIN	BLOOD	MAX
0001	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-01	0.00E+00	0.00E+00	1.11E-01
0002	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E+01	0.00E+00	0.00E+00	1.67E+01
0003	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-03	0.00E+00	0.00E+00	5.00E-03
0004	0.00E+00	1.67E-02	0.00E+00	1.67E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E-02	1.67E-02
0005	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-02	0.00E+00	0.00E+00	0.00E+00	5.00E-02
0006	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-01	0.00E+00	0.00E+00	2.00E-01
0007	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-01	0.00E+00	0.00E+00	3.33E-01
0008	0.00E+00	1.43E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-04
0009	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0010	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0011	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0012	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0013	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0014	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0015	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-01	0.00E+00	0.00E+00	1.11E-01
0016	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-04	0.00E+00	0.00E+00	3.33E-04
0017	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-02	0.00E+00	0.00E+00	3.33E-02
0018	0.00E+00	3.33E-03	0.00E+00	3.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-03	0.00E+00	0.00E+00	3.33E-03
0019	0.00E+00	1.43E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-03	0.00E+00	0.00E+00	1.43E-03
0020	0.00E+00	0.00E+00	0.00E+00	5.00E-04	5.00E-04	0.00E+00	5.00E-04	0.00E+00	5.00E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-04
0021	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0023	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	0.00E+00	0.00E+00	0.00E+00	2.50E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-04
SUM	0.00E+00	2.16E-02	0.00E+00	2.08E-02	5.00E-04	1.70E+01	5.00E-04	0.00E+00	5.00E-04	5.00E-02	1.75E+01	0.00E+00	1.67E-02	1.75E+01

ACUTE HI

CHEM	CV	CNS	BONE	DEVEL	ENDO	EYE	GILV	IMMUN	KIDN	REPRO	RESP	SKIN	BLOOD	MAX
0001	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0002	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E+00	0.00E+00	0.00E+00	5.26E+00
0003	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.13E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.13E-04	0.00E+00	0.00E+00	3.13E-04
0004	0.00E+00	0.00E+00	0.00E+00	7.69E-04	0.00E+00	0.00E+00	0.00E+00	7.69E-04	0.00E+00	7.69E-04	0.00E+00	0.00E+00	7.69E-04	7.69E-04
0005	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0006	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0007	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-02	0.00E+00	1.06E-02	0.00E+00	0.00E+00	1.06E-02	0.00E+00	0.00E+00	1.06E-02
0008	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0009	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0010	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0011	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0012	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0013	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0014	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0015	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0016	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0017	0.00E+00	0.00E+00	0.00E+00	3.23E-04	0.00E+00	3.23E-04	0.00E+00	0.00E+00	0.00E+00	3.23E-04	3.23E-04	0.00E+00	0.00E+00	3.23E-04
0018	0.00E+00	2.70E-05	0.00E+00	2.70E-05	0.00E+00	2.70E-05	0.00E+00	0.00E+00	0.00E+00	2.70E-05	2.70E-05	0.00E+00	0.00E+00	2.70E-05
0019	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.55E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.55E-05	0.00E+00	0.00E+00	4.55E-05
0020	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0021	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0023	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	0.00E+00	3.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-05
SUM	0.00E+00	6.27E-05	0.00E+00	1.12E-03	0.00E+00	5.27E+00	0.00E+00	1.14E-02	0.00E+00	1.12E-03	5.27E+00	0.00E+00	7.69E-04	5.27E+00

This file: c:\HARP\projects\demo\PointEstimateRisk.txt

Created by HARP Version 1.3 Build 23.04.05
Uses ISC Version 99155
Uses BPIP (Dated: 04112)
Creation date: 7/14/2007 6:46:07 AM

EXCEPTION REPORT
   (there have been no changes or exceptions)

INPUT FILES:
   Source-Receptor file:
   Averaging period adjustment factors file: not applicable
   Emission rates file: none
   Site parameters file: C:\HARP\PROJECTS\DEMO\SDAPCD Rule 1200 pathways.sit

GLC DATA SOURCE:
  concentrations loaded from file C:\HARP\PROJECTS\DEMO\QVR.cml
  chemicals and/or concentrations have been edited by the user
  User memo:

Screening mode is OFF

Exposure Duration: 70 year (adult resident)
Analysis Method: High-end Point Estimate
Health Effect: Cancer, Chronic and Acute

SITE PARAMETERS

DEPOSITION

   Deposition rate (m/s)   0.05

DRINKING WATER

*** Pathway disabled ***

FISH

*** Pathway disabled ***

PASTURE

*** Pathway disabled ***

HOME GROWN PRODUCE

*** Pathway disabled ***

PIGS, CHICKENS AND EGGS

*** Pathway disabled ***

DERMAL ABSORPTION

*** Pathway enabled ***

SOIL INGESTION

*** Pathway enabled ***

MOTHER'S MILK

*** Pathway enabled ***

CHEMICAL GROUND LEVEL CONCENTRATIONS (micrograms/m^3) (*** indicates not a multipathway chemical)

ABBREV	CAS	GLC Avrg	GLC Max	GLC Water	GLC Pasture	GLC Fish
Acetaldehyde	75070	1.000E+00	1.000E+00	***	***	***
Acrolein	107028	1.000E+00	1.000E+00	***	***	***
Ammonia	7664417	1.000E+00	1.000E+00	***	***	***
Benzene	71432	1.000E+00	1.000E+00	***	***	***
1,3-Butadiene	106990	1.000E+00	1.000E+00	***	***	***
DieselExhPM	9901	1.000E+00	1.000E+00	***	***	***
Formaldehyde	50000	1.000E+00	1.000E+00	***	***	***
Hexane	110543	1.000E+00	1.000E+00	***	***	***
B[a]anthracene	56553	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
B[a]P	50328	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
B[b]fluoranthen	205992	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
B[k]fluoranthen	207089	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
Chrysene	218019	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
In[1,2,3-cd]pyr	193395	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
Naphthalene	91203	1.000E+00	1.000E+00	***	***	***
Propylene	115071	1.000E+00	1.000E+00	***	***	***
Propylene Oxide	75569	1.000E+00	1.000E+00	***	***	***
Toluene	108883	1.000E+00	1.000E+00	***	***	***
Xylenes	1210	1.000E+00	1.000E+00	***	***	***
Ethyl Benzene	100414	1.000E+00	1.000E+00	***	***	***
Anthracene	120127	1.000E+00	1.000E+00	***	***	***
D[a,h]anthracen	53703	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
PM	11101	1.000E+00	1.000E+00	***	***	***
Methanol	67561	1.000E+00	1.000E+00	***	***	***

CHEMICAL CROSS-REFERENCE TABLE

CHEM	CAS	ABBREVIATION	POLLUTANT NAME	BACKGROUND (ug/m^3)
0001	75070	Acetaldehyde	Acetaldehyde	0.000E+00
0002	107028	Acrolein	Acrolein	0.000E+00
0003	7664417	Ammonia	Ammonia	0.000E+00
0004	71432	Benzene	Benzene	0.000E+00
0005	106990	1,3-Butadiene	1,3-Butadiene	0.000E+00
0006	9901	DieselExhPM	Diesel engine exhaust, particulate matter	0.000E+00
0007	50000	Formaldehyde	Formaldehyde	0.000E+00
0008	110543	Hexane	Hexane	0.000E+00
0009	56553	B[a]anthracene	Benz[a]anthracene	0.000E+00
0010	50328	B[a]P	Benzo[a]pyrene	0.000E+00
0011	205992	B[b]fluoranthen	Benzo[b]fluoranthene	0.000E+00
0012	207089	B[k]fluoranthen	Benzo[k]fluoranthene	0.000E+00
0013	218019	Chrysene	Chrysene	0.000E+00
0014	193395	In[1,2,3-cd]pyr	Indeno[1,2,3-cd]pyrene	0.000E+00
0015	91203	Naphthalene	Naphthalene	0.000E+00
0016	115071	Propylene	Propylene	0.000E+00
0017	75569	Propylene Oxide	Propylene oxide	0.000E+00
0018	108883	Toluene	Toluene	0.000E+00
0019	1210	Xylenes	Xylenes (mixed)	0.000E+00
0020	100414	Ethyl Benzene	Ethyl benzene	0.000E+00
0021	120127	Anthracene	Anthracene	0.000E+00
0022	53703	D[a,h]anthracen	Dibenz[a,h]anthracene	0.000E+00
0023	11101	PM	Particulate Matter	0.000E+00
0024	67561	Methanol	Methanol	0.000E+00

EMISSIONS DATA SOURCE:
CHEMICALS ADDED OR DELETED: none

EMISSIONS FOR FACILITY FAC= CO= DEV= PRO= STK= NAME=
SOURCE MULTIPLIER=

CAS	ABBREV	MULTIPLIER	BG (ug/m^3)	AVRG (lbs/yr)	MAX (lbs/hr)

EMISSIONS FOR FACILITY FAC= CO= DEV= PRO= STK= NAME=
SOURCE MULTIPLIER=

CAS	ABBREV	MULTIPLIER	BG (ug/m^3)	AVRG (lbs/yr)	MAX (lbs/hr)

EMISSIONS FOR FACILITY FAC= CO= DEV= PRO= STK= NAME=
SOURCE MULTIPLIER=

CAS	ABBREV	MULTIPLIER	BG (ug/m^3)	AVRG (lbs/yr)	MAX (lbs/hr)

HIGH-END DOSE BY PATHWAY (mg/(kg-d)) FOR CANCER CALCULATIONS

CHEM	INHAL	DERM	SOIL	MOTHER	FISH	WATER	VEG	DAIRY	BEEF	CHICK	PIG	EGG
0001	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0002	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0003	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

0004	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0005	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0006	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0007	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0008	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0009	3.77E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0010	3.77E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0011	3.77E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0012	3.77E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0013	3.77E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0014	3.77E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0015	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0016	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0017	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0018	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0019	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0020	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0021	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	3.77E-04	2.81E-03	4.21E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0023	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	3.77E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

HIGH-END CANCER RISK

CHEM	INHAL	DERM	SOIL	MOTHER	FISH	WATER	VEG	DAIRY	BEEF	CHICK	PIG	EGG	MEAT	ORAL	TOTAL
0001	3.77E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-06
0002	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0003	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0004	3.77E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.77E-05
0005	2.26E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.26E-04
0006	4.15E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.15E-04
0007	7.91E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.91E-06
0008	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0009	1.47E-04	3.37E-03	5.05E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-03	4.02E-03
0010	1.47E-03	3.37E-02	5.05E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-02	4.02E-02
0011	1.47E-04	3.37E-03	5.05E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-03	4.02E-03
0012	1.47E-04	3.37E-03	5.05E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-03	4.02E-03
0013	1.47E-05	3.37E-04	5.05E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-04	4.02E-04
0014	1.47E-04	3.37E-03	5.05E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-03	4.02E-03
0015	4.52E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.52E-05
0016	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0017	4.90E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.90E-06
0018	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0019	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0020	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0021	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	1.55E-03	1.15E-02	1.72E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-02	1.48E-02
0023	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SUM	4.36E-03	5.90E-02	8.84E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.79E-02	7.22E-02

INHALATION CONCENTRATION (ug/m^3) AND HIGH-END DOSE BY PATHWAY (mg/(kg-d)) FOR CHRONIC CALCULATIONS

CHEM	INHAL	DERM	SOIL	MOTHER	FISH	WATER	VEG	DAIRY	BEEF	CHICK	PIG	EGG
0001	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0002	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0003	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0004	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0005	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0006	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0007	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0008	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0009	1.00E+00	2.93E-03	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0010	1.00E+00	2.93E-03	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0011	1.00E+00	2.93E-03	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0012	1.00E+00	2.93E-03	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0013	1.00E+00	2.93E-03	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0014	1.00E+00	2.93E-03	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

0015	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0016	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0017	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0018	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0019	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0020	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0021	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	1.00E+00	2.93E-03	4.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0023	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

HIGH-END CHRONIC HI

CHEM	CV	CNS	BONE	DEVEL	ENDO	EYE	GILV	IMMUN	KIDN	REPRO	RESP	SKIN	BLOOD	MAX
0001	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-01	0.00E+00	0.00E+00	1.11E-01
0002	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E+01	0.00E+00	0.00E+00	1.67E+01
0003	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-03	0.00E+00	0.00E+00	5.00E-03
0004	0.00E+00	1.67E-02	0.00E+00	1.67E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E-02	1.67E-02
0005	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-02	0.00E+00	0.00E+00	0.00E+00	5.00E-02
0006	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-01	0.00E+00	0.00E+00	2.00E-01
0007	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-01	0.00E+00	0.00E+00	3.33E-01
0008	0.00E+00	1.43E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-04
0009	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0010	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0011	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0012	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0013	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0014	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0015	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-01	0.00E+00	0.00E+00	1.11E-01
0016	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-04	0.00E+00	0.00E+00	3.33E-04
0017	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-02	0.00E+00	0.00E+00	3.33E-02
0018	0.00E+00	3.33E-03	0.00E+00	3.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-03	0.00E+00	0.00E+00	3.33E-03
0019	0.00E+00	1.43E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-03	0.00E+00	0.00E+00	1.43E-03
0020	0.00E+00	0.00E+00	0.00E+00	5.00E-04	5.00E-04	0.00E+00	5.00E-04	0.00E+00	5.00E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-04
0021	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0023	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	0.00E+00	0.00E+00	0.00E+00	2.50E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-04
SUM	0.00E+00	2.16E-02	0.00E+00	2.08E-02	5.00E-04	1.70E+01	5.00E-04	0.00E+00	5.00E-04	5.00E-02	1.75E+01	0.00E+00	1.67E-02	1.75E+01

ACUTE HI

CHEM	CV	CNS	BONE	DEVEL	ENDO	EYE	GILV	IMMUN	KIDN	REPRO	RESP	SKIN	BLOOD	MAX
0001	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0002	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E+00	0.00E+00	0.00E+00	5.26E+00
0003	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.13E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.13E-04	0.00E+00	0.00E+00	3.13E-04
0004	0.00E+00	0.00E+00	0.00E+00	7.69E-04	0.00E+00	0.00E+00	0.00E+00	7.69E-04	0.00E+00	7.69E-04	0.00E+00	0.00E+00	7.69E-04	7.69E-04
0005	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0006	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0007	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-02	0.00E+00	1.06E-02	0.00E+00	0.00E+00	1.06E-02	0.00E+00	0.00E+00	1.06E-02
0008	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0009	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0010	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0011	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0012	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0013	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0014	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0015	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0016	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0017	0.00E+00	0.00E+00	0.00E+00	3.23E-04	0.00E+00	3.23E-04	0.00E+00	0.00E+00	0.00E+00	3.23E-04	3.23E-04	0.00E+00	0.00E+00	3.23E-04
0018	0.00E+00	2.70E-05	0.00E+00	2.70E-05	0.00E+00	2.70E-05	0.00E+00	0.00E+00	0.00E+00	2.70E-05	2.70E-05	0.00E+00	0.00E+00	2.70E-05
0019	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.55E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.55E-05	0.00E+00	0.00E+00	4.55E-05
0020	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0021	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0023	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	0.00E+00	3.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-05
SUM	0.00E+00	6.27E-05	0.00E+00	1.12E-03	0.00E+00	5.27E+00	0.00E+00	1.14E-02	0.00E+00	1.12E-03	5.27E+00	0.00E+00	7.69E-04	5.27E+00

This file: c:\HARP\projects\demo\PointEstimateRisk.txt

Created by HARP Version 1.3 Build 23.04.05
Uses ISC Version 99155
Uses BPIP (Dated: 04112)
Creation date: 7/14/2007 7:16:08 AM

EXCEPTION REPORT
   (there have been no changes or exceptions)

INPUT FILES:
   Source-Receptor file:
   Averaging period adjustment factors file: not applicable
   Emission rates file: none
   Site parameters file: C:\HARP\PROJECTS\DEMO\SDAPCD Rule 1200 pathways.sit

GLC DATA SOURCE:
  concentrations loaded from file C:\HARP\PROJECTS\DEMO\QVR.cml
  chemicals and/or concentrations have been edited by the user
  User memo:

Screening mode is OFF

Exposure Duration: Standard work schedule (49 wks/yr, 5 days/wk, 8 hrs/day, 40 yrs)
Analysis Method: Point estimate
Health Effect: Cancer, Chronic and Acute

SITE PARAMETERS

DEPOSITION

   Deposition rate (m/s)   0.05

DRINKING WATER

*** Pathway disabled ***

FISH

*** Pathway disabled ***

PASTURE

*** Pathway disabled ***

HOME GROWN PRODUCE

*** Pathway disabled ***

PIGS, CHICKENS AND EGGS

*** Pathway disabled ***

DERMAL ABSORPTION

*** Pathway enabled ***

SOIL INGESTION

*** Pathway enabled ***

MOTHER'S MILK

*** Pathway enabled ***

CHEMICAL GROUND LEVEL CONCENTRATIONS (micrograms/m^3) (*** indicates not a multipathway chemical)

ABBREV	CAS	GLC Avrg	GLC Max	GLC Water	GLC Pasture	GLC Fish
Acetaldehyde	75070	1.000E+00	1.000E+00	***	***	***
Acrolein	107028	1.000E+00	1.000E+00	***	***	***
Ammonia	7664417	1.000E+00	1.000E+00	***	***	***
Benzene	71432	1.000E+00	1.000E+00	***	***	***
1,3-Butadiene	106990	1.000E+00	1.000E+00	***	***	***
DieselExhPM	9901	1.000E+00	1.000E+00	***	***	***
Formaldehyde	50000	1.000E+00	1.000E+00	***	***	***
Hexane	110543	1.000E+00	1.000E+00	***	***	***
B[a]anthracene	56553	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
B[a]P	50328	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
B[b]fluoranthen	205992	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
B[k]fluoranthen	207089	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
Chrysene	218019	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
In[1,2,3-cd]pyr	193395	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
Naphthalene	91203	1.000E+00	1.000E+00	***	***	***
Propylene	115071	1.000E+00	1.000E+00	***	***	***
Propylene Oxide	75569	1.000E+00	1.000E+00	***	***	***
Toluene	108883	1.000E+00	1.000E+00	***	***	***
Xylenes	1210	1.000E+00	1.000E+00	***	***	***
Ethyl Benzene	100414	1.000E+00	1.000E+00	***	***	***
Anthracene	120127	1.000E+00	1.000E+00	***	***	***
D[a,h]anthracen	53703	1.000E+00	1.000E+00	1.000E+00	1.000E+00	1.000E+00
PM	11101	1.000E+00	1.000E+00	***	***	***
Methanol	67561	1.000E+00	1.000E+00	***	***	***

CHEMICAL CROSS-REFERENCE TABLE

CHEM	CAS	ABBREVIATION	POLLUTANT NAME	BACKGROUND (ug/m^3)
0001	75070	Acetaldehyde	Acetaldehyde	0.000E+00
0002	107028	Acrolein	Acrolein	0.000E+00
0003	7664417	Ammonia	Ammonia	0.000E+00
0004	71432	Benzene	Benzene	0.000E+00
0005	106990	1,3-Butadiene	1,3-Butadiene	0.000E+00
0006	9901	DieselExhPM	Diesel engine exhaust, particulate matter	0.000E+00
0007	50000	Formaldehyde	Formaldehyde	0.000E+00
0008	110543	Hexane	Hexane	0.000E+00
0009	56553	B[a]anthracene	Benz[a]anthracene	0.000E+00
0010	50328	B[a]P	Benzo[a]pyrene	0.000E+00
0011	205992	B[b]fluoranthen	Benzo[b]fluoranthene	0.000E+00
0012	207089	B[k]fluoranthen	Benzo[k]fluoranthene	0.000E+00
0013	218019	Chrysene	Chrysene	0.000E+00
0014	193395	In[1,2,3-cd]pyr	Indeno[1,2,3-cd]pyrene	0.000E+00
0015	91203	Naphthalene	Naphthalene	0.000E+00
0016	115071	Propylene	Propylene	0.000E+00
0017	75569	Propylene Oxide	Propylene oxide	0.000E+00
0018	108883	Toluene	Toluene	0.000E+00
0019	1210	Xylenes	Xylenes (mixed)	0.000E+00
0020	100414	Ethyl Benzene	Ethyl benzene	0.000E+00
0021	120127	Anthracene	Anthracene	0.000E+00
0022	53703	D[a,h]anthracen	Dibenz[a,h]anthracene	0.000E+00
0023	11101	PM	Particulate Matter	0.000E+00
0024	67561	Methanol	Methanol	0.000E+00

EMISSIONS DATA SOURCE:
CHEMICALS ADDED OR DELETED: none

EMISSIONS FOR FACILITY FAC= CO= DEV= PRO= STK= NAME=
SOURCE MULTIPLIER=

CAS	ABBREV	MULTIPLIER	BG (ug/m^3)	AVRG (lbs/yr)	MAX (lbs/hr)

EMISSIONS FOR FACILITY FAC= CO= DEV= PRO= STK= NAME=
SOURCE MULTIPLIER=

CAS	ABBREV	MULTIPLIER	BG (ug/m^3)	AVRG (lbs/yr)	MAX (lbs/hr)

EMISSIONS FOR FACILITY FAC= CO= DEV= PRO= STK= NAME=
SOURCE MULTIPLIER=

CAS	ABBREV	MULTIPLIER	BG (ug/m^3)	AVRG (lbs/yr)	MAX (lbs/hr)

AVERAGE DOSE BY PATHWAY (mg/(kg-d)) FOR CANCER CALCULATIONS

CHEM	INHAL	DERM	SOIL	MOTHER	FISH	WATER	VEG	DAIRY	BEEF	CHICK	PIG	EGG
0001	5.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0002	5.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0003	5.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

0004	5.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0005	5.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0006	5.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0007	5.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0008	5.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0009	5.72E-05	1.07E-03	1.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0010	5.72E-05	1.07E-03	1.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0011	5.72E-05	1.07E-03	1.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0012	5.72E-05	1.07E-03	1.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0013	5.72E-05	1.07E-03	1.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0014	5.72E-05	1.07E-03	1.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0015	5.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0016	5.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0017	5.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0018	5.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0019	5.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0020	5.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0021	5.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	5.72E-05	1.07E-03	1.39E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0023	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	5.72E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

AVERAGE CANCER RISK

CHEM	INHAL	DERM	SOIL	MOTHER	FISH	WATER	VEG	DAIRY	BEEF	CHICK	PIG	EGG	MEAT	ORAL	TOTAL
0001	5.72E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.72E-07
0002	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0003	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0004	5.72E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.72E-06
0005	3.43E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.43E-05
0006	6.29E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.29E-05
0007	1.20E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.20E-06
0008	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0009	2.23E-05	1.28E-03	1.66E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.45E-03	1.47E-03
0010	2.23E-04	1.28E-02	1.66E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.45E-02	1.47E-02
0011	2.23E-05	1.28E-03	1.66E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.45E-03	1.47E-03
0012	2.23E-05	1.28E-03	1.66E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.45E-03	1.47E-03
0013	2.23E-06	1.28E-04	1.66E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.45E-04	1.47E-04
0014	2.23E-05	1.28E-03	1.66E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.45E-03	1.47E-03
0015	6.86E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.86E-06
0016	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0017	7.43E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.43E-07
0018	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0019	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0020	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0021	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	2.34E-04	4.37E-03	5.68E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.94E-03	5.17E-03
0023	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SUM	6.61E-04	2.24E-02	2.91E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.53E-02	2.60E-02

INHALATION CONCENTRATION (ug/m^3) AND AVERAGE DOSE BY PATHWAY (mg/(kg-d)) FOR CHRONIC CALCULATIONS

CHEM	INHAL	DERM	SOIL	MOTHER	FISH	WATER	VEG	DAIRY	BEEF	CHICK	PIG	EGG
0001	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0002	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0003	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0004	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0005	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0006	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0007	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0008	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0009	1.00E+00	2.78E-03	3.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0010	1.00E+00	2.78E-03	3.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0011	1.00E+00	2.78E-03	3.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0012	1.00E+00	2.78E-03	3.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0013	1.00E+00	2.78E-03	3.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0014	1.00E+00	2.78E-03	3.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

0015	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0016	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0017	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0018	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0019	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0020	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0021	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	1.00E+00	2.78E-03	3.61E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0023	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	1.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

AVERAGE CHRONIC HI

CHEM	CV	CNS	BONE	DEVEL	ENDO	EYE	GILV	IMMUN	KIDN	REPRO	RESP	SKIN	BLOOD	MAX
0001	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-01	0.00E+00	0.00E+00	1.11E-01
0002	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E+01	0.00E+00	0.00E+00	1.67E+01
0003	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-03	0.00E+00	0.00E+00	5.00E-03
0004	0.00E+00	1.67E-02	0.00E+00	1.67E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E-02	1.67E-02
0005	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-02	0.00E+00	0.00E+00	0.00E+00	5.00E-02
0006	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.00E-01	0.00E+00	0.00E+00	2.00E-01
0007	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-01	0.00E+00	0.00E+00	3.33E-01
0008	0.00E+00	1.43E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-04
0009	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0010	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0011	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0012	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0013	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0014	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0015	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.11E-01	0.00E+00	0.00E+00	1.11E-01
0016	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-04	0.00E+00	0.00E+00	3.33E-04
0017	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-02	0.00E+00	0.00E+00	3.33E-02
0018	0.00E+00	3.33E-03	0.00E+00	3.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.33E-03	0.00E+00	0.00E+00	3.33E-03
0019	0.00E+00	1.43E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-03	0.00E+00	0.00E+00	1.43E-03
0020	0.00E+00	0.00E+00	0.00E+00	5.00E-04	5.00E-04	0.00E+00	5.00E-04	0.00E+00	5.00E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-04
0021	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0023	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	0.00E+00	0.00E+00	0.00E+00	2.50E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.50E-04
SUM	0.00E+00	2.16E-02	0.00E+00	2.08E-02	5.00E-04	1.70E+01	5.00E-04	0.00E+00	5.00E-04	5.00E-02	1.75E+01	0.00E+00	1.67E-02	1.75E+01

ACUTE HI

CHEM	CV	CNS	BONE	DEVEL	ENDO	EYE	GILV	IMMUN	KIDN	REPRO	RESP	SKIN	BLOOD	MAX
0001	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0002	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.26E+00	0.00E+00	0.00E+00	5.26E+00
0003	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.13E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.13E-04	0.00E+00	0.00E+00	3.13E-04
0004	0.00E+00	0.00E+00	0.00E+00	7.69E-04	0.00E+00	0.00E+00	0.00E+00	7.69E-04	0.00E+00	7.69E-04	0.00E+00	0.00E+00	7.69E-04	7.69E-04
0005	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0006	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0007	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-02	0.00E+00	1.06E-02	0.00E+00	0.00E+00	1.06E-02	0.00E+00	0.00E+00	1.06E-02
0008	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0009	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0010	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0011	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0012	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0013	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0014	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0015	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0016	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0017	0.00E+00	0.00E+00	0.00E+00	3.23E-04	0.00E+00	3.23E-04	0.00E+00	0.00E+00	0.00E+00	3.23E-04	3.23E-04	0.00E+00	0.00E+00	3.23E-04
0018	0.00E+00	2.70E-05	0.00E+00	2.70E-05	0.00E+00	2.70E-05	0.00E+00	0.00E+00	0.00E+00	2.70E-05	2.70E-05	0.00E+00	0.00E+00	2.70E-05
0019	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.55E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.55E-05	0.00E+00	0.00E+00	4.55E-05
0020	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0021	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0022	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0023	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
0024	0.00E+00	3.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-05
SUM	0.00E+00	6.27E-05	0.00E+00	1.12E-03	0.00E+00	5.27E+00	0.00E+00	1.14E-02	0.00E+00	1.12E-03	5.27E+00	0.00E+00	7.69E-04	5.27E+00

APPENDIX 5.1F

Construction Emissions and Impact Analysis

APPENDIX 5.1F

CONSTRUCTION EMISSIONS AND IMPACT ANALYSIS

5.1F.1 Onsite Construction

The Ivanpah Project will be constructed in three phases, one for each facility. Each phase will take approximately 24 months to complete. Construction on Phase 1 (Ivanpah 1) will commence as soon as the project is approved. Construction on Phase 2 (Ivanpah 2) is expected to begin 15 months later. Construction on Phase 3 (Ivanpah 3) is expected to begin 11 months after that. Phase 1 should be completed before Phase 3 begins.

Each phase will start with five months of ground preparation. Vegetation will be removed from the power block area and the areas where heliostats will be located. The power block area will be graded flat. The heliostat fields will be "smoothed:" the basic contours of the land will be unchanged, including water drainage channels, but the peaks and valleys will not be as pronounced. One goal of site preparation activities is to minimize changes to water drainage characteristics.

Once the site has been prepared, the power block structures will be built and the heliostat arrays installed.

5.1F.1.1 Construction Activities

The construction schedule for each project is broken down into several activities: Mobilization (2 months), during which the site is set up to support the equipment and workers that will be on the site; Clean and grub (5 months for Ivanpah 1 & 2, 10 months for Ivanpah 3) during which the vegetation is removed from the heliostat field, and the terrain is smoothed (not, however, graded, except for the power block area); Heliostat erection (13 months for Ivanpah 1 & 2, 26 months for Ivanpah 3); Power block and tower construction (14 months, beginning at the same time as heliostat erection); and Commissioning and testing (3 months), beginning when heliostat erection and power block construction are complete.

There are two types of construction emissions: fugitive dust, and combustion emissions. Fugitive dust comes from moving, disturbing, and traveling over the work site and roads. The largest contribution to dust emissions comes from workers commuting to and from the site on two miles of dirt road. Other activities that create dust include:

- Site preparation and grading/excavation at the construction site;
- Onsite travel on paved and unpaved surfaces;
- Aggregate and soil loading and unloading operations; and
- Wind erosion of areas disturbed during construction activities.

Combustion emissions come from the workers' vehicles, from heavy equipment (both stationary and mobile), and from delivery vehicles.

Combustion emissions during construction will result from:

- Exhaust from the Diesel construction equipment used for site preparation, grading, excavation, trenching and construction of onsite structures;
- Exhaust from water trucks used to control construction dust emissions;
- Exhaust from Diesel-powered welding machines;

- Exhaust from pickup trucks and Diesel trucks used to transport workers and materials around the construction site;
- Exhaust from Diesel trucks used to deliver concrete, fuel, and construction supplies to the construction site; and
- Exhaust from automobiles and buses used by workers to commute to the construction site.

To determine the potential worst-case daily construction impacts, exhaust and dust emission rates have been evaluated for each source of emissions. Maximum short-term impacts are calculated based on the equipment mix expected during Month 12 of the construction schedule. Annual emissions are based on the average equipment mix during the peak 12-month period out of the overall 32-month construction period.

5.1F.3 Available Minimization Measures

The following typical dust minimization measures will be implemented to control exhaust emissions from the Diesel heavy equipment and potential emissions of fugitive dust during construction of the project:

- Unpaved roads and disturbed areas in the project construction site will be watered as frequently as necessary to prevent fugitive dust plumes. The frequency of watering can be reduced or eliminated during periods of precipitation.
- The vehicle speed limit will be 15 miles per hour within the construction site.
- The construction site entrances shall be posted with visible speed limit signs.
- Construction equipment vehicle tires will be inspected and washed as necessary to be cleaned free of dirt prior to entering paved roadways.
- Gravel ramps of at least 20 feet in length will be provided at the tire washing/cleaning station.
- Unpaved exits from the construction site will be graveled or treated to prevent track-out to public roadways.
- Construction vehicles will enter the construction site through the treated entrance roadways, unless an alternative route has been submitted to and approved by the Compliance Project Manager.
- Construction areas adjacent to any paved roadway will be provided with sandbags or other measures as specified in the Storm Water Pollution Prevention Plan (SWPPP) to prevent run-off to roadways.
- Paved roads within the construction site will be swept at least twice daily (or less during periods of precipitation) on days when construction activity occurs to prevent the accumulation of dirt and debris.
- At least the first 500 feet of any public roadway exiting from the construction site shall be swept at least twice daily (or less during periods of precipitation) on days when construction activity occurs or on any other day when dirt or runoff from the construction site is visible on public roadways.
- Soil storage piles and disturbed areas that remain inactive for longer than 10 days will be covered or treated with appropriate dust suppressant compounds.

- Vehicles used to transport solid bulk material on public roadways and having the potential to cause visible emissions will be provided with a cover, or the materials will be sufficiently wetted and loaded onto the trucks in a manner to provide at least one foot of freeboard.
- Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) will be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition shall remain in place until the soil is stabilized or permanently covered with vegetation.
- Workers will be transported between Las Vegas and the construction site in shuttle buses. Fewer commute vehicles using the dirt roads between the highway and the project site will mean fewer dust and combustion emissions.

An on-site Air Quality Construction Mitigation Manager will be responsible for directing and documenting compliance with construction-related mitigation conditions.

5.1F.4 Estimates of Emissions with Minimization Measures

5.1F.4.1 Onsite Construction

Tables 5.1F-1 and 5.1F-2 show the estimated maximum daily and annual heavy equipment exhaust and fugitive dust emissions with recommended mitigation measures for onsite construction activities. Detailed emission calculations are included as Attachment 5.1F-1.

TABLE 5.1F-1
MAXIMUM DAILY EMISSIONS DURING CONSTRUCTION, POUNDS PER DAY

	NOx	CO	VOC	SOx	PM_{10}	$PM_{2.5}$
Onsite						
Construction Equipment	363.36	116.74	22.96	1.01	13.35	13.35
Fugitive Dust	--	--	--	--	176.98	31.57
Offsite						
Worker Travel, Truck Deliveries[a]	108.09	376.47	37.69	0.99	77.06	12.65
Total Emissions						
Total	471.45	493.21	60.65	1.99	267.38	57.56

a. Offsite emissions. Emissions from onsite worker travel and truck deliveries are included in the fugitive dust and construction equipment emissions.

TABLE 5.1F-2
PEAK ANNUAL EMISSIONS DURING PROJECT CONSTRUCTION, TONS PER YEAR

	NOx	CO	VOC	SOx	PM_{10}	$PM_{2.5}$
Onsite						
Construction Equipment	29.91	9.93	1.97	0.07	1.17	1.17
Fugitive Dust	--	--	--	--	16.66	2.99
Offsite						
Worker Travel, Truck Deliveries[a]	9.07	33.02	3.30	0.08	5.99	1.39
Total Emissions						
Total	38.98	42.95	5.27	0.16	23.83	5.55

a. Offsite emissions. Emissions from onsite worker travel and truck deliveries are included in the fugitive dust and construction equipment emissions.

5.1F.5 Analysis of Ambient Impacts from Onsite Construction

Ambient air quality impacts from emissions during construction of the project were estimated using an air quality dispersion modeling analysis. The modeling analysis considers the construction site location, the surrounding topography, and the sources of emissions during construction, including vehicle and equipment exhaust emissions and fugitive dust.

5.1F.5.1 Existing Ambient Levels

There is no single nearby station where ambient data is collected for all of the pollutants of concern. As with the modeling analysis of project operating impacts (Section 5.1.6), ambient monitoring data from several monitoring stations were used to establish the ambient background levels for the construction impact modeling analysis. Table 5.1F-3 shows the maximum concentrations of NOx, SO_2, CO, and PM_{10} recorded for 2004 through 2006 at the stations.

TABLE 5.1F-3
MAXIMUM BACKGROUND CONCENTRATIONS, 2004-2006 (µg/m³)

Pollutant	Averaging Time	Monitoring Site	Year	Value
NO_2	1-hour	Barstow	2004	190.1
	Annual	Barstow	2004	43.3
SO_2	1-hour	Trona	2006	60.3
	3-hour	Trona	2006	44.5
	24-hour	Trona	2004	13.1
	Annual	Trona	2006	2.6
CO	1-hour	Barstow	2006	4010
	8-hour	Barstow	2005	1535
PM_{10}	24-hour	Trona	2006	184.4
	Annual	Barstow	2005	25.4
$PM_{2.5}$	24-hour	Big Bear	2003[b]	28.8
	Annual	Big Bear	2003[b]	10.6

Source: California Air Quality Data, California Air Resources Board website; EPA AIRData website. Reported values have been rounded to the nearest tenth of a µg/m³.
Notes:
a. 24-hour average $PM_{2.5}$ concentrations shown are 98th percentile values rather than highest values because compliance with the ambient air quality standards is based on 98th percentile readings.
b. Data not available for 2004-2005.

5.1F.5.2 Dispersion Model

The EPA-approved Industrial Source Complex Short Term (ISCST) model was used to estimate ambient impacts from construction activities.

The emission sources for the construction site were grouped into three categories: exhaust emissions, construction dust emissions and windblown dust emissions. The exhaust and construction dust emissions were modeled as volume sources. The windblown dust emissions were modeled as area sources. For the volume sources, the vertical dimension was set to 6 meters. For combustion sources in the project site area, the horizontal dimension was set to 243.1 meters, with sigma-y = 56.53 meters (based on the width of the construction area).

For the windblown dust sources, the area covers the active construction area. An effective plume height of 0.5 meters was used in the modeling analysis. The construction impacts modeling analysis receptor set excluded the areas under the applicant's control, including the existing Ivanpah property and laydown areas.

To determine the construction impacts on short-term ambient standards (24 hours and less), the worst-case daily onsite construction emission levels shown in Table 5.1F-1 were used. For pollutants with annual average ambient standards, the annual onsite emission levels shown in Table 5.1F-2 were used. As with the health risk assessment, the meteorological data used for the construction emission impacts analysis is the two-year dataset from Jean, Nevada.

F-4.5.3 Modeling Results

Based on the emission rates of NOx, SO_2, CO, and PM_{10} and the meteorological data, the ISCST model calculates hourly and annual ambient impacts for each pollutant. As mentioned above, the modeled 1-hour, 3-hour, 8-hour, and 24-hour ambient impacts are based on the worst-case daily emission rates of NOx, SO_2, CO, and PM_{10}. The annual impacts are based on the annual emission rates of these pollutants.

In accordance with the procedure followed for similar projects, one-hour NO_2 impacts during project construction and project operation were modeled using the Plume Volume Molar Ratio Method (PVMRM) adaptation of the Ozone Limiting Method (Cole and Summerhays, 1979).

Hourly ozone data collected at the Barstow monitoring stations during the years 2001-2002 was be used in conjunction with PVMRM to calculate hourly NO_2 concentrations from hourly NOx concentrations. The PVMRM involves an initial comparison of the estimated maximum NOx concentration and the ambient O_3 concentration left in the plume after reaction of NO with O_3 to determine which is the limiting factor to NO_2 formation. If the remaining O_3 concentration is greater than the maximum NOx concentration, total conversion is assumed. If the NOx concentration is greater than the remaining O_3 concentration, the formation of NO_2 is limited by the remaining ambient O_3 concentration. In this case, the NO_2 concentration is set equal to the O_3 concentration plus a correction factor that accounts for in-stack and near-stack thermal conversion.

The modeling analysis results are shown in Table 5.1F-4. Also included in the table are the maximum background levels that have occurred in the last 3 years and the resulting total ambient impacts. Construction impacts alone for all modeled pollutants are expected to be below the most stringent state and national standards. Construction activities are not expected to cause an exceedance of state or federal ambient air quality standards.

However, The state 24-hour and annual PM_{10} standards are already exceeded in the absence of the construction emissions for the project. As shown in Table 5.1F-4, the incremental PM impacts from project construction are small relative to the existing background.

One set of measure frequently used by CEQA lead agencies to determine significance of air quality impacts is the federal PSD significance thresholds. Facilities with operating emissions that fall below these thresholds are deemed to have an insignificant impact for PSD purposes. The PSD significance thresholds are shown in Table 5.1F-5.

The modeled impacts from construction exceed the annual PSD significance level for NO_2 and the 24-hour significance level for PM_{10}. However, as has been noted, the PSD significance levels were established based on ongoing impacts from a facility's normal operations. Construction emissions, in contrast, are short term. The construction impacts from this project will not cause a new violation of the standard (the NO_2 standard will not be exceeded, and the background pm10 is already above the standard. All feasible mitigation measures have been included as part of the project design.

The dust minimization measures already proposed by the applicant are expected to be effective in minimizing fugitive dust emissions.

TABLE 5.1F-4
MODELED MAXIMUM CONSTRUCTION IMPACTS (INCLUDES ALL ONSITE EMISSIONS)

Pollutant	Averaging Time	Maximum Facility Impact (µg/m^3)	Background (µg/m^3)	Total Impact (µg/m^3)	State Standard (µg/m^3)	Federal Standard (µg/m^3)
NO2	1-hour	124.5	190.1	314.6	470[a]	-
	Annual	1.2	43.3	44.5	56	100
SO2	1-hour	0.4	60.3	60.7	650	-
	3-hour	0.1	44.5	44.6	-	1300
	24-hour	0.04	13.1	13.1	109	365
	Annual	0.003	2.6	2.6	-	80
CO	1-hour	78.8	4,010	4089	23,000	40,000
	8-hour	15.6	1,535	1551	10,000	10,000
PM10	24-hour	6.7	184.4	191.1	50	150
	Annual	0.7	25.4	26.1	20	
PM2.5	24-hour	1.6	28.8	30.4	--	35
	Annual	0.2	10.6	10.8	12	15

Notes:

a. State has adopted a new 1 hour NOx standard of 0.18 ppm (338 (µg/m3) and an annual NOx standard of 0.030 ppm (56 µg/m^3) that are awaiting OAL approval before implementation.

TABLE 5.1F-5

COMPARISON OF MAXIMUM MODELED CONSTRUCTION IMPACTS AND PSD SIGNIFICANT IMPACT LEVELS

Pollutant	Averaging Time	Significant Impact Level, µg/m^3	Maximum Modeled Impact for Ivanpah, µg/m^3	Exceed Significant Impact Level?
NO_2	Annual	1	1.2	Yes
SO_2	3-hour	25	0,1	No
	24-Hour	5	0.04	No
	Annual	1	0.003	No
CO	1-Hour	2000	78.8	No
	8-Hour	500	15.6	No
PM_{10}	24-Hour	5	6.7	Yes
	Annual	1	0.2	No

It is also important to note that emissions in an exhaust plume are dispersed through the entrainment of ambient air, which dilutes the concentration of the emissions as they are carried away from the source by winds. The process of mixing the pollutants with greater and greater volumes of cleaner air is controlled primarily by the turbulence in the atmosphere. This dispersion occurs both horizontally, as the exhaust plume rises above the emission point, and vertically, as winds carry the plume horizontally away from its source.

The rise of a plume above its initial point of release is a significant contributing factor to the reductions in ground-level concentrations, both because a rising plume entrains more ambient air as it travels downwind, and because it travels farther downwind (and thus also undergoes more horizontal dispersion) before it impacts the ground. Vertical plume rise occurs as a result of buoyancy (plume is hotter than ambient air, and hot air, being less dense, tends to rise) and/or momentum (plume has an initial vertical velocity).

In ISCST3, area sources are not considered to have either buoyant or momentum plume rise, and therefore the model assumes that there is no vertical dispersion taking place. Thus a significant source of plume dilution is ignored when sources are modeled as area sources. The project construction site impacts are not unusual in comparison to most construction project analyses. Construction sites that use good dust suppression techniques and low-emitting vehicles typically do not cause exceedances of air quality standards. The input and output modeling files are being provided electronically.

F-5.4 Health Risk of Diesel Exhaust

The combustion portion of annual PM_{10} emissions from Table 5.1F-3 above was modeled separately to determine the annual average Diesel PM_{10} exhaust concentration. This was used with HARP-derived risk values for Diesel exhaust particulate[6] for a 70-year lifetime to determine the potential carcinogenic risk from Diesel exhaust during construction. The exposure was also adjusted by a factor of 32/840, or 0.0381, to adjust a 70-year (840 month) lifetime to the 32-month construction exposure period.

The maximum modeled annual average concentration of Diesel exhaust PM_{10} at any location is 0.028 µg/m^3. The risk values obtained from HARP range from 1.10×10^{-5} (average point estimate value) to 1.59×10^{-5} (derived OEHHA and high end risk

[6] See Appendix 5.1E for a discussion of the use of the HARP model to derive cancer risk values.

estimates). Using the range of risk values and adjustment factors described above, the carcinogenic risk due to exposure to Diesel exhaust during construction activities is expected to be between approximately 0.3 and 0.5 in one million.

It is also important to note that these impacts are highly localized near the project site. This analysis remains conservative because, as discussed above, the modeled PM_{10} concentrations from construction operations are overpredicted by the ISCST3 model.

Attachment 5.1F-1

Detailed Construction Emissions Calculations

Ivanpah Project
Construction Modeling

Short Term Impacts (24 hours and less)					
	NOx	CO	SOx	PM2.5	PM10
TOTAL					
Combustion (lbs/day)	363.36	116.74	1.01	13.35	13.35
Construction Dust (lbs/day)				31.36	176.46
Windblown Dust (lbs/day)				0.21	0.52
ACTIVE CONSTRUCTION AREA					
Combustion (lbs/day)	290.69	93.39	0.81	10.68	10.68
Construction Dust (lbs/day)				31.36	176.46
Windblown Dust (lbs/day)				0.21	0.52
LAYDOWN AREA					
Combustion (lbs/day)	72.67	23.35	0.20	2.67	2.67
Construction Dust (lbs/day)				0.00	0.00
Windblown Dust (lbs/day)				0.00	0.00

Long Term Impacts (annual)					
	NOx	CO	SOx	PM2.5	PM10
TOTAL					
Combustion (tons/yr)	29.91	9.93	0.07	1.17	1.17
Construction Dust (tons/yr)				2.96	16.59
Windblown Dust (tons/yr)				0.03	0.07
ACTIVE CONSTRUCTION AREA					
Combustion (tons/yr)	23.928308	7.9468	0.0593	0.9391	0.9391
Construction Dust (tons/yr)				2.96	16.588
Windblown Dust (tons/yr)				0.03	0.0741
LAYDOWN AREA					
Combustion (tons/yr)	5.9821	1.9867	0.0148	0.2348	0.2348
Construction Dust (tons/yr)				0	0
Windblown Dust (tons/yr)				0	0

Delivery Truck Daily Emissions (Month 32)												
Number of Deliveries Per Day(1)	Average Round Trip Haul Distance (miles)	Vehicle Miles Traveled Per Day	Emission Factors (lbs/vmt)(1)					Daily Emissions (lbs/day)				
			NOx	CO	POC	SOx	PM10	NOx	CO	POC	SOx	PM10
19.95	100	1995	0.0384	0.0211	0.0027	0.0004	0.0007	76.60	42.11	5.33	0.77	1.48
Idle exhaust (2)												0.08379

Notes:
(1) See notes for combustion emissions.
(2) 20 trucks per day times 1 hr idle time per visit times 0.0042 lb/hr.

Delivery Truck Annual Emissions												
Number of Deliveries Per Year	Average Round Trip Haul Distance (miles)	Vehicle Miles Traveled Per Year	Emission Factors (lbs/vmt)(1)					Annual Emissions (tons/yr)				
			NOx	CO	POC	SOx	PM10	NOx	CO	POC	SOx	PM10
3275	100	327500.00	0.0384	0.0211	0.0027	0.0004	0.0007	6.29	3.46	0.44	0.06	0.12
Idle exhaust (2,3)												0.00688

Notes:
(1) See notes for combustion emissions.
(2) Annual average number of trucks per year times 1 hr idle time per visit times 0.0042 lb/hr
(3) Based on 1.91 g/hr idle emission rate for the composite HDD truck fleet in 2001 from EPA's PART5 model.

Construction Equipment Daily Fuel Use (peak period, month 27)

Equipment	Number of Units	Hrs/Day Per Unit	Gals/Hr Per Unit	Total Fuel Use (Gals/day)
Backhoe	2	6.4	2.25	28.80
Cranes, 30 ton	6	6.4	4.00	153.60
Cranes, 250 ton	1	5.6	7.50	42.00
Cranes, 80 ton	2	6.4	4.00	51.20
Dozer	8	6.4	4.00	204.80
transit mix truck	1	4.8	3.13	15.02
Excavator	0	6.4	3.70	0.00
Forklift	8	5.6	1.70	76.16
Manlift	0	4.8	2.49	0.00
Motor Grader	2	6.4	3.00	38.40
Pile Driving Eqt	0	6.4	7.50	0.00
Tandem Dump, 30 CY	2	6.4	3.13	40.06
Scrapers	10	6.4	7.50	480.00
Roller Compactors	0	6.4	3.25	0.00
Water truck	7	4	3.13	87.64
Welding Machine, Portable	2	8	1.27	20.32
Concrete Pump Truck	1	1.6	3.13	5.01
Paving Machine	0	2.4	6.85	0.00
fuel lube truck	3	6.4	3.25	62.40
pickup	26	4.8	3.13	390.62
stakebed truck	5	6.4	1.27	40.64
diesel generator	2	6.4	1.27	16.26
air compressor diesel	5	6.4	1.27	40.64
Crane, 100 + ton (250)	3	5.6	7.50	126.00
Total =				1919.58

Construction Equipment Annual Fuel Use (12-month construction period)

Equipment	12-Month Average Number of Units Per Year(1)	Peak 12-Month Average Number of Units Per Year(1)	Average Operating Hrs/Day Per Unit	Gals/Hr Per Unit	Average Operating Days per Year	12-Month Average Total Fuel Use (Gals/yr)	Peak 12-Month Average Total Fuel Use (Gals/yr)
Backhoe	1.88	2.50	6.4	2.25	264	7,128	9,504
Cranes, 30 ton	3.94	5.25	6.4	4.00	264	26,611	35,482
Cranes, 250 ton	0.44	0.67	5.6	7.50	264	4,851	7,392
Cranes, 80 ton	1.19	1.67	6.4	4.00	264	8,026	11,264
Dozer	1.81	2.76	6.4	4.00	264	12,250	18,666
transit mix truck	0.69	0.90	4.8	3.13	264	2,727	3,589
Excavator	0.00	0.00	6.4	3.70	264	0	0
Forklift	6.81	9.14	5.6	1.70	264	17,122	22,979
Manlift	0.00	0.00	4.8	2.49	264	0	0
Motor Grader	1.63	2.38	6.4	3.00	264	8,237	12,069
Pile Driving Eqt	0.00	0.00	6.4	7.50	264	0	0
Tandem Dump, 30 CY	0.69	1.05	6.4	3.13	264	3,636	5,540
Scrapers	3.38	5.14	6.4	7.50	264	42,768	65,170
Roller Compactors	0.50	0.76	6.4	3.25	264	2,746	4,184
Water truck	2.31	3.52	4	3.13	264	7,643	11,647
Welding Machine, Portable	1.00	1.24	8	1.27	264	2,682	3,321
Concrete Pump Truck	0.50	0.62	1.6	3.13	264	661	818
Paving Machine	0.00	0.00	2.4	6.85	264	0	0
fuel lube truck	1.44	2.05	6.4	3.25	264	7,894	11,244
pickup	19.13	25.71	4.8	3.13	264	75,856	101,991
stakebed truck	3.38	4.48	6.4	1.27	264	7,242	9,605
diesel generator	0.88	1.05	6.4	1.27	264	1,878	2,248
air compressor diesel	4.19	5.67	6.4	1.27	264	8,986	12,159
Crane, 100 + ton (250)	1.19	1.52	5.6	7.50	264	13,167	16,896
Total =						262,109	211,624

Onsite Combustion Emissions

			Base Factors g/bhp, if Tier 1 >50 hp (1)						Appendix A Table A3 Adjustment (2)						Adjustment (3)	Adjusted Factors (g/bhp)					
Equipment	HP Cat.	Tier	BSFC lb/h	NOx	CO	VOC	SOx	PM10	Adj. Type	NOx	CO	VOC	SOx	PM10	PM10 Fuel S	BSFC	NOx	CO	VOC	SOx	PM10
Backhoe	100-175	1	0.367	5.6523	0.8667	0.3384	0.00499	0.2799	LoLF	1.10	2.57	2.29	1.18	1.97	-0.101	0.433	6.22	2.23	0.77	0.0057	0.45
Cranes, 30 ton	175-300	1	0.367	5.5772	0.7475	0.3085	0.00499	0.2521	None	1.00	1.00	1.00	1.00	1.00	-0.086	0.367	5.58	0.75	0.31	0.0049	0.17
Cranes, 250 ton	300-600	1	0.367	6.0153	1.306	0.2025	0.00499	0.2008	None	1.00	1.00	1.00	1.00	1.00	-0.086	0.367	6.02	1.31	0.20	0.0049	0.11
Cranes, 80 ton	300-600	1	0.367	6.0153	1.306	0.2025	0.00499	0.2008	None	1.00	1.00	1.00	1.00	1.00	-0.086	0.367	6.02	1.31	0.20	0.0049	0.11
Dozer	100-175	1	0.367	5.6523	0.8667	0.3384	0.00499	0.2799	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.37	1.33	0.36	0.0049	0.26
transit mix truck	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Excavator	100-175	1	0.367	5.6523	0.8667	0.3384	0.00499	0.2799	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.37	1.33	0.36	0.0049	0.26
Forklift	50-100	1	0.408	5.5988	2.3655	0.5213	0.00555	0.4730	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.096	0.412	5.32	3.62	0.55	0.0055	0.49
Manlift	50-100	1	0.408	5.5988	2.3655	0.5213	0.00555	0.4730	LoLF	1.10	2.57	2.29	1.18	1.97	-0.113	0.481	6.16	6.08	1.19	0.0064	0.82
Motor Grader	175-300	1	0.367	5.5772	0.7475	0.3085	0.00499	0.2521	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.30	1.14	0.32	0.0049	0.22
Pile Driving Eqt	300-600	1	0.367	6.0153	1.306	0.2025	0.00499	0.2008	None	1.00	1.00	1.00	1.00	1.00	-0.086	0.367	6.02	1.31	0.20	0.0049	0.11
Tandem Dump, 30 CY	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Scrapers	175-300	1	0.367	5.5772	0.7475	0.3085	0.00499	0.2521	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.30	1.14	0.32	0.0049	0.22
Roller Compactors	100-175	1	0.367	5.6523	0.8667	0.3384	0.00499	0.2799	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.37	1.33	0.36	0.0049	0.26
Water truck	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Welding Machine, Portable	16-25	1	0.408	4.4399	2.1610	0.438	0.00555	0.2665	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.096	0.412	4.22	3.31	0.46	0.0055	0.23
Concrete Pump Truck	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
Paving Machine	175-300	1	0.367	5.5772	0.7475	0.3085	0.00499	0.2521	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.087	0.371	5.30	1.14	0.32	0.0049	0.22
fuel lube truck	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
pickup	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
stakebed truck	Onroad	na	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad	Onroad
diesel generator	16-25	1	0.408	4.4399	2.1610	0.438	0.00555	0.2665	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.096	0.412	4.22	3.31	0.46	0.0055	0.23
air compressor diesel	16-25	1	0.408	4.4399	2.1610	0.438	0.00555	0.2665	Hi LF	0.95	1.53	1.05	1.01	1.23	-0.096	0.412	4.22	3.31	0.46	0.0055	0.23
Crane, 100 + ton (250)	300-600	1	0.367	6.0153	1.306	0.2025	0.00499	0.2008	None	1.00	1.00	1.00	1.00	1.00	-0.086	0.367	6.02	1.31	0.20	0.0049	0.11

		Adjusted factors lbs/1000 gallon (4)					Total Daily Fuel Use(5) (Gals/day)	Daily Emissions Lbs/day					Total Annual Fuel Use(6) (Gals/yr)	Annual Emissions Lbs/yr				
Equipment	Tier	NOx	CO	VOC	SOx	PM10		NOx	CO	VOC	SOx	PM10		NOx	CO	VOC	SOx	PM10
Backhoe	1	224.73	80.51	28.01	0.21	16.27	28.80	6.47	2.32	0.81	0.01	0.47	9,504	2135.80	765.15	266.20	1.97	154.61
Cranes, 30 ton	1	237.87	31.88	13.16	0.21	7.09	153.60	36.54	4.90	2.02	0.03	1.09	35,482	8439.93	1131.18	466.85	7.37	251.57
Cranes, 250 ton	1	256.55	55.70	8.64	0.21	4.90	42.00	10.78	2.34	0.36	0.01	0.21	7,392	1896.44	411.74	63.84	1.54	36.24
Cranes, 80 ton	1	256.55	55.70	8.64	0.21	4.90	51.20	13.14	2.85	0.44	0.01	0.25	11,264	2889.81	627.42	97.28	2.34	55.22
Dozer	1	226.75	56.00	15.00	0.21	10.88	204.80	46.44	11.47	3.07	0.04	2.23	18,666	4232.52	1045.23	280.07	3.88	203.02
transit mix truck	na	180.04	98.97	12.52	1.81	3.48	15.02	2.70	1.49	0.19	0.03	0.05	3,589	646.10	355.16	44.93	6.49	12.50
Excavator	1	226.75	56.00	15.00	0.21	10.88	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00
Forklift	1	202.03	137.47	20.79	0.21	18.44	76.16	15.39	10.47	1.58	0.02	1.40	22,979	4642.43	3158.94	477.75	4.77	423.66
Manlift	1	200.23	197.65	38.81	0.21	26.63	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00
Motor Grader	1	223.74	48.29	13.68	0.21	9.43	38.40	8.59	1.85	0.53	0.01	0.36	12,069	2700.19	582.85	165.08	2.51	113.83
Pile Driving Eqt	1	256.55	55.70	8.64	0.21	4.90	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00
Tandem Dump, 30 CY	na	180.04	98.97	12.52	1.81	3.48	40.06	7.21	3.97	0.50	0.07	0.14	5,540	997.49	548.32	69.37	10.01	19.30
Scrapers	1	223.74	48.29	13.68	0.21	9.43	480.00	107.39	23.18	6.57	0.10	4.53	65,170	14581.00	3147.39	891.44	13.54	614.71
Roller Compactors	1	226.75	56.00	15.00	0.21	10.88	0.00	0.00	0.00	0.00	0.00	0.00	4,184	948.67	234.28	62.77	0.87	45.50
Water truck	na	180.04	98.97	12.52	1.81	3.48	87.64	15.78	8.67	1.10	0.16	0.31	11,647	2097.00	1152.71	145.83	21.05	40.57
Welding Machine, Portable	1	160.21	125.59	17.47	0.21	8.79	20.32	3.26	2.55	0.35	0.00	0.18	3,321	532.05	417.06	58.01	0.69	29.19
Concrete Pump Truck	na	180.04	98.97	12.52	1.81	3.48	5.01	0.90	0.50	0.06	0.01	0.02	818	147.36	81.00	10.25	1.48	2.85
Paving Machine	1	223.74	48.29	13.68	0.21	9.43	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00
fuel lube truck	na	180.04	98.97	12.52	1.81	3.48	87.64	15.78	8.67	1.10	0.16	0.31	11647.18	2097.00	1152.71	145.83	21.05	40.57
pickup	na	180.04	98.97	12.52	1.81	3.48	87.64	15.78	8.67	1.10	0.16	0.31	11647.18	2097.00	1152.71	145.83	21.05	40.57
stakebed truck	na	180.04	98.97	12.52	1.81	3.48	87.64	15.78	8.67	1.10	0.16	0.31	11647.18	2097.00	1152.71	145.83	21.05	40.57
diesel generator	1	160.21	125.59	17.47	0.21	8.79	16.26	2.60	2.04	0.28	0.00	0.14	2,248	360.16	282.32	39.27	0.47	19.76
air compressor diesel	1	160.21	125.59	17.47	0.21	8.79	40.64	6.51	5.10	0.71	0.01	0.36	12,159	1948.12	1527.09	212.41	2.53	106.87
Crane, 100 + ton (250)	1	256.55	55.70	8.64	0.21	4.90	126.00	32.33	7.02	1.09	0.03	0.62	16,896	4334.71	941.12	145.92	3.51	82.83
Total =							1,688.83	363.36	116.74	22.96	1.01	13.26	277,869.20	59,820.77	19,867.07	3,934.81	148.18	2,333.96
														29.91	9.93	1.97	0.07	1.17 tons/yr

(1) - Steady State Emission Factors from Table A2 of EPA November 2002 NR-009b Publication.
(2) - In use adjustment factors per Table A3 EPA November 2002 NR-009b Publication.
(3) - PM10 and SO2 adjustments due to Equation 5 and Equation 7 on pages 18 and 19, Respectively of EPA Report No. NR-009b
(4) - Calculation uses adjusted BSFC and assumed 7.1 lbs/gallon. The onroad emission factors are not adjusted.
(5) - Daily fuel use based on peak combustion month equipment schedule.
(6) - Annual fuel use based on average level during peak 12-month period.

Daily Fugitive Dust Emissions (peak month = month 32)

Equipment	Number of Units	Daily Process Rate Per Unit	Total Process Rate	Units	PM2.5 Emission Factor(1) (lbs/unit)	PM10 Emission Factor(1) (lbs/unit)	Control Factor(1) (%)	PM2.5 Emissions (lbs/day)	PM10 Emissions (lbs/day)
Backhoe	4	882.0	3,528.0	tons	5.305E-05	0.0015	0%	0.19	5.32
Dozer	1	6.4	6.4	hr	0.23	0.4194	0%	1.48	2.68
Compactor - Unpaved Road Travel	2	8.6	17.1	vmt	0.02	0.2754	0%	0.33	4.71
Scraper - Excavation	4	6.4	25.6	hr	0.23	0.4194	0%	5.91	10.74
Scraper - Unpaved Road Travel	4	0.0	0.0	vmt	0.53	3.4638	92%	0.00	0.00
Excavator	0	735.0	0.0	tons	1.141E-05	3.63E-05	0%	0.00	0.00
Water Truck Unpaved Road Travel	2	18.0	36.0	vmt	0.44	2.8400	92%	1.33	8.68
Forklift Unpaved Road Travel	10	18.0	180.0	vmt	0.26	1.7100	92%	4.01	26.13
transit mix truck Unpaved Road Travel	1	0.1	0.1	vmt	0.46	2.9806	92%	0.00	0.02
Motor Grader	4	3.4	13.7	vmt	0.02	0.2754	92%	0.02	0.32
Tandem Dump Unpaved Road Travel	1	14.3	14.3	vmt	0.46	2.9806	92%	0.56	3.62
Tandem Dump Unloading	1	3,528.0	3,528.0	tons	1.14E-05	3.63E-05	0%	0.04	0.13
Windblown Dust (active construction area)	N/A	361,548.0	361,548.0	sq.ft.	6.728E-06	1.682E-05	92%	0.21	0.52
Worker Gravel Road Travel (onsite)	231	6.0	1,386.0	vmt	0.12	0.7705	92%	13.90	90.65
Delivery Truck Gravel Road Travel (onsite)	19.95	6.0	119.7	vmt	0.35	2.3088	92%	3.60	23.46
Total onsite=								31.57	176.98
Worker Gravel Road Travel (offsite)	231	4.0	924.0	vmt	0.12	0.7705	92%	9.27	60.43
Delivery Truck Gravel Road Travel (offsite)	19.95	4.0	79.8	vmt	0.35	2.3088	92%	2.40	15.64
Total offsite=								11.66	76.07

Notes:
(1) See notes for fugitive dust emission calculations.

Annual Fugitive Dust Emissions

Activity	Average Daily PM2.5 Emissions(1) (lbs/day)	Average Daily PM10 Emissions(1) (lbs/day)	Days per Year	Annual PM2.5 Emissions (tons/yr)	Annual PM10 Emissions (tons/yr)
Construction Activities	24.68	138.85	240	2.96	16.66
Windblown Dust	0.16	0.41	365	0.03	0.07
Total =				2.99	16.74

Notes:
(1) Based on average of daily emissions during peak 12-month construction period.

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25																							
Construction Worker	13	13	77	77	83	83	167	324	327	370	338	348	370	395	473	557	498	498	512	497	332	218	51	33	0	557																						
											12-month avg	185	215	247	280	320	354	389	418	432	432	420	396	370	339	432																						
Major Construction Equipment																																																
Dozer		4	8	4	4	4	4	1																																								
Scraper			10	10	10	10	10	4																																								
Blade			2	2	2	6	6	4														2	2																									
Backhoe							4	4	4	4	2	2	2	2	2	2						1	1																									
Dump trucks							1	1	1	1				2	2	2						1																										
Water trucks		2	6	6	6	6	6	2						1	1	1																																
roller compactor					2	2	2	2																																								
concrete pump								1	1	1	1	1	1	1	1																																	
transit mix trucks							1	1	1	1	1	1	1	1	1	1	1																															
crane (20 ton)							2	2	2	4	4	6	6	6	6	6	3	3	3	3	3	3	1																									
crane (65 ton)										1	1	1	1	1	2	2	2	2	2	2	2																											
crane (100 ton)															1	1	1	1	1	1	1																											
crane (+100 ton)											2	2	2	2	3	3	1	1	1	1	1																											
welder diesel											2	2	2	2	2	2	2	2																														
deisel generator										2	2	2	2	2	2	2																																
air compressor diesel										2	5	5	5	5	5	7	6	6	6	6	6	3																										
forklift diesel							2	2	2	4	8	8	8	8	8	8	9	9	9	8	9	5	2																									
fuel lube truck		1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1																														
pickup	4	8	6	9	9	9	9	15	15	16	16	20	20	20	20	20	20	16	12	12	9	9	6	6																								
stakebed truck	2	2	1	1	1	1	1	2	2	2	2	4	4	4	4	4	4	3	2	2	2	2	1	1																								
														4	8	4	4	4	4	1																												
															10	10	10	10	10	4																												
															2	2	2	6	6	4														2	2													
																			4	4	4	4	2	2	2	2	2	2						1	1													
																			1	1	1	1				2	2	2						1														
														2	6	6	6	6	6	2						1	1	1																				
																	2	2	2	2																												
																				1	1	1	1	1	1	1	1																					
																			1	1	1	1	1	1	1	1	1	1	1																			
																			2	2	2	4	4	6	6	6	6	6	3	3	3	3	3	3	1													
																						1	1	1	1	1	2	2	2	2	2	2	2															
																											1	1	1	1	1	1	1															
																							2	2	2	2	3	3	1	1	1	1	1															
																							2	2	2	2	2	2	2	2																		
																						2	2	2	2	2	2	2																				
																						2	5	5	5	5	5	7	6	6	6	6	6	3														
																			2	2	2	4	8	8	8	8	8	8	9	9	9	8	9	5	2													
														1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1																		
													4	8	6	9	9	9	9	15	15	16	16	20	20	20	20	20	20	16	12	12	9	9	6	6												
													2	2	1	1	1	1	1	2	2	2	2	4	4	4	4	4	4	3	2	2	2	2	1	1												
																									4	8	4	4	4	4	1																
																										10	10	10	10	10	4																
																										2	2	2	6	6	4														2	2	
																														4	4	4	4	2	2	2	2	2	2						1	1	
																														1	1	1	1				2	2	2						1		
																									2	6	6	6	6	6	2						1	1	1								
																													2	2	2	2															
																															1	1	1	1	1	1	1	1									
																														1	1	1	1	1	1	1	1	1	1	1							
																														2	2	2	4	4	6	6	6	6	6	3	3	3	3	3	3	1	
																																	1	1	1	1	1	2	2	2	2	2	2	2			
																																						1	1	1	1	1	1	1			
																																		2	2	2	2	3	3	1	1	1	1	1			
																																		2	2	2	2	2	2	2	2						
																																	2	2	2	2	2	2	2								
																																	2	5	5	5	5	5	7	6	6	6	6	6	3		
																														2	2	2	4	8	8	8	8	8	8	9	9	9	8	9	5	2	
																									1	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1						
																								4	8	6	9	9	9	9	15	15	16	16	20	20	20	20	20	20	16	12	12	9	9	6	6
																								2	2	1	1	1	1	1	2	2	2	2	4	4	4	4	4	4	3	2	2	2	2	1	1

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Dozer	0	4	8	4	4	4	4	1	0	0	0	0	0	4	8	4	4	4	4	1	0	0	0	0	0	4	8	4	4	4	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scraper	0	0	10	10	10	10	10	4	0	0	0	0	0	0	10	10	10	10	10	4	0	0	0	0	0	0	10	10	10	10	10	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blade	0	0	2	2	2	6	6	4	0	0	0	0	0	0	2	2	2	6	6	4	0	2	2	0	0	0	2	2	2	6	6	4	0	2	2	0	0	0	0	0	0	0	0	0	0	2	2	0
Backhoe	0	0	0	0	0	0	4	4	4	4	2	2	2	2	2	2	0	0	4	4	4	5	3	2	2	2	2	2	0	0	4	4	4	5	3	2	2	2	2	2	0	0	0	0	0	1	1	0
Dump trucks	0	0	0	0	0	0	1	1	1	1	0	0	0	2	2	2	0	0	1	1	1	2	0	0	0	2	2	2	0	0	1	1	1	2	0	0	0	2	2	2	0	0	0	0	0	1	0	0
Water trucks	0	2	6	6	6	6	6	2	0	0	0	0	0	3	7	7	6	6	6	2	0	0	0	0	0	3	7	7	6	6	6	2	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0
roller compactor	0	0	0	0	2	2	2	2	0	0	0	0	0	0	0	0	2	2	2	2	0	0	0	0	0	0	0	0	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
concrete pump	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
transit mix trucks	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0
crane (20 ton)	0	0	0	0	0	0	2	2	2	4	4	6	6	6	6	6	3	3	5	5	5	7	5	6	6	6	6	6	3	3	5	5	5	7	5	6	6	6	6	6	3	3	3	3	3	3	1	0
crane (65 ton)	0	0	0	0	0	0	0	0	0	1	1	1	1	1	2	2	2	2	2	2	2	1	1	1	1	1	2	2	2	2	2	2	2	1	1	1	1	1	2	2	2	2	2	2	2	0	0	0
crane (100 ton)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0
crane (+100 ton)	0	0	0	0	0	0	0	0	0	0	2	2	2	2	3	3	1	1	1	1	1	0	2	2	2	2	3	3	1	1	1	1	1	0	2	2	2	2	3	3	1	1	1	1	1	0	0	0
welder diesel	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0	0
deisel generator	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	0	0	0	0	0	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0
air compressor diese	0	0	0	0	0	0	0	0	0	2	5	5	5	5	5	7	6	6	6	6	6	5	5	5	5	5	5	7	6	6	6	6	6	5	5	5	5	5	5	7	6	6	6	6	6	3	0	0
forklift diesel	0	0	0	0	0	0	2	2	2	4	8	8	8	8	8	8	9	9	11	10	11	9	10	8	8	8	8	8	9	9	11	10	11	9	10	8	8	8	8	8	9	9	9	8	9	5	2	0
fuel lube truck	0	1	2	2	2	2	2	2	1	1	1	1	1	2	3	3	3	3	2	2	1	1	1	1	1	2	3	3	3	3	2	2	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
pickup	4	8	6	9	9	9	9	15	15	16	16	20	24	28	26	29	29	25	21	27	24	25	22	26	24	28	26	29	29	25	21	27	24	25	22	26	20	20	20	20	20	16	12	12	9	9	6	6
stakebed truck	2	2	1	1	1	1	1	2	2	2	2	4	6	6	5	5	5	4	3	4	4	4	3	5	6	6	5	5	5	4	3	4	4	4	3	5	4	4	4	4	4	3	2	2	2	2	1	1

TABLE 5.10-8
Plant Construction Personnel for by Discipline, All Phases

IVANPAH 1

Job Category	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Totals	Check
	Months After Notice to Proceed																									
Power Block, Towers, Transmission Lines & Water Line																										
Boilermakers															22	22	22	22	22	14	8				132	
Carpenters					6	6	18	29	40	40	40	40	40	40	28	28	6	6	6	6	6	6	6	6	403	
Construction Equip. Operators			42	42	42	36	36																		198	
Electricians	2	2	2	2	2	2	19	35	35	35	13	13	17	19	35	85	85	85	85	85	85	35	2	2	782	
Ironworkers						6	12	11	17	44	44	44	44	44	46	41	7	7	7	3	3				380	
Insulation Workers																	12	12	22	22	22	22	22	10	144	
Laborers	8	8	25	25	25	25	32	19	23	23	23	23	23	23	19	19	10	10	10	10	10	10	10	10	423	
Linemen										20	20	20	20	20	20										120	
Millwrights															10	14	14	14	14	9	9	4			88	
Operating Engineers	2	2	3	3	3	3	7	12	15	25	21	21	21	21	27	23	17	17	17	15	9	3	3	3	293	
Painters																			4	8	10	10	6		38	
Pipefitters							15	29	29	15	9	9	27	50	88	147	147	147	147	147	108	66			1180	
Teamsters	1	1	5	5	5	5	5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	61	
Craft Subtotal	13	13	77	77	83	83	144	137	161	204	172	172	194	219	297	381	322	322	336	321	272	158	51	33	4242	4242
Heliostat Erection																										
Base pre-casting								24	24	24	24	24	24	24	24	24	24	24	24	24					312	
Pre-Assembly								32	32	32	32	32	32	32	32	32	32	32	32	32					416	
Transport and erection								10	10	10	10	10	10	10	10	10	10	10	10	10					130	
Base trenching								6	6	6	6	6	6	6	6	6	6	6	6	6					78	
Backfill								2	2	2	2	2	2	2	2	2	2	2	2	2					26	
Compaction								2	2	2	2	2	2	2	2	2	2	2	2	2					26	
Electricians												10	10	10	10	10	10	10	10	10					90	
Unskilled Labor								30	30	30	30	30	30	30	30	30	30	30	30	30					390	
Heliostat Subtotal	0	0	0	0	0	0	0	106	106	106	106	116	116	116	116	116	116	116	116	116	0	0	0	0	1468	
Construction Management								40	40	40	40	40	40	40	40	40	40	40	40	40	40	40			600	
Foremen								20	20	20	20	20	20	20	20	20	20	20	20	20	20	20			300	
Staff Subtotal	0	0	0	0	0	0	0	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	0	0	900	900
TOTAL PLANT STAFF	**13**	**13**	**77**	**77**	**83**	**83**	**144**	**303**	**327**	**370**	**338**	**348**	**370**	**395**	**473**	**557**	**498**	**498**	**512**	**497**	**332**	**218**	**51**	**33**	**6610**	6610
Natural Gas Pipeline																										
Laborers							6	6																	12	
Operating Engineers							2	2																	4	
Pipefitters							12	12																	24	
Surveyors							2																		2	
Teamsters							1	1																	2	
TOTAL GAS PIPELINE STAFF	**0**	**0**	**0**	**0**	**0**	**0**	**23**	**21**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**44**	44
TOTAL WORKFORCE	**13**	**13**	**77**	**77**	**83**	**83**	**167**	**324**	**327**	**370**	**338**	**348**	**370**	**395**	**473**	**557**	**498**	**498**	**512**	**497**	**332**	**218**	**51**	**33**	**6654**	6654

Activity: Mobilization (months 1–2); Clear & Grub Site (months 3–7); Heliostat Erection (months 8–20); Commissioning & Testing (months 22–24); Power Block and Tower Construction (months 8–22)

Ivanpah 1
Average workforce = **277**
Peak workforce = **557**

Calendar																								
Quarters:		**Q1**			**Q2**			**Q3**			**Q4**			**Q1**			**Q2**			**Q3**			**Q4**	
Month (Name)	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10
Month (Number)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Check

IVANPAH 2

Job Category	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Totals	Check
	Months After Notice to Proceed																							
Power Block, Towers, Transmission, Gas & Water Lines																								
Boilermakers													22	22	22	22	22	14	8				132	
Carpenters			6	6	18	29	40	40	40	40	40	40	28	28	6	6	6	6	6	6	6	6	403	
Construction Equip. Operators	42	42	42	36	36																		198	
Electricians	2	2	2	2	19	35	35	35	13	13	17	19	35	85	85	85	85	85	85	35	2	2	778	
Ironworkers				6	12	11	17	44	44	44	44	64	66	41	7	7	7	3	3				420	
Insulation Workers															12	12	22	22	22	22	22	10	144	
Laborers	25	25	25	25	32	19	23	23	23	23	23	23	19	19	10	10	10	10	10	10	10	10	407	
Linemen								20	20	20	20												80	
Millwrights													10	14	14	14	14	9	9	4			88	
Operating Engineers	3	3	3	3	7	12	15	25	21	21	21	21	27	23	17	17	17	15	9	3	3	3	289	
Painters																	4	8	10	10	6		38	
Pipefitters					15	29	29	15	9	9	27	50	88	147	147	147	147	147	108	66			1180	
Teamsters	5	5	5	5	5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	59	
Craft Subtotal	77	77	83	83	144	137	161	204	172	172	194	219	297	381	322	322	336	321	272	158	51	33	4216	4216
Heliostat Erection																								
Base pre-casting						24	24	24	24	24	24	24	24	24	24	24	24	24					312	
Pre-Assembly						32	32	32	32	32	32	32	32	32	32	32	32	32					416	
Transport and erection						10	10	10	10	10	10	10	10	10	10	10	10	10					130	
Base trenching						6	6	6	6	6	6	6	6	6	6	6	6	6					78	
Backfill						2	2	2	2	2	2	2	2	2	2	2	2	2					26	
Compaction						2	2	2	2	2	2	2	2	2	2	2	2	2					26	
Electricians										10	10	10	10	10	10	10	10	10					90	
Unskilled Labor						30	30	30	30	30	30	30	30	30	30	30	30	30					390	
Heliostat Subtotal	0	0	0	0	0	106	106	106	106	116	116	116	116	116	116	116	116	116	0	0	0	0	1468	
Construction Management						40	40	40	40	40	40	40	40	40	40	40	40	40	40	40			600	
Foremen						20	20	20	20	20	20	20	20	20	20	20	20	20	20	20			300	
Staff Subtotal	0	0	0	0	0	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	0	0	900	900
TOTAL PLANT STAFF	**77**	**77**	**83**	**83**	**144**	**303**	**327**	**370**	**338**	**348**	**370**	**395**	**473**	**557**	**498**	**498**	**512**	**497**	**332**	**218**	**51**	**33**	**6584**	6584

Activity: Clear & Grub Site (months 13–17); Heliostat Erection (months 18–30); Commissioning & Testing (months 32–34); Power Block and Tower Construction (months 18–32)

Ivanpah 2
Average workforce = **299**
Peak workforce = **557**

Calendar																																				
Quarters:		**Q1**			**Q2**			**Q3**			**Q4**			**Q1**			**Q2**			**Q3**			**Q4**			**Q1**			**Q2**			**Q3**			**Q4**	
Month (Name)	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11
Month (Number)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36

IVANPAH 3

Job Category	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Totals	Check
	Months After Notice to Proceed																							check
Power Block, Towers, Transmission, Gas & Water Lines																								
Boilermakers													29	29	29	29	29	18	10				173	
Carpenters			8	8	23	38	52	52	52	52	52	52	36	36	8	8	8	8	8	8	8	8	525	
Construction Equip. Operators	55	55	55	47	47																		259	
Electricians	3	3	3	3	25	46	46	46	17	17	22	25	46	111	111	111	111	111	111	46	3	3	1020	
Ironworkers				8	16	14	22	83	83	63	63	63	66	53	9	9	9	4	4				569	
Insulation Workers															16	16	29	29	29	29	29	13	190	
Laborers	33	33	33	33	42	25	30	30	30	30	30	30	25	25	13	13	13	13	13	13	13	13	533	
Linemen										20	20	20	20										80	
Millwrights													13	18	18	18	18	12	12	5			114	
Operating Engineers	4	4	4	4	9	16	20	33	27	27	27	27	35	30	22	22	22	20	12	4	4	4	377	
Painters																	5	10	13	13	8		49	
Pipefitters					20	38	38	20	12	12	35	65	114	191	191	191	191	191	140	86			1535	
Teamsters	7	7	7	7	7	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	86	
Craft Subtotal	102	102	110	110	189	180	211	267	224	224	252	285	387	496	420	420	438	419	355	207	68	44	5510	5510
Heliostat Erection																								
Base pre-casting						48	48	48	48	48	48	48	48	48	48	48	48	48					624	
Pre-Assembly						64	64	64	64	64	64	64	64	64	64	64	64	64					832	
Transport and erection						20	20	20	20	20	20	20	20	20	20	20	20	20					260	
Base trenching						12	12	12	12	12	12	12	12	12	12	12	12	12					156	
Backfill						4	4	4	4	4	4	4	4	4	4	4	4	4					52	
Compaction						4	4	4	4	4	4	4	4	4	4	4	4	4					52	
Electricians										20	20	20	20	20	20	20	20	20					180	
Unskilled Labor						60	60	60	60	60	60	60	60	60	60	60	60	60					780	
Heliostat Subtotal	0	0	0	0	0	212	212	212	212	232	232	232	232	232	232	232	232	232	0	0	0	0	2936	2936
Construction Management						45	45	45	45	45	45	45	45	45	45	45	45	45	45	45			675	
Foremen						25	25	25	25	25	25	25	25	25	25	25	25	25	25	25			375	
Staff Subtotal	0	0	0	0	0	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	0	0	1050	
TOTAL PLANT STAFF	**102**	**102**	**110**	**110**	**189**	**462**	**493**	**549**	**506**	**526**	**554**	**587**	**689**	**798**	**722**	**722**	**740**	**721**	**425**	**277**	**68**	**44**	**9496**	9496

Activity: Clear & Grub Site (months 27–31); Heliostat Erection (months 32–44); Commissioning & Testing (months 46–48); Power Block and Tower Construction (months 32–46)

Ivanpah 3
Average workforce = **432**
Peak workforce = **798**

Calendar																								
Quarters:		**Q1**			**Q2**			**Q3**			**Q4**			**Q1**			**Q2**			**Q3**			**Q4**	
Month (Name)	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09	Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10
Month (Number)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**
TOTAL ALL PHASES	**13**	**13**	**77**	**77**	**83**	**83**	**167**	**324**	**327**	**370**	**338**	**348**	**370**	**395**	**550**	**634**	**581**	**581**	**656**	**800**	**659**	**588**	**389**	**381**

Calendar																										
Quarters:		**Q1**			**Q2**			**Q3**			**Q4**			**Q1**			**Q2**			**Q3**			**Q4**			
Month (Name)	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12		
Month (Number)	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**		
TOTAL ALL PHASES	**370**	**395**	**575**	**659**	**608**	**608**	**701**	**959**	**825**	**767**	**557**	**559**	**554**	**587**	**689**	**798**	**722**	**722**	**740**	**721**	**425**	**277**	**68**	**44**	**22,734**	22734

ALL PHASES
Average workforce = **474**
Peak workforce = **959**

AVERAGE DAILY TRAFFIC ESTIMATES

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Workers																								
Transport Busses (15/bus)			4	4	4	4	7	13	14	15	14	14	15	16	22	26	24	24	27	32	27	24	16	16
Personal Vehicle (2/vehicle)			15	15	17	17	33	65	65	74	68	70	74	79	110	127	116	116	131	160	132	118	78	76
Construction Vehicles																								
Ivanpah 1																								
Solar Fields (containers/week)								28	28	28	28	28	28	28	28	28	28	28	28	28				
Power Block								30	30	30	30	30	30	30	30	30	30	30	30	30	30	30		
Grading Equipment			21			3	18																	
Ivanpah 2																								
Solar Fields (containers/month)																				28	28	28	28	28
Power Block																				30	30	30	30	30
Grading Equipment															21			3	18					
Ivanpah 3																								
Solar Fields (containers/month)																								
Power Block																								
Grading Equipment																								
Construction Truck Total	0	0	21	0	0	3	18	58	58	58	58	58	58	58	79	58	58	61	76	116	88	88	58	58

	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48				
Workers																												
Transport Busses (15/bus)	15	16	23	27	25	25	29	39	33	31	23	23	23	24	28	32	29	29	30	29	17	12	3	2	AVG	19	MAX	39
Personal Vehicle (2/vehicle)	74	79	115	132	122	122	140	192	165	153	111	112	111	117	138	160	144	144	148	144	85	55	14	9	AVG	95	MAX	192
Construction Vehicles																												
Ivanpah 1																												
Solar Fields (containers/week)																												
Power Block																												
Grading Equipment																												
Ivanpah 2																												
Solar Fields (containers/month)	28	28	28	28	28	28	28	28																				
Power Block	30	30	30	30	30	30	30	30	30	30																		
Grading Equipment																												
Ivanpah 3																												
Solar Fields (containers/month)								57	57	57	57	57	57	57	57	57	57	57	57	57								
Power Block								30	30	30	30	30	30	30	30	30	30	30	30	30	30	30						
Grading Equipment			28			4	24																					
Construction Truck Total	58	58	86	58	58	62	82	145	117	117	87	87	87	87	87	87	87	87	87	87	30	30	0	0	AVG	62	MAX	145
																									TOTAL	176		376

APPENDIX 5.1G

Offset Requirements

APPENDIX 5.1G

OFFSET REQUIREMENTS

Operating emissions are well below the MDAQMD offset thresholds for all pollutants. MDAQMD offset requirements are not triggered by this project.

APPENDIX 5.1H

Cumulative Impacts Analysis Protocol

APPENDIX 5.1H

CUMULATIVE IMPACTS ANALYSIS PROTOCOL

Potential cumulative air quality impacts that might be expected to occur resulting from the operation of the proposed Ivanpah facility and other reasonably foreseeable projects are both regional and localized in nature. These cumulative impacts will be evaluated as follows.

Cumulative impacts from Ivanpah could result from emissions of carbon monoxide, oxides of nitrogen, sulfur oxides, and directly emitted PM_{10}. To ensure that other projects that might have significant cumulative impacts in conjunction with Ivanpah are identified, a search area with a radius of 6 miles will be used for the cumulative impacts analysis.

Within this search area, three categories of projects with combustion sources will be used as criteria for identification:

- Projects that are existing and have been in operation since at least 2004.
- Projects for which air pollution permits to construct have been issued and that began operation after 2004.
- Projects for which air pollution permits to construct have not been issued, but that are reasonably foreseeable.

Projects that are existing and have been in operation since at least 2005 are already reflected in the ambient air quality data that has been used to represent background concentrations; consequently, no further analysis of the emissions from this category of facilities will be performed. The cumulative impacts analysis adds the modeled impacts of selected facilities to the maximum measured background air quality levels, thus ensuring that these existing projects are taken into account.

Projects for which air pollution permits to construct have been issued, but that were not operational by 2004 will be identified through a request of permit records from the Mojave Desert AQMD. The search will be requested to be performed at two levels. Projects that had a permit to construct issued after January 1, 2003, will be included in the cumulative air quality impacts analysis. The January 1, 2003 date was selected based on the typical length of time a permit to construct is valid and typical project construction times, assuring that projects not reflected in the 2004 ambient air quality data are included in the analysis. Projects for which the emissions change was smaller than 10 pounds per day will be assumed to be *de minimis*, and will not be included in the dispersion modeling analysis.

A list of projects within the area for which air pollution permits to construct have not yet been issued, but that are reasonably foreseeable, will also be requested from the MDAQMD staff.

APPENDIX 5.1I

Modeling Protocol

APPENDIX 5.1I

MODELING PROTOCOL

The modeling protocol was submitted to MDAQMD for review on June 18, 2007. A copy was also provided to the CEC staff.

sierra research

Air Dispersion Modeling Protocol Ivanpah Solar Electric Generating Station, Ivanpah Valley, San Bernardino County, California

prepared for:

Bright Source Energy, Inc.

June 18, 2007

prepared by:

Sierra Research, Inc.
1801 J Street
Sacramento, California 95814
(916) 444-6666

Air Dispersion Modeling Protocol
Ivanpah Solar Electric Generating Station

Submitted to:

Mojave Desert Air Quality Management District

June 14, 2007

Submitted by:

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AIR DISPERSION MODELING PROTOCOL

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1. INTRODUCTION

BrightSource Energy, Inc (BrightSource) intends to submit an Application for Certification to the California Energy Commission and an Application for a Determination of Compliance (equivalent to Authority to Construct permits) to the Mojave Desert Air Quality Management District (AQMD or District) for the proposed Ivanpah Solar Electric Generating Station (Ivanpah SEGS or Project) in Summer 2007. As part of the applications, an Air Quality Impact Analysis (AQIA) will be prepared. The analysis will require air dispersion modeling, for which this modeling protocol describes the procedures that will be followed in conducting the modeling. The modeling will address both potential maximum criteria pollutant impacts and health impacts from toxic air contaminants (TACs).

2. PROJECT DESCRIPTION

The description of the Project will present the emission sources followed by the project location.

Proposed Emission Sources

The Project includes three solar concentrating thermal power plants, based on distributed power tower and heliostat mirror technology, in which heliostat (mirror) fields focus solar energy on power tower receivers near the center of the heliostat array. In each plant, one Rankine-cycle reheat steam turbine receives live steam from four solar boilers, and reheat steam from one solar reheater, at the top of its own distributed power tower adjacent to the turbine. The reflecting area of an individual heliostat is about 7 square meters. The solar field and power generation equipment are started up each morning after sunrise and insolation build-up, and shut down in the evening when insolation drops below the level required to keep the turbine on line. Main project parameters are as listed in Table 1.

Table 1
Main Project Parameters

Plant	Capacity, Net MW	No. of Heliostats (approx.)	UTM [a] Easting (meters)	UTM [a] Northing (meters)
Ivanpah 1	100	68,000	640,300	3,933,250
Ivanpah 2	100	68,000	638,800	3,935,800
Ivanpah 3	200	136,000	637,500	3,937,700

[a] Approximate Universal Transverse Mercator coordinates in North American Datum 27 (NAD27), Zone 10 for center of each solar plant.

Each of the three plants will have one natural gas-fired boiler to bring the solar power system up to operating temperature in the morning, and to keep system temperatures up when clouds briefly block sunlight. The boilers are not big enough to allow operation for sustained periods of reduced sunlight (i.e., on cloudy days or at night). Annual average heat input to the boilers from their clean-burning natural gas fuel is expected to be less than 2% of the heat input from all fuels used. Boiler use will not exceed the equivalent of four hours base load on any given day, and average boiler use will be less than one hour

per operating day. Solar heat will be used to keep each boiler in hot standby mode, capable of responding to demand on short notice. No fuel will be fired while a boiler is on hot standby.

In addition, each of the three plants will have one emergency standby Diesel fuel-fired internal combustion engine to provide power to operate boiler feed and recirculation pumps if power is otherwise unavailable. Finally, each plant will be equipped with a Diesel fuel-fired emergency firewater pump engine.

Total emissions of each criteria pollutant from the project will be well below major source and offset thresholds.

Project Location

The project site is in the Ivanpah Valley approximately 4.5 miles southwest of the intersection of Interstate 15 and the Nevada border at Stateline, Nevada, and 5.5 miles southwest of Primm, Nevada. The approximate Universal Transverse Mercator (UTM) coordinates of the center of each plant site are listed in Table 1. The nominal site elevations for the three plant sites are 878, 922, and 924 meters above mean sea level (AMSL), respectively. Although the general area in the immediate vicinity of the Project site is relatively flat, a knob of volcanic rock rises to 3,160 feet AMSL 0.8 mile directly east of the sites, and complex terrain rises up to 6,000 feet AMSL within 4 to 8 miles in most directions (except to the southeast).

Figure 1 gives an aerial view of the location of the facility; the meteorological monitoring station in Jean, Nevada is indicated in this view. Figure 2 is a more focused aerial view of Ivanpah Valley, showing the project site with respect to Interstate 15 and the immediately surrounding mountains. Figure 3 is a scaled figure showing the detailed facility plot plan and the property boundary. (All figures cited are provided at the end of this document.)

3. DISPERSION MODELING

The air dispersion modeling will be conducted with several models, including AERMOD (Version 07026), SCREEN3 (Version 96043), and CTSCREEN (Version 94111). The air quality modeling analysis will follow the September 27, 2005 USEPA AERMOD Implementation Guide and EPA's "Guideline on Air Quality Models." USEPA default options will be used.

Because the stacks are mounted near substantial structures (solar towers and other buildings), building downwash will be considered in AERMOD by implementing the Building Profile Input Program (BPIP).

Existing Meteorological Data

Hourly surface meteorological data (e.g., hourly wind speed and direction, temperature) for Jean, Nevada during the period 2001-2004 was obtained from the website of the Clark County (Nevada) Department of Air Quality and Environmental Management.[1] The Jean monitoring station is located approximately 16 miles north-northeast of the project site. The data for 2001 and 2002 are acceptably complete, having at least 8,694 and 8,651 hours of either wind speed or temperature, respectively, and hence, are proposed for use in the air dispersion modeling. Figures 4 and 5 contain the wind roses for the two years of acceptable data. To the extent missing data need substitution in the Jean datasets, surface meteorological data will be substituted from data measured at Nellis Air Force Base, located approximately 35 miles northeast of the project site. Upper air data will be taken from the Desert Rock, Nevada monitoring station located north of Las Vegas, and approximately 70 miles northwest of the project site.

For health risk assessment, the HARP model, Version 1.3, will be run with the TAC emission rates discussed above, and following the guidance provided in the Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics "Hot Spots" Information and Assessment Act (AB2588).

Existing Ambient Air Quality Data

Figure 6 shows the location of the district/state/federal-operated ambient monitoring stations in the region surrounding the project site. Ambient concentrations of ozone,

[1] Clark County Department of Air Quality and Environmental Management, Archive Retrieval, *http://www.ccairquality.org/archives/index.html*.

NO_2, and PM_{10} are recorded at two monitoring stations—one located in Barstow, about 100 miles west-southwest of the project site; and the other located in Trona, 110 miles west-northwest of the project site. Trona PM_{10} measurements may contain anomalies that are attributable to local sources or events in or near the Searles Valley. CO is also measured at Barstow. SO_2 is also measured in Trona. Ambient PM_{10} concentrations are monitored at four closer locations in Pahrump, Nevada, 50 miles from the Ivanpah project site. The Pahrump Valley is experiencing local elevated PM levels due to intense development. The level of development that is causing problems in Pahrump is not present in the Ivanpah Valley. Therefore the data from the Pahrump stations are not useful as background data for the project.

The nearest $PM_{2.5}$ monitor is in Big Bear City, 120 miles southwest of the Ivanpah project site. The nearest lead monitor is located in San Bernardino, 140 miles southwest of the Ivanpah project site.

The nearest sulfate monitor is located in Riverside, Riverside County. Sulfate measurements at most monitoring stations in California were discontinued years ago, and are no longer reported on the ARB website because sulfur dioxide emissions are low enough to prevent sulfate levels from being anywhere near the California ambient air quality standard of 25 $\mu g/m^3$ on a 24-hour average basis.

In summary, data from the following sites will be used to represent background levels at the proposed project site:

NO_2 – Barstow
SO_2 – Trona
CO – Barstow
PM_{10} – Barstow
$PM_{2.5}$ – Big Bear City
Sulfate - Riverside

Modeled concentrations will be added to the maximum representative background concentrations measured during the period 2004-2006 to determine compliance with the California and national ambient air quality standards (CAAQS and NAAQS, respectively).

Air Quality Dispersion Models

Overview – Several USEPA dispersion models are proposed for use to quantify pollutant impacts on the surrounding environment based on the emission sources' operating parameters and locations. The models proposed for use are Building Profile Input Program – Plume Rise Model Enhancements (BPIP-PRIME, current version 04274), AERMOD (current version 07026), SCREEN3 (current version 96043), and CTSCREEN (current version 94111). These models, along with options for their use and how they are used, are discussed below.

Simple, Complex, and Intermediate Terrain Impacts – For modeling the project in simple, complex, and intermediate terrain, the guideline AERMOD air dispersion model will be used with the hourly surface meteorological data from Jean, Nevada; substitution data from Nellis Air Force Base, Las Vegas, Nevada; and upper air meteorological data from Desert Rock, Nevada.

The USEPA adopted AERMOD as a guideline model on November 9, 2005. AERMOD is a steady-state, multiple-source, Gaussian dispersion model designed for use with stack emission sources situated in terrain where ground elevations can exceed the stack heights of the emission sources (i.e., complex terrain).[2] The AERMOD model requires hourly meteorological data consisting of wind vector and speed (with reference height), temperature (with reference height), Monin-Obukhov length, surface roughness length, heights of the mechanically and convectively generated boundary layers, surface friction velocity, convective velocity scale, and vertical potential temperature gradient in the 500-meter layer above the planetary boundary layer. The model assumes that there is no variability in meteorological parameters over a one-hour time period, hence the term "steady-state." The AERMOD model allows input of multiple sources and source groupings, eliminating the need for multiple model runs. Complex phenomena such as building-induced plume downwash are treated in this model.

Standard AERMOD control parameters will be used (stack tip downwash, non-screening mode, non-flat terrain, sequential meteorological data check employed). Stack-tip downwash, which adjusts the effective stack height downward following the methods of Briggs (1972) for cases where the stack exit velocity is less than 1.5 times the wind speed at stack top, will be selected per USEPA guidance. The rural default option will be used by not invoking the URBANOPT option.[3]

Two AERMET preprocessors (Stages 1 and 2, and Stage 3) are used to prepare meteorological data for use in AERMOD. In accordance with USEPA guidance for rural sources using rural NWS data,[4] surface roughness characteristics are input for wind direction sectors in the vicinity of the monitoring station at Stage 3 of the meteorological data preparation. Source site values of albedo and Bowen ratio are selected for each season. In defining sectors for surface characteristics, USEPA (2000) suggests that a user specify a sector no smaller than a 30-degree arc. The expected wind direction variability over the course of an hour, as well as the encroachment of characteristics from the adjacent sectors with travel time, makes it hard to preserve the identity of a narrow (i.e., < 30 degrees) sector's characteristics. Use of a weighted-average[5] of characteristics by surface area within a 30-degree (or wider) sector makes it possible to have a unique

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[2] AERMOD has been adopted as a guideline model by USEPA as a replacement for ISCST3. AERMOD incorporates an improved downwash algorithm as compared to ISCST3 (Federal Register, November 9, 2005; Volume 70, Number 216, Pages 68218-68261).

[3] Although the URBANOPT in AERMOD offers the user the opportunity to set the quantitative value of the surface roughness around the project site, it should be recognized that the rural vs. urban option in AERMOD is primarily designed to set the fraction of incident heat flux that is transferred into the atmosphere. This fraction becomes important in urban areas having an appreciable "urban heat island" effect due to a large presence of land covered by concrete, asphalt, and buildings.

[4] USEPS, "AERMOD Implementation Guide," September 27, 2005. *http://www.epa.gov/scram001/7thconf/aermod*.

[5] Weighting is based on wind direction frequency, such as determined from a wind rose.

portion of the surface significantly influence the properties of the sector that it occupies. The two appropriate sectors for the project area are an eastern quadrant between 60 and 150 degrees and the full three-quarters of a circle between 150 and around clockwise to 60 degrees.

The length of the upwind fetch for defining the nature of the turbulent characteristics of the atmosphere at the source location has been defined as 3 kilometers in Irwin (1978) and in USEPA's *Guideline on Air Quality Models*[6] for the purpose of defining land-use characteristics. The resulting values for the three land use parameters are shown in Table 2.

Table 2
Land Use Parameters Used AERMET Processing For AERMOD Modeling

FREQ_SECT	SEASONAL	2	Sectors		
SECTOR	1	60	150	Degrees	
SECTOR	2	150	60	Degrees	
	SEASON	SECTOR	*A*	*Bo*	z_0
SITE_CHAR	1 (spring)	1	0.3	3	0.3
SITE_CHAR	1 (spring)	2	0.3	3	0.1
SITE_CHAR	2 (summer)	1	0.28	4	0.3
SITE_CHAR	2 (summer)	2	0.28	4	0.1
SITE_CHAR	3 (fall)	1	0.28	6	0.3
SITE_CHAR	3 (fall)	2	0.28	6	0.1
SITE_CHAR	4 (winter)	1	0.4	6	0.3
SITE_CHAR	4 (winter)	2	0.4	6	0.1

A = Albedo; Bo = Bowen ratio; z_0 *= surface roughness*

<u>Ambient Ratio Method and Ozone Limiting Method</u> – Annual NO_2 concentrations will be calculated using the Ambient Ratio Method (ARM), adopted in Supplement C to the Guideline on Air Quality Models (USEPA, 1995). The Guideline allows a nationwide default of 75% for the conversion of nitric oxide (NO) to NO_2 on an annual basis and the calculation of NO_2/NOx ratios.

If NO_2 concentrations need to be examined in more detail, the Plume Volume Molar Ratio Method (PVMRM) adaptation of the Ozone Limiting Method (Cole and Summerhays, 1979) will be used. Hourly ozone data collected at either the Barstow or Trona monitoring stations during the years 2001-2002 will be used in conjunction with PVMRM to calculate hourly NO_2 concentrations from hourly NOx concentrations. The PVMRM involves an initial comparison of the estimated maximum NOx concentration and the ambient O_3 concentration left in the plume after reaction of NO with O_3 to determine which is the limiting factor to NO_2 formation. If the remaining O_3

[6] Published as Appendix W to 40 CFR Part 51 (as revised).

concentration is greater than the maximum NOx concentration, total conversion is assumed. If the NOx concentration is greater than the remaining O_3 concentration, the formation of NO_2 is limited by the remaining ambient O_3 concentration. In this case, the NO_2 concentration is set equal to the O_3 concentration plus a correction factor that accounts for in-stack and near-stack thermal conversion.

Missing hourly ozone data will be substituted prior to use with day-appropriate values (e.g., from the previous day, or the next day, for the same hour). If such substitution values are not available, the missing data will be substituted with 40 ppb ozone (typical ozone tropospheric background level).

Fumigation – The SCREEN3 model will be used to evaluate inversion breakup fumigation impacts for short-term averaging periods (24 hours or less), as appropriate. The methodology in USEPA, 1992 (Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised) will be followed for these analyses. Combined impacts for all sources under fumigation conditions will be evaluated, based on USEPA and any applicable SDAPCD modeling guidelines.

Refined Analysis of Impacts at Receptors Above Stack Top - The CTSCREEN model may be needed for a more refined evaluation of project impacts on elevated terrain. AERMOD depends on a simplified representation of terrain to establish the location of a dividing streamline with respect to terrain. Pollutants below the dividing streamline are blown around a terrain obstacle, and pollutants above are blown over the obstacle. CTSCREEN processes terrain in a more sophisticated way to establish where the dividing streamline should be placed for a given source and provides a more realistic assessment of plume impaction on elevated terrain. Hence, CTSCREEN provides greater resolution of ground-level concentrations in elevated-terrain than does AERMOD.[7]

In the event CTSCREEN is used for a more refined evaluation of $PM_{2.5}$ impacts, the highest second-high (H2H) value[8] will be combined with the highest three-year average 98th percentile background concentration for the period 2004-2006 to determine compliance with the 24-hour average $PM_{2.5}$ AAQS for non-PSD purposes. For determining compliance with the annual average $PM_{2.5}$ AAQS for non-PSD purposes, the highest modeled annual average concentration will be combined with the highest three-year average annual average background concentration for the period 2004-2006. Per EPA policy, compliance with the $PM_{2.5}$ AAQS for PSD purposes will be based on the compliance assessment for PM_{10}.

Good Engineering Practice (GEP) Stack Height and Downwash

[7] 40 CFR Part 51, Appendix W, Section 4.2.2 (Refined Analytical Techniques).

[8] CTSCREEN generates HSH values for 3-hour and 24-hour averaging periods. "Users Guide to CTDMPLUS: Volume 2: The Screening Mode (CTSCREEN), p. 2-6. Available at http://www.epa.gov/scram001/userg/screen/ctscreen.pdf.

AERMOD can account for building downwash effects on dispersing plumes. Stack locations and heights and building locations and dimensions will be input to BPIP-PRIME. The first part of BPIP-PRIME determines and reports on whether a stack is being subjected to wake effects from a structure or structures. The second part calculates direction-specific building dimensions for each structure that are used by AERMOD to evaluate wake effects. The BPIP-PRIME output is formatted for use in AERMOD input files.

Receptor Selection

Receptor and source base elevations will be determined from USGS Digital Elevation Model (DEM) data using the 7½-minute format (10- to 30-meter spacing between grid nodes). All coordinates will be referenced to UTM North American Datum 1927 (NAD27), Zone 11. The receptor elevations will be interpolated among the DEM nodes.

Cartesian coordinate receptor grids will be used to provide adequate spatial coverage surrounding the project area for assessing ground-level pollution concentrations, to identify the extent of significant impacts, and to identify maximum impact locations.

For the impact analyses, nested grids will be developed to fully represent the maximum impact area(s). The near-field receptor grid will be spaced 25 meters apart on the fence line, surrounded by a tier of four parallel rows of receptors also spaced 25 meters apart. Beyond the near-field receptor grid, receptors will be placed with 250-meter spacing out to 10 km in each direction from the facility fence line. A fine square grid with 25‑ meter spacing out 1 km in each direction will be set up around each maximum impact point to more precisely locate the position of the maximum. Figure 7 shows emission sources and the receptor grid with actual coordinates to be used in the model. Concentrations within the facility fence line will not be calculated.

Sensitive receptors are locations where those who are especially susceptible to adverse health effects from exposure to toxic air contaminants, such as children, the elderly, and the ill, are likely to be found. Such facilities include schools (K-12), daycare centers, hospitals, clinics, and facilities that care for the elderly. The nearest school, Baker High School, is approximately 40 miles southwest of the project. The nearest hospital is in Las Vegas, 40 miles to the north-northeast. No sensitive receptors are within six miles of the project.

Although not sensitive receptors, discrete receptors will be placed at the locations of residential trailers at Primm, the prison at Jean, and isolated residential trailers and other homes found in Nipton and other closer isolated locations in Ivanpah Valley.

Modeling Scenarios

Pollutant emissions to the atmosphere from the proposed facility will occur from combustion of natural gas in the boilers, and during periodic testing and emergency use of the engines. Emission rates will be included in the permit application for the project

and will be based on vendor data and additional conservative assumptions of equipment performance.

In the modeling analysis, maximum impacts will be predicted for maximum (100%) load conditions using all available meteorological data (i.e., 2001- 2002 from Jean, Nevada) and coarse grid impacts will be refined with fine grid receptors spaced 25 meters apart.

Ambient Air Quality Impact Analyses – In evaluating the impacts of the proposed project on ambient air quality, we will model the ambient impacts of the project, add those impacts to background concentrations, and compare the results to the state and federal ambient standards for SO_2, NO_2, PM_{10}, $PM_{2.5}$, and CO.

In accordance with USEPA (40 CFR part 51, Appendix W, Sections 11.2.3.2 and 11.2.3.3) guidance, the highest second-highest modeled concentrations will be used to demonstrate compliance with the short-term federal standards and the highest modeled concentration will be used to demonstrate compliance with the federal annual and all state standards.

Class I Area Impact Methodology

The project is not subject to PSD review. Therefore an analysis of air quality impacts at nearby Class I areas will not be conducted for the proposed Ivanpah Project.

Toxics Impact Analysis

A partial multi-pathway health risk assessment (HRA) will be performed to determine the impact of the toxic air pollutant emissions associated with the proposed project. This approach accounts for the four following pathways: inhalation, dermal absorption, soil ingestion, and mother's milk ingestion. This analysis will be performed according to the Office of Environmental Health Hazard Analysis "Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments" (August and October 2003). The HRA modeling will be prepared using CARB's Hotspots Analysis and Reporting Program (HARP) computer program (Version 1.3, October 18, 2005). The HARP model will be used to assess cancer risk as well as non-cancer chronic and acute health hazards.

Because the HARP model incorporates the previously EPA-approved model ISCST3, a special methodology will be employed to be consistent with using AERMOD for the air dispersion modeling and retain the health values and risk computations provided by HARP Version 1.3. The following paragraphs describe the procedures used to prepare this risk assessment are described below.

Modeling Inputs – The risk assessment module of the HARP model will be run using unit ground level impacts to obtain derived cancer risks for each toxic air contaminant

(TAC).[9] Cancer risks will be obtained for the derived (OEHHA) method, the derived (adjusted) method, average point estimate and high-end point estimate options. The HARP model output is cancer risk by TAC and route for each type of analysis, based on an exposure of 1.0 $\mu g/m^3$. Individual cancer risks are expressed in units of risk per $\mu g/m^3$ of exposure. To calculate the weighted risk for each source, the annual average emission rate in g/s for each TAC will be multiplied by the individual cancer risk for that TAC in $(\mu g/m^3)^{-1}$. The resulting weighted cancer risks for each TAC will then be summed for the source. The same approach will be used to determine the non-cancer acute and chronic health hazards associated with the Project.

Risk Analysis Method – The results of the screening modeling will be used to determine the worst-case full load operating conditions for modeling annual and 1-hour averaging periods, which will be used in determining cancer risk and chronic health hazard, and acute health hazard, respectively. The total weighted risk "rate" for each source will be used in place of emission rates in the modeling analysis. The weighted risk "rates" will be used for the HRA modeling. The model calculated value is then total cancer risk, chronic health hazard, or acute health hazard, at each receptor. As discussed earlier, the screening analysis for the criteria pollutant modeling analysis will be performed using the AERMOD model, using full load stack parameters, specific receptor grids, and the 2001 and 2002 Jean, Nevada meteorological data.

The contribution of each TAC to total cancer risk and total chronic and acute health hazard for each analysis method will then be determined using the individual contribution of each TAC to the total weighted risk "rate."

[9] Procedure is described in Part B of Topic 8 of the HARP How-To Guides: How to Perform Health Analyses Using a Ground Level Concentration.

The results of the partial multi-pathway HRA will be summarized as shown in Table 3.

Table 3 Maximum Potential Health Impacts	
Risk Methodology	**SEGS**
Modeled Residential Cancer Risk (Limit = 10 in one million)	
Residential: Derived (OEHHA) Method	
Residential: Average Point Estimate	
Residential: High-end Point Estimate	
Residential: Derived (adjusted) Method	
Modeled Worker Cancer Risk (Limit = 10 in one million)	
Worker Exposure: Derived (OEHHA) Method	
Modeled Non-Cancer Acute and Chronic Impacts (Limit = 1.0)	
Acute Health Hazard Index	
Chronic Health Hazard Index	

The analysis of potential cancer risk described here is extremely conservative because of the following:

- The analysis includes representative weather data over two years to assure that the least favorable conditions producing the highest ground-level concentration of project emissions are included. The analysis then assumes that these worst-case weather conditions will occur every year for 70 years.

- The boilers are assumed to operate at hourly, daily, and annual emission conditions that produce the highest ground-level concentrations.

- The analysis assumes that a sensitive individual is at the location of the highest ground-level concentration of project emissions continuously over the entire 70-year period. In reality, people rarely live in their homes for 70 years, and even if they do, they leave their homes to attend school, go to work, go shopping, and so on. Almost no people reside at all in the area of the proposed project.

The point of using these unrealistic assumptions is to consciously overstate the potential impacts. No one will experience exposures as great as those assumed for this analysis. By determining that even this highly overstated exposure will not be significant, there is a high degree of confidence that the much lower exposures that actual persons will experience will not result in a significant increase in cancer risk. In short, the analysis

assures that there will not be significant public health impacts at any location, under any weather condition, under any operating condition.

Construction Impact Analysis – Emissions due to the construction of the project will be estimated, including an assessment of emissions from vehicle and equipment exhaust and the fugitive dust generated from material handling. Construction emissions from the project will then be modeled for potential air quality impact, using the ISCST3 Gaussian air dispersion model.

Combustion Diesel PM_{10} emission impacts from delivery trucks and other construction equipment will be evaluated to demonstrate that the carcinogenic risk from construction activities will be below ten in one million at all receptors.

4. DISPERSION MODELING REPORT CONTENT AND ORGANIZATION

The results of the total criteria pollutant and TAC modeling will be assembled in a final air dispersion modeling report organized as follows:

Facility Description

Model Options and Input – Includes model options, source parameters, meteorological data, and receptor grid used for modeling.

Modeling Results

- A plot plan showing emission points, nearby buildings (including dimensions), cross-section lines, property lines, fence lines, roads, and UTM coordinates.

- A table showing building heights used in the modeling analysis.

- Modeling summaries of maximum impacts for each air quality model showing meteorological conditions and receptor location and elevation;

- All modeling outputs (including BPIP and meteorological files) in electronic format, together with a description of all filenames (to be provided as an appendix of the report).

- HARP Version 1.3 input and output files (in electronic format).

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Figure 1
Regional Aerial View of the Project Location

Figure 2
Aerial View of the Project Site: Ivanpah Solar Electric Generating Station (Ivanpah SEGS)

Figure 3
Detailed Facility Plot Plan

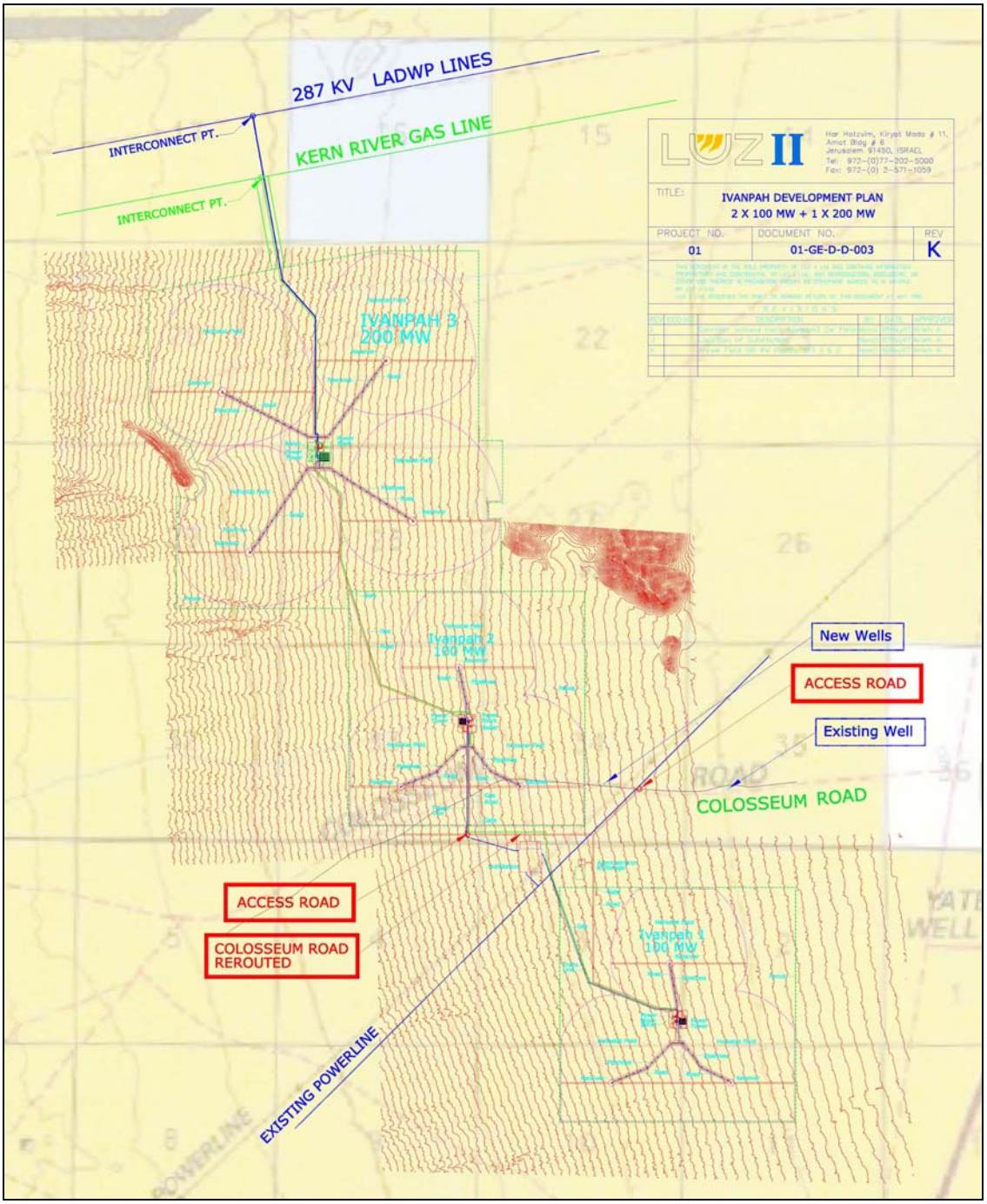
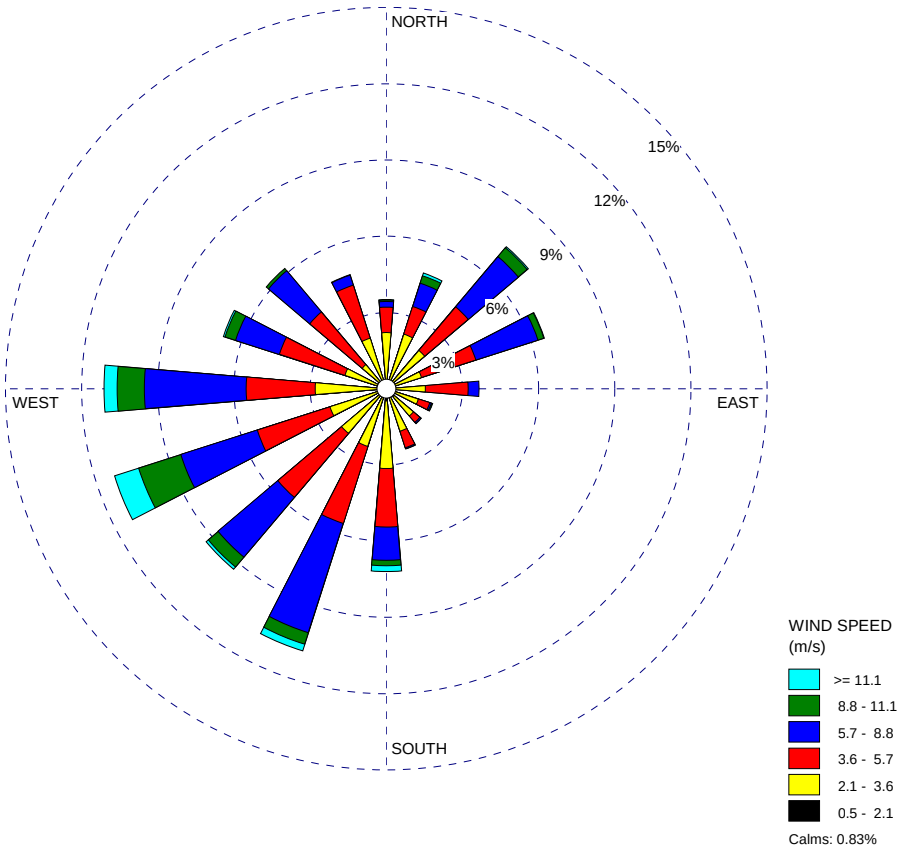


Figure 4
Wind Rose for 2001 Meteorological Data from Jean, NV

WIND ROSE PLOT:
Jean, 2001
Jan., 2001 to Dec., 2001

DISPLAY:
Wind Speed
Direction (blowing from)



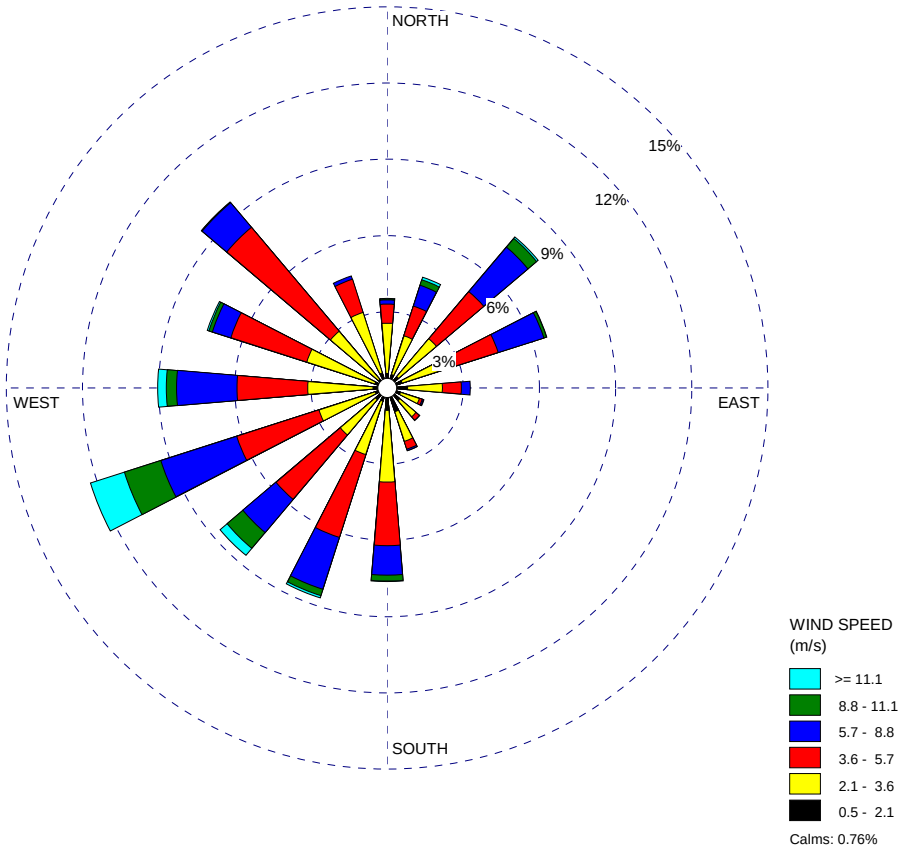
COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2001 **Jan 1 - Dec 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **0.83%**	TOTAL COUNT: **8760 hrs.**	
	AVG. WIND SPEED: **5.14 m/s**	DATE: **6/13/2007**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Figure 5
Wind Rose for 2002 Meteorological Data from Jean, NV

WIND ROSE PLOT:
Jean, 2002
Jan., 2002 to Dec., 2002

DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	2002 **Jan 1 - Dec 31** **00:00 - 23:00**	MODELER:	
	CALM WINDS: **0.76%**	TOTAL COUNT: **8760 hrs.**	
	AVG. WIND SPEED: **4.58 m/s**	DATE: **6/13/2007**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Figure 6
Ambient Monitoring Stations

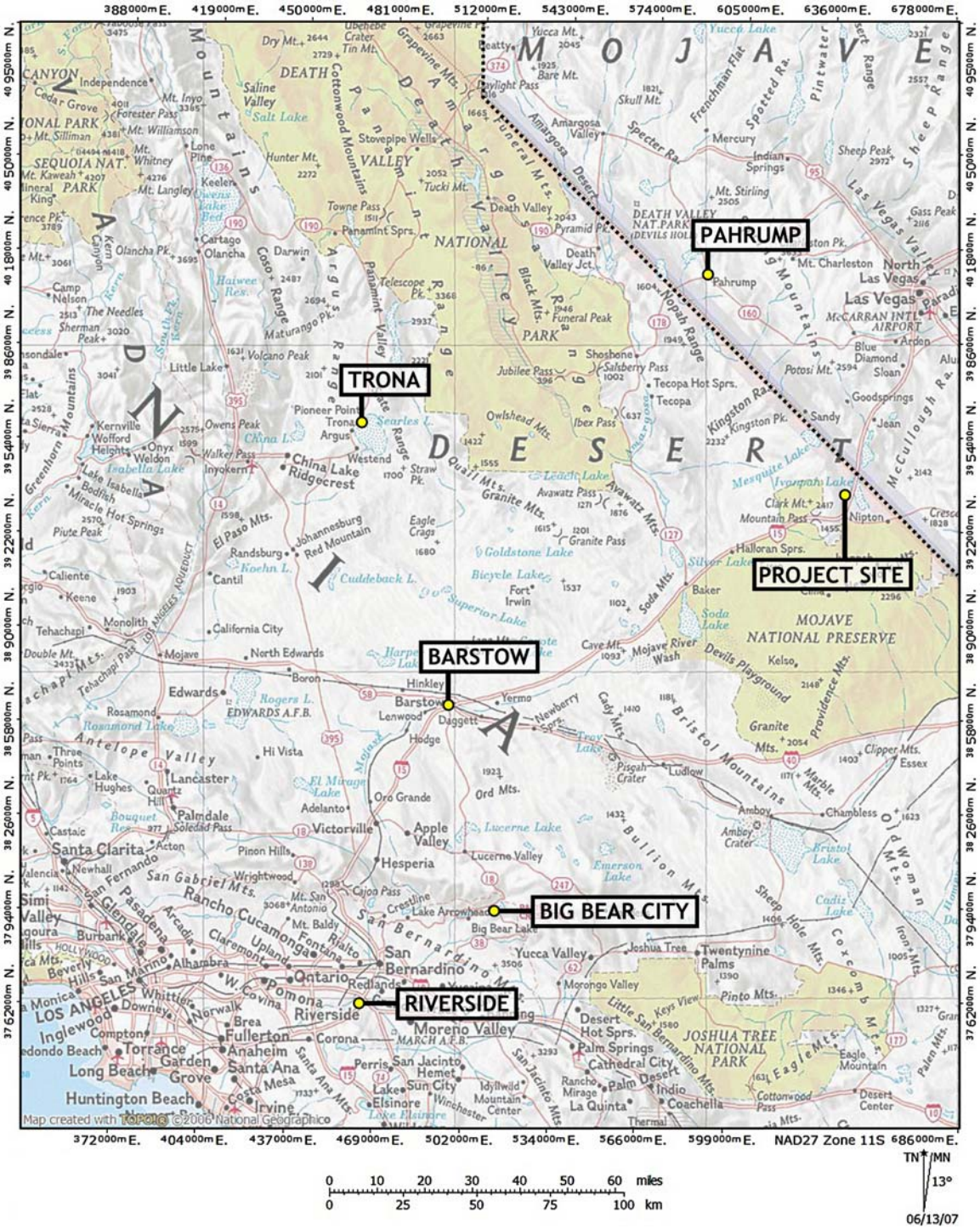
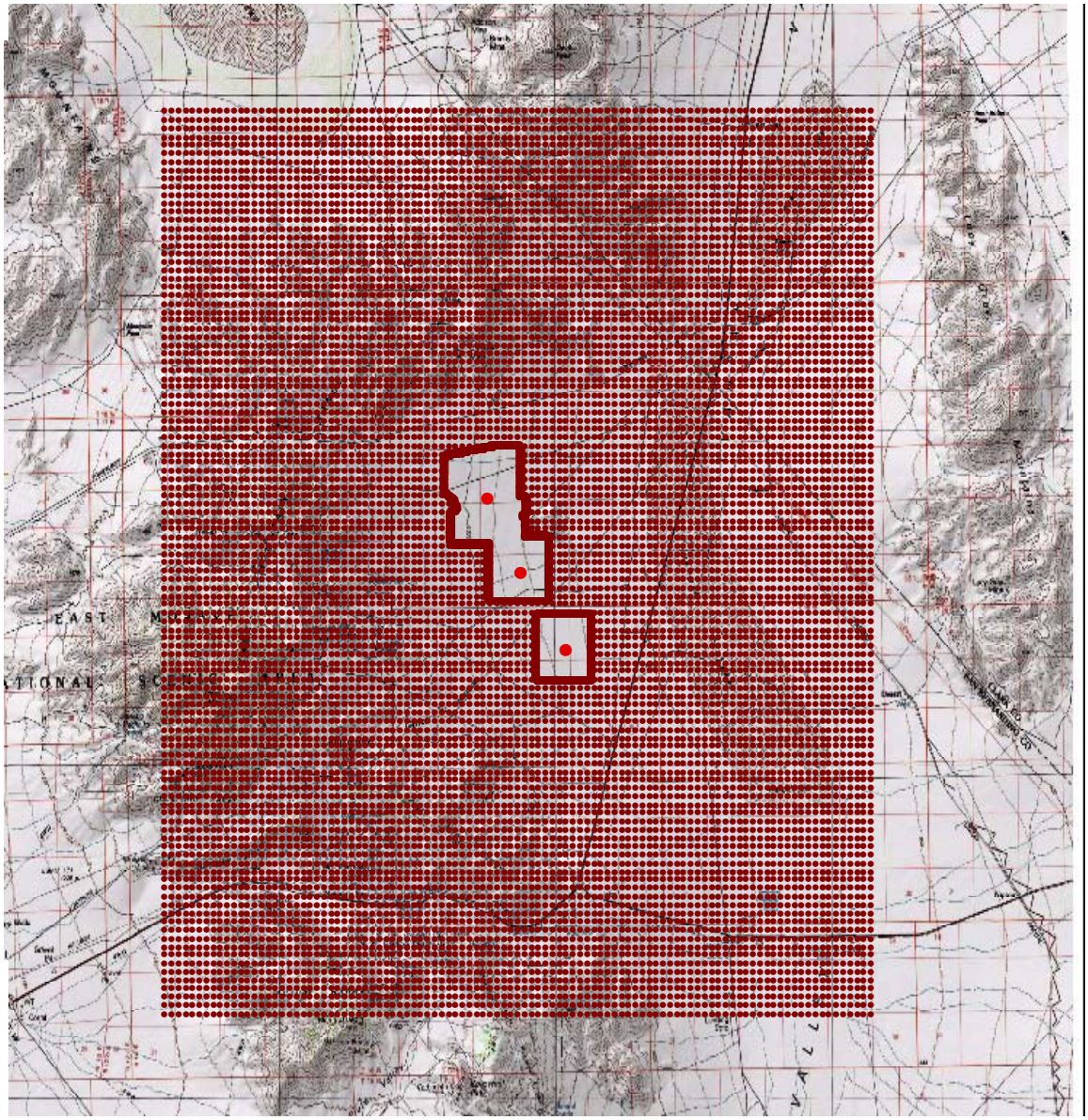



Figure 7
Emission Sources and Receptor Grid