Appendix G
Air Quality Background Data

Appendix G *Air Quality Data and Information*

This appendix contains the following information:

Table G-1: National and California Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[a,c]	National Standards[b]	
			Primary[c,d]	Secondary[c,e]
Ozone (O_3)	1-hour	0.09 ppm (180 µg/m^3)	0.12 ppm (235 µg/m^3)	Same as Primary
	8-hour	0.07 ppm (137 µg/m^3)*	0.08 ppm (157 µg/m^3)	Same as Primary
Respirable Particulate Matter (PM_{10})	24-hour	50 µg/m^3	150 µg/m^3	Same as Primary
	Annual Arithmetic Mean	30 µg/m^3	50 µg/m^3	Same as Primary
Fine Particulate Matter ($PM_{2.5}$)	24-hour	None	65 µg/m^3	Same as Primary
	Annual Arithmetic Mean	12 µg/m^3	15 µg/m^3	Same as Primary
Carbon monoxide	8-hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)	Same as Primary
	1-hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	Same as Primary
	8-hour (Lake Tahoe)	6 ppm (7 mg/m^3)	None	None
Nitrogen dioxide	Annual Arithmetic Mean	None	0.053 ppm (100 µg/m^3)	Same as Primary
	1-hour	0.25 ppm (470 µg/m^3)	None	None
Sulfur dioxide	Annual Arithmetic Mean	None	80 µg/m^3 (0.03 ppm)	None
	24-hour	0.04 ppm (105 µg/m^3)	365 µg/m^3 (0.14 ppm)	None
	3-hour	None	None	1,300 µg/m^3 (0.5 ppm)
	1-hour	0.25 ppm (655 µg/m^3)	None	None
Lead[f]	30-day	1.5 µg/m^3	None	None
	Calendar Quarter	None	1.5 µg/m^3	Same as Primary
Visibility Reducing Particles	8-hour	State Standard: Extinction coefficient of 0.23/km, visibility of 10 miles or more (0.07/km, 30 miles for Lake Tahoe) due to particles when relative humidity is <70%.	No National Standard	
Sulfates	24-hour	25 µg/m^3	None	None
Hydrogen sulfide	1-hour	0.03 ppm (42 µg/m^3)	None	None
Vinyl chloride[f]	24-hour	0.01 ppm (26 µg/m^3)	None	None

* This concentration was approved by the California Air Resources Board on April 28, 2005, and is expected to become effective in early 2006.

µg/m^3 = Micrograms per cubic meter.
mg/m^3 = Milligrams per cubic meter.

Notes on following page.

[a] California standards for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter - PM_{10} and $PM_{2.5}$, and visibility reducing particles, are values that are not to be exceeded. All others are not be to equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in 17 CCR 70200.

[b] National standards (other than ozone, particulate matter, and those based on annual averages or annual arithmetic means), are not to be exceeded more than once a year. New federal 8-hour ozone and fine particulate matter standards were promulgated by U.S. EPA on July 18, 1997. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 µg/m3 is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact U.S.EPA for further clarification and current federal policies.

[c] Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based on a reference temperature of 25°C and a reference pressure of 760 tons (mm of mercury). Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of mercury; ppm in this table refers to parts per million by volume, or micromoles of pollutant per mole of gas.

[d] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[e] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[f] The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

Table G-2: Summary of Local SMAQMD Ozone Data

Year	Days Over Standard			Max. Conc. Recorded (ppm)	
	State	National			
	1-hour (0.09 ppm)	1-hour (0.12 ppm)	8-hour (0.08 ppm)	1-hour	8-hour
2004	0 days	0 days	0 days	0.090 ppm	0.072 ppm
2003	2 days	0 days	1 days	0.097 ppm	0.085 ppm
2002	4 days	0 days	0 days	0.100 ppm	0.081 ppm
2001	5 days	0 days	2 days	0.103 ppm	0.091 ppm
2000	4 days	0 days	1 days	0.099 ppm	0.089 ppm

Data for the Sacramento – 3801 Airport Road monitoring station (California Air Resources Board, 2005) [http://www.arb.ca.gov/adam/]. This station was selected because it is the closest station in Sacramento County to the Annexation Territory.

Table G-3: Summary of Local SMAQMD PM_{10} Data

Year	Est. Days Over Standard		Annual Average		3-Year Average		High 24-hour Average	
	National (150 µg/m^3)	State (50 µg/m^3)	National	State	National	State	National	State
2004	0	0	19.6	20.5		26	47.0	87.1
2003						26	57.0	123.0
2002	0	24.5	25.5	26.0		26	73.0	73.0
2001						23	51.0	53.0
2000						23	73.0	76.0

Data for the Sacramento – 3801 Airport Road monitoring station. This station was selected because it is the closest station in Sacramento County to the Annexation Territory. Note that state and federal results are based on different samplers and/or methods. Blanks mean that there was insufficient data available to determine the value.

Table G-4: Summary of Local Yolo-Solano AQMD Ozone Data

Year	Days Over Standard			Max. Conc. Recorded (ppm)	
	State	National			
	1-hour (0.09 ppm)	1-hour (0.12 ppm)	8-hour (0.08 ppm)	1-hour	8-hour
2004	1 days	0 days	0 days	0.097 ppm	0.073 ppm
2003	3 days	0 days	0 days	0.098 ppm	0.084 ppm
2002	9 days	0 days	4 days	0.110 ppm	0.091 ppm
2001	3 days	0 days	1 days	0.103 ppm	0.089 ppm
2000	3 days	0 days	0 days	0.100 ppm	0.083 ppm

Data for the Yolo-Solano AQMD Woodland-Gibson Road monitoring station (California Air Resources Board, 2005) [http://www.arb.ca.gov/adam/]. This station was selected because it is centrally located in the Annexation Territory.

Table G-5: Summary of Local Yolo-Solano AQMD PM_{10} Data

Year	Est. Days Over Standard		Annual Average		3-Year Average		High 24-hour Average	
	National (150 µg/m^3)	State (50 µg/m^3)	National	State	National	State	National	State
2004	6.1	79.5	34.5	35.2	27	35	169.0	171.0
2003	0		20.7		24	27	55.0	55.0
2002	0	36.8	26.8	27.3	25	27	82.0	86.0
2001	0	19.1	23.8	24.3	27	33	67.0	70.0
2000	0	11.9	23.2	24.1		33	63.0	62.0

Data for the Yolo-Solano AQMD Woodland-Gibson Road monitoring station. This station was selected because it is centrally located in the Annexation Territory. Note that state and federal results are based on different samplers and/or methods. Blanks mean that there was insufficient data available to determine the value.

Table G-6: Air Emissions Inventory Summary

Program Component		Total Daily Emissions (lb/day)			
		HC (ROG)	CO	NO_x	PM_{10}
Construction	**Construction Phase**				
Woodland to Elverta TL	1. Grading/Foundations	4.077	34.850	30.918	0.586
	2. Install Poles	3.781	34.201	21.607	0.569
	3. Install Conductor	2.823	24.026	18.362	0.598
Willow Slough Substation	1. Grading/Underground work	4.097	29.986	33.482	1.102
	2. Foundations	2.116	18.193	15.858	0.292
	3. Install Equipment	1.382	13.141	7.566	0.194
Power Inn Rd. - Hedge TL Recon.	1. Construct foundations	3.849	33.317	27.187	0.573
	2. Install Poles	2.534	22.957	14.262	0.378
	3. Install Conductors	2.048	17.750	12.504	0.390
N. City Interconnection	1. Construct foundations	2.014	17.368	14.900	0.292
	2. Install Poles	1.368	12.902	7.296	0.190
	3. Install Conductors	2.048	17.750	12.504	0.390
Service and Maintenance Operations					
Daily - Service Resp. & Meter Readers		0.258	4.004	2.010	0.068
Weekly - Substation Inspection & Maintenance		0.056	0.885	0.477	0.015
2x/ week - Designers		0.024	0.466	0.028	0.000
Total Operations		0.339	5.355	2.515	0.084
2x Total Operations (for transition period)		0.677	10.711	5.031	0.167
AQMD Thresholds					
SMAQMD Short-term		NA	NA	85	NA
SMAQMD Long-term		65	NA	65	NA
Y-SAQMD		82	NA	82	150

Table G-7: SMUD Yolo Annexation Construction Emissions Inventory Assumptions and Results

EMISSION FACTORS

On-Highway, non-SMUD Vehicles, for Year 2006:

Concrete Trucks

EMFAC2002 Rates for HHD (ALL), 65 F, 40% RH, 45 mph, 30 min length for trip related

	Dist. Related, gram/mile	Trip Related (start+soak) gram/trip
ROG	0.169	3.842
CO	1.307	0
NO_x	12.019	6.608
PM_{10}	0.036	0.002

Pick Up Trucks (non-SMUD)

EMFAC2002 Rates for LDT1(ALL), 65 F, 40% RH, 45 mph, 30 min length for trip related

	Dist. Related, gram/mile	Trip Related (start+soak) gram/trip
ROG	0.592	1.714
CO	10.773	0
NO_x	1.117	1.349
PM_{10}	0.010	0.001

Flat Bed Trucks (non-SMUD)

EMFAC2002 Rates for LHD2(ALL), 65 F, 40% RH, 45 mph, 30 min length for trip related

	Dist. Related, gram/mile	Trip Related (start+soak) gram/trip
ROG	0.089	0.686
CO	1.095	16.174
NO_x	2.973	0.853
PM_{10}	0.039	0.005

Other Construction Equipment:

Drill Rigs

SMAQMP 2004:Table 3-2 factors for 2006

	lb/day
HC	2.21
CO	18.75
NO_x	15.22
PM	0.35

D6 (Crawler Tractor)

SMAQMP 2004:Table 3-2 factors for 2006

	lb/day
HC	1.45
CO	10.35
NO_x	11.12
PM	0.43

Table G-7: (Continued)

Cranes

Sacramento Metropolitan Air Quality Management District, 2004:Table 3-2 factors for 2006

	lb/day
HC	1.44
CO	12.27
NO_x	8.37
PM	0.23

Backhoe

Sacramento Metropolitan Air Quality Management District, 2004:Table 3-2 factors for 2006

	lb/day
HC	0.65
CO	4.64
NO_x	4.98
PM	0.19

Line Tensioner
(Used compressor as surrogate)

SMAQMP 2004:Table 3-2 factors for 2006

	lb/day
HC	0.85
CO	6.06
NO_x	6.51
PM	0.25

Compactor

Sacramento Metropolitan Air Quality Management District, 2004:Table 3-2 factors for 2006

	lb/day
HC	1.84
CO	13.12
NO_x	14.1
PM	0.54

ASSUMPTIONS AND RESULTS

Woodland to Elverta 115-kV Transmission Line

Ph. 1 Grading & Foundations **Results:**

No.	Equip.	Assumed duty cycle or trip data trip/day ea	mi/trip	ROG lb/day	CO lb/day	NO_x lb/day	PM_{10} lb/day
2	drill rigs	80%	active cycle	3.536	30	24.352	0.56
4	pu trucks	4	10	0.2690	3.7967	0.4412	0.0036
5	concr. trks.	4	10	0.2437	0.5758	5.5858	0.0159
2	fl.bed trks.	4	10	0.0278	0.4780	0.5389	0.0070
			TOTALS	**4.077**	**34.850**	**30.918**	**0.586**

Ph. 2 Install Poles **Results:**

No.	Equip.	Assumed duty cycle or trip data trip/day ea	mi/trip	ROG lb/day	CO lb/day	NO_x lb/day	PM_{10} lb/day
3	cranes	80%	active cycle	3.456	29.448	20.088	0.552
4	pu trucks	4	10	0.2690	3.7967	0.4412	0.0036
4	fl.bed trks.	4	10	0.0555	0.9559	1.0778	0.0139
			TOTALS	**3.781**	**34.201**	**21.607**	**0.569**

Table G-7: (Continued)

Ph. 3 Install Conductor **Results:**

No.	Equip.	Assumed duty cycle or trip data trip/day ea	mi/trip		ROG lb/day	CO lb/day	NO_x lb/day	PM lb/day
3	fl.bed trks.	4	10		0.0417	0.7169	0.8084	0.0104
4	pu trucks	4	10		0.2690	3.7967	0.4412	0.0036
1	crane	80% active cycle			1.152	9.816	6.696	0.184
2	line tens.	80% active cycle			1.36	9.696	10.416	0.4
	(note: used air compressor as surrogate)			**TOTALS**	**2.823**	**24.026**	**18.362**	**0.598**

Willow Slough Substation

Ph. 1 Grading, Underground Work **Results:**

No.	Equip.	Assumed duty cycle or trip data trip/day ea	mi/trip		ROG lb/day	CO lb/day	NO_x lb/day	PM_{10} lb/day
1	D6 tractor	80% active cycle			1.16	8.28	8.896	0.344
2	backhoe	80% active cycle			1.04	7.424	7.968	0.304
1	compactor	80% active cycle			1.472	10.496	11.28	0.432
4	concr. trks.	4	10		0.1950	0.4606	4.4687	0.0128
2	fl.bed trks.	4	10		0.0278	0.4780	0.5389	0.0070
3	pu trucks	4	10		0.2018	2.8475	0.3309	0.0027
				TOTALS	**4.097**	**29.986**	**33.482**	**1.102**

Ph. 2 Foundations **Results:**

No.	Equip.	Assumed duty cycle or trip data trip/day ea	mi/trip		ROG lb/day	CO lb/day	NO_x lb/day	PM_{10} lb/day
1	drill rig	80% active cycle			1.768	15	12.176	0.28
3	concr. trks.	4	10		0.1462	0.3455	3.3515	0.0096
3	pu trucks	4	10		0.2018	2.8475	0.3309	0.0027
				TOTALS	**2.116**	**18.193**	**15.858**	**0.292**

Ph. 3 Install Equipment **Results:**

No.	Equip.	Assumed duty cycle or trip data trip/day ea	mi/trip		ROG lb/day	CO lb/day	NO_x lb/day	PM_{10} lb/day
1	crane	80% active cycle			1.152	9.816	6.696	0.184
3	pu trucks	4	10		0.2018	2.8475	0.3309	0.0027
2	fl.bed trks.	4	10		0.0278	0.4780	0.5389	0.0070
				TOTALS	**1.382**	**13.141**	**7.566**	**0.194**

Table G-7: (Continued)

Power Inn Rd. to Hedge TL Reconstruction

Ph. 1 Construct Foundations **Results:**

No.	Equip.	Assumed duty cycle or trip data trip/day ea	mi/trip		ROG lb/day	CO lb/day	NO_x lb/day	PM_{10} lb/day
2	drill rig	80%	active cycle		3.536	30	24.352	0.56
2	concr. trks.	4	10		0.0975	0.2303	2.2343	0.0064
3	pu trucks	4	10		0.2018	2.8475	0.3309	0.0027
1	fl.bed trks.	4	10		0.0139	0.2390	0.2695	0.0035
				TOTALS	**3.849**	**33.317**	**27.187**	**0.573**

Ph. 2 Install Poles **Results:**

No.	Equip.	Assumed duty cycle or trip data trip/day ea	mi/trip		ROG lb/day	CO lb/day	NO_x lb/day	PM_{10} lb/day
2	cranes	80%	active cycle		2.304	19.632	13.392	0.368
3	pu trucks	4	10		0.2018	2.8475	0.3309	0.0027
2	fl.bed trks.	4	10		0.0278	0.4780	0.5389	0.0070
				TOTALS	**2.534**	**22.957**	**14.262**	**0.378**

Ph. 3 String Conductor **Results:**

No.	Equip.	Assumed duty cycle or trip data trip/day ea	mi/trip		ROG lb/day	CO lb/day	NO_x lb/day	PM_{10} lb/day
1	crane	80%	active cycle		1.152	9.816	6.696	0.184
1	line tens.	80%	active cycle		0.68	4.848	5.208	0.2
1	fl.bed trks.	4	10		0.0139	0.2390	0.2695	0.0035
3	pu trucks	4	10		0.2018	2.8475	0.3309	0.0027
				TOTALS	**2.048**	**17.750**	**12.504**	**0.390**

North City Interconnections

Ph. 1 Construct Foundations **Results:**

No.	Equip.	Assumed duty cycle or trip data trip/day ea	mi/trip		ROG lb/day	CO lb/day	NO_x lb/day	PM_{10} lb/day
1	drill rig	80%	active cycle		1.768	15	12.176	0.28
2	concr. trks.	4	10		0.0975	0.2303	2.2343	0.0064
2	pu trucks	4	10		0.1345	1.8983	0.2206	0.0018
1	fl.bed trks.	4	10		0.0139	0.2390	0.2695	0.0035
				TOTALS	**2.014**	**17.368**	**14.900**	**0.292**

Table G-7: (Continued)

Ph. 2 Install Poles					**Results:**			
		Assumed duty cycle or trip data						
No.	Equip.	trip/day ea	mi/trip		ROG lb/day	CO lb/day	NO_x lb/day	PM_{10} lb/day
1	cranes	80%	active cycle		1.152	9.816	6.696	0.184
3	pu trucks	4	10		0.2018	2.8475	0.3309	0.0027
1	fl.bed trks.	4	10		0.0139	0.2390	0.2695	0.0035
				TOTALS	**1.368**	**12.902**	**7.296**	**0.190**
Ph.3 Install Conductors					**Results:**			
		Assumed duty cycle or trip data						
No.	Equip.	trip/day ea	mi/trip		ROG lb/day	CO lb/day	NO_x lb/day	PM_{10} lb/day
1	crane	80%	active cycle		1.152	9.816	6.696	0.184
1	line tens.	80%	active cycle		0.68	4.848	5.208	0.2
1	fl.bed trks.	4	10		0.0139	0.2390	0.2695	0.0035
3	pu trucks	4	10		0.2018	2.8475	0.3309	0.0027
				TOTALS	**2.048**	**17.750**	**12.504**	**0.390**

Table G-8: Service and Maintenance Emissions

SERVICE AND MAINTENANCE EMISSIONS																
Estimate of Mean Trip Distance:																
			Dist. From	Dist. Frac.												
Populations		Frac.	SMUD mi.													
Woodland	52,500	0.34	26	8.8												
Davis	64,500	0.42	18	7.5												
W. Sac	38,000	0.25	8	2.0												
Tot	155,000	1		18.26	mean population weighted travel distance											
					used for all trip types except to substation											
Vehicle & Trip List from SMUD:																
									SMUD Empirical Mean Emission Factors g/mi				**Daily Emissions lb/day**[a]			
Daily						back-forth[b]	in area[c]	Total								
				1-way	mean	mean	miles	Mean	HC	CO	NO_x	PM	**HC**	**CO**	**NO_x**	**PM**
No. trips	Veh. Type			trips	trips/day	VMT/day		VMT/day								
2	Line Truck (heavy)			4	4.0	73.0	10.0	83.0	0.409	2.477	8.699	0.373	0.075	0.453	1.591	0.068
2	Foreman Truck (1 ton)			4	4.0	73.0	10.0	83.0	0.358	5.993	1.048	0	0.065	1.096	0.192	0.000
2	Trouble Shooter (van)			4	4.0	73.0	20.0	93.0	0.217	5.099	0.65	0	0.044	1.045	0.133	0.000
3	Meter Reader (pu)			6	6.0	109.5	20.0	129.5	0.257	4.941	0.331	0	0.073	1.410	0.094	0.000
												Subtotal	0.258	4.004	2.010	0.068
1 Trip Every Week																
1	Substation Truck (heavy) 22 mi			2	0.4	8.8	10.0	18.8	0.409	2.477	8.699	0.373	0.017	0.103	0.360	0.015
1	Foreman Truck (1 ton)			2	0.4	7.3	20.0	27.3	0.358	5.993	1.048	0	0.022	0.360	0.063	0.000
1	Substation Technician (van) 22			2	0.4	8.8	10.0	18.8	0.217	5.099	0.65	0	0.009	0.211	0.027	0.000
1	Substation Reader (van) 22			2	0.4	8.8	10.0	18.8	0.217	5.099	0.65	0	0.009	0.211	0.027	0.000
												Subtotal	0.056	0.885	0.477	0.015
2 Trips Per Week																
2	Designer (sedan)			4	1.6	29.2	20.0	49.2	0.222	4.3	0.258	0	0.024	0.466	0.028	0.000
	TOTALS				21.2	391.6	130.0	521.6	NA	NA	NA	NA	**0.3**	**5.4**	**2.5**	**0.1**

[a] Based on vehicle emissions measured by SMUD in 2005.
[b] Based on distance from SMUD vehicle yard to each of the affected jurisdictions.
[c] Assumed travel distance for service calls.

Assume for 6 months before and 1 year after the number of daily trips will be 2x.