APPENDIX F

PUBLIC HEALTH

Toxic Air Contaminant Emission Calculations For the Larkspur 3 Energy Facility Project

Toxic Air Contaminant Emissions from Turbine

Max Fuel Flow LHV	**428.6**	**MMBtu/hr**
Max Fuel Flow HHV	**474.4**	**MMBtu/hr**
Maximum annual hours of operation	**4090**	**hr/yr**

Total operations hours include startups and shutdowns

Operations Fuel Flow based on Case 106 - 38°F, 100% load

Pollutant	**CAS**	**Emission Factor (lb/MMcf)[a]**	**Emission Factor (lb/MMBtu)[b]**	**Maximum Hourly Emission Rate (lb/hr)**	**Annual Emission Rate (lb/yr)**
Ammonia [c]	7664417			3.21	1.31E+04
1,3-Butadiene	106990	0.0004	3.92E-07	1.86E-04	7.61E-01
Acetaldehyde	75070	0.0408	4.00E-05	1.90E-02	7.76E+01
Acrolein	107028	0.0065	6.37E-06	3.02E-03	1.24E+01
Benzene	71432	0.0122	1.20E-05	5.67E-03	2.32E+01
Ethylbenzene	100414	0.0326	3.20E-05	1.52E-02	6.20E+01
Formaldehyde	50000	0.7242	7.10E-04	3.37E-01	1.38E+03
Naphthalene	91203	0.0013	1.27E-06	6.05E-04	2.47E+00
PAHs (other than naphthalene)	1151	0.0022	2.16E-06	1.02E-03	4.18E+00
Toluene	108883	0.1326	1.30E-04	6.17E-02	2.52E+02
Xylenes	1330207	0.0004386	4.30E-07	2.04E-04	8.34E-01

Notes:

[a] Emission factors obtained from SDAPCD (T10 - TURBINE, NATURAL GAS FIRED, ALL SIZES, WITH WATER INJECTION & SELECTIVE CATALYTIC REDUCTION (SCR)) based on US EPA AP-42 Table 3.1-3 for natural gas-fired stationary turbines

[b] Used a HHV of 1020 Btu/scf.

[c] Ammonia emission rate based on an exhaust NH3 limit of 5 ppmv @ 15% O2

Toxic Air Contaminant Emissions from Black Start Engine

Rated Horsepower	**805**	**bhp**
Fuel Consumption	**7098**	**Btu/bhp-hr**
Heat Input (HHV)	**5.71**	**MMBtu/hr**
Maximum Hourly usage	**30**	**minutes**
Expected non-emergency usage	**24**	**hr/yr**

Fuel consumption based on Caterpillar specification for 600 kW engine generator, G3512.

Pollutant	**CAS**	**Emission Factor (lb/MMcf)[a]**	**Emission Factor (lb/MMBtu)[b]**	**Hourly Emission Rate (lb/hr)**	**Annual Emission Rate (lb/yr)**
1,3-Butadiene	106990	0.27	2.65E-04	7.56E-04	3.63E-02
Acetaldehyde	75070	8.53	8.36E-03	2.39E-02	1.15E+00
Acrolein [c]	107028	0.10	9.80E-05	2.80E-04	1.34E-02
Benzene	71432	0.45	4.41E-04	1.26E-03	6.05E-02
Ethylbenzene	100414	0.04	3.92E-05	1.12E-04	5.38E-03
Formaldehyde	50000	53.86	5.28E-02	1.51E-01	7.24E+00
Hexane	110543	1.13	1.11E-03	3.16E-03	1.52E-01
Methanol	67561	2.55	2.50E-03	7.14E-03	3.43E-01
Methylene Chloride	75092	0.02	1.96E-05	5.60E-05	2.69E-03
Naphthalene	91203	0.08	7.84E-05	2.24E-04	1.08E-02
PAHs (other than naphthalene)	1151	0.03	2.94E-05	8.40E-05	4.03E-03
Phenol	108952	0.02	1.96E-05	5.60E-05	2.69E-03
Toluene	108883	0.42	4.12E-04	1.18E-03	5.64E-02
Xylenes	1330207	0.19	1.86E-04	5.32E-04	2.55E-02

Notes:

[a] Emission factors obtained from SDAPCD (E15 - ENGINES, NATURAL GAS FIRED, 4 STROKE, LEAN BURN, UNCONTROLLED) based on US EPA AP-42 Table 3.2-2 for natural gas 4-STROKE LEAN-BURN ENGINES

[b] Used a HHV of 1020 Btu/scf.

[c] District emission factor based on SDAPCD source test results.

Toxic Air Contaminant Emission Calculations For the Existing Larkspur Energy Facility Units 1 and 2 Turbines

Toxic Air Contaminant Emissions from Turbine Units 1 & 2

Max Fuel Flow HHV	**463.5**	**MMBtu/hr**
Maximum annual hours of operation	**5950**	**hr/yr**

Total operations hours include startups and shutdowns
Maximum Operations Fuel Flow from Permit

Pollutant	**CAS**	**Emission Factor (lb/MMcf)[a]**	**Emission Factor (lb/MMBtu)[b]**	**Maximum Hourly Emission Rate (lb/hr)**	**Annual Emission Rate (lb/yr)**
Ammonia [c]	7664417			6.2	3.69E+04
1,3-Butadiene	106990	0.0004	3.92E-07	1.82E-04	1.08E+00
Acetaldehyde	75070	0.0408	4.00E-05	1.85E-02	1.10E+02
Acrolein	107028	0.0065	6.37E-06	2.95E-03	1.76E+01
Benzene	71432	0.0122	1.20E-05	5.54E-03	3.30E+01
Ethylbenzene	100414	0.0326	3.20E-05	1.48E-02	8.81E+01
Formaldehyde	50000	0.7242	7.10E-04	3.29E-01	1.96E+03
Naphthalene	91203	0.0013	1.27E-06	5.91E-04	3.51E+00
PAHs (other than naphthalene)	1151	0.0022	2.16E-06	1.00E-03	5.95E+00
Toluene	108883	0.1326	1.30E-04	6.03E-02	3.59E+02
Xylenes	1330207	0.0004386	4.30E-07	1.99E-04	1.19E+00

Notes:

[a] Emission factors obtained from SDAPCD (T10 - TURBINE, NATURAL GAS FIRED, ALL SIZES, WITH WATER INJECTION & SELECTIVE CATALYTIC REDUCTION (SCR)) based on US EPA AP-42 Table 3.1-3 for natural gas-fired stationary turbines

[b] Used a HHV of 1020 Btu/scf.

[c] Ammonia emission rate based on an exhaust NH_3 limit of 10 ppmv @ 15% O_2 (from permit)