APPENDIX C

GENERATING STATION OPERATING TOXIC POLLUTANT EMISSIONS

- **Gas Turbine Toxic Pollutant Estimates**
- **Cooling Tower Toxic Pollutant Estimates**

Toxic Emission Estimates and Health Risk Assessment Information
Maximally Exposed Individual (MEI)

Facility Information:

Riverside ERC

Equipment Information (per turbine):

Unit	Rating MMBTU	Load (%)	Hrs/Yr	Fuel (cfh)	Fuel (MMcfh)
Turbine	490	100	1300	480392	0.48039

Equipment Information (per cooling tower):

Unit	Rating (gpm)	Drift Rate (%)	TDS (ppm)	Hrs/Yr
Cooling Tower	5590	0.001	-	1300

Number of Turbines: 2

Turbine Toxic Emissions Information:

Compound	Factor (lb/MMcf)	Control Efficiency (%)	Emissions (per turbine)			Emissions (total)			Emission Factor Source
			(lb/hr)	(lb/yr)	(tons/yr)	(lb/hr)	(lb/yr)	(tons/yr)	
Acetaldehyde	4.10E-02	85%	2.95E-03	3.84E+00	1.92E-03	5.91E-03	7.68E+00	3.84E-03	AP-42
Acrolein	6.49E-03	85%	4.68E-04	6.08E-01	3.04E-04	9.35E-04	1.22E+00	6.08E-04	AP-42
Ammonia	7.12	-	3.33E+00	4.32E+03	2.16E+00	6.65E+00	8.65E+03	4.32E+00	Manufacturer
Benzene	1.20E-02	85%	8.65E-04	1.12E+00	5.62E-04	1.73E-03	2.25E+00	1.12E-03	AP-42
Butadiene (1,3)	4.38E-04	85%	3.16E-05	4.10E-02	2.05E-05	6.31E-05	8.21E-02	4.10E-05	AP-42
Ethylbenzene	3.27E-02	85%	2.36E-03	3.06E+00	1.53E-03	4.71E-03	6.13E+00	3.06E-03	AP-42
Formaldehyde	7.23E-01	85%	5.21E-02	6.77E+01	3.39E-02	1.04E-01	1.35E+02	6.77E-02	AP-42
Hexane	2.59E-01	85%	1.87E-02	2.43E+01	1.21E-02	3.73E-02	4.85E+01	2.43E-02	CATEF
Napthalene	1.30E-03	85%	9.37E-05	1.22E-01	6.09E-05	1.87E-04	2.44E-01	1.22E-04	AP-42
PAH'S (No Napthalene)	2.27E-03	85%	1.64E-04	2.13E-01	1.06E-04	3.27E-04	4.25E-01	2.13E-04	AP-42
Propylene	2.00E+00	85%	1.44E-01	1.87E+02	9.37E-02	2.88E-01	3.75E+02	1.87E-01	CATEF
Propylene Oxide	4.78E-02	85%	3.44E-03	4.48E+00	2.24E-03	6.89E-03	8.96E+00	4.48E-03	CATEF
Toluene	1.37E-01	85%	9.87E-03	1.28E+01	6.42E-03	1.97E-02	2.57E+01	1.28E-02	AP-42
Xylene	6.50E-02	85%	4.68E-03	6.09E+00	3.04E-03	9.37E-03	1.22E+01	6.09E-03	AP-42

Number of Cooling Tower: 1 **(3 Cells Combined)**

Cooling Tower Toxic Emissions Information:

Compound	Concentration (ppmW)	Drift Rate (%)	Emissions (per tower)			Emissions (total)			Emission Factor Source
			(lb/hr)	(lb/yr)	(tons/yr)	(lb/hr)	(lb/yr)	(tons/yr)	
Arsenic	0.018	0.001	5.04E-07	6.55E-04	3.27E-07	5.04E-07	6.55E-04	3.27E-07	Typical Analysis
Cadmium	0.003	0.001	8.39E-08	1.09E-04	5.45E-08	8.39E-08	1.09E-04	5.45E-08	Typical Analysis
Chloride	0.201	0.001	5.62E-06	7.31E-03	3.65E-06	5.62E-06	7.31E-03	3.65E-06	Typical Analysis
Chromium	0.015	0.001	4.20E-07	5.45E-04	2.73E-07	4.20E-07	5.45E-04	2.73E-07	Typical Analysis
Chromium (hexavalent)	0.005	0.001	1.40E-07	1.82E-04	9.09E-08	1.40E-07	1.82E-04	9.09E-08	Typical Analysis
Copper	0.081	0.001	2.27E-06	2.95E-03	1.47E-06	2.27E-06	2.95E-03	1.47E-06	Typical Analysis
Dichloroethene	0.013	0.001	3.64E-07	4.73E-04	2.36E-07	3.64E-07	4.73E-04	2.36E-07	Typical Analysis
Lead	0.012	0.001	3.36E-07	4.36E-04	2.18E-07	3.36E-07	4.36E-04	2.18E-07	Typical Analysis
Manganese	0.054	0.001	1.51E-06	1.96E-03	9.82E-07	1.51E-06	1.96E-03	9.82E-07	Typical Analysis
Nickel	0.015	0.001	4.20E-07	5.45E-04	2.73E-07	4.20E-07	5.45E-04	2.73E-07	Typical Analysis
Trichloroethene	0.010	0.001	2.80E-07	3.64E-04	1.82E-07	2.80E-07	3.64E-04	1.82E-07	Typical Analysis
Zinc	0.321	0.001	8.98E-06	1.17E-02	5.84E-06	8.98E-06	1.17E-02	5.84E-06	Typical Analysis

Notes:

- Emission Factor Source - US EPA AP-42, July 2000, Section 3.2 (Based on 1020 HHV) and CalARB CATEF.
- Spreadsheet Revised 2/01/04
- PAH includes speciated compounds except naphthalene.

Table 5.8-6
Non-Criteria Emissions from the Cooling Towers
KRCDPP

Pollutant	HAP or Non-Criteria Pollutant	Pollutant Concentration (mg/l)	Circulation Water Rate per Cell (gpm)	Cooling Tower Drift Rate (%)	Maximum Annual Operating Hours	Emission Rate 1 Cell (lbs/hr)	Emission Rate 4 Cells (lbs/hr)	Emission Rate 1 Cell (tons/year)	Emission Rate 4 Cells (tons/year)
Barium	No	0.28	2000	0.001	3120	2.804E-06	1.121E-05	4.374E-06	1.75E-05
Bicarbonate	No	800	2000	0.001	3120	0.0080106	0.0320425	0.0124966	0.0499864
Bromide	No	0.332	2000	0.001	3120	3.324E-06	1.33E-05	5.186E-06	2.074E-05
Calcium	No	220	2000	0.001	3120	0.0022029	0.0088117	0.0034366	0.0137462
Chloride	Yes	108	2000	0.001	3120	0.0010814	0.0043257	0.001687	0.0067482
Chromium	Yes	0.064	2000	0.001	3120	6.409E-07	2.563E-06	9.997E-07	3.999E-06
Magnesium	No	104	2000	0.001	3120	0.0010414	0.0041655	0.0016246	0.0064982
Nitrate	No	128	2000	0.001	3120	0.0012817	0.0051268	0.0019995	0.0079978
Potassium	No	16	2000	0.001	3120	0.0001602	0.0006409	0.0002499	0.0009997
Silica	No	156	2000	0.001	3120	0.0015621	0.0062483	0.0024368	0.0097473
Sodium	No	124	2000	0.001	3120	0.0012416	0.0049666	0.001937	0.0077479
Strontium	Yes	1.2	2000	0.001	3120	1.202E-05	4.806E-05	1.874E-05	7.498E-05
Sulfate	Yes	68	2000	0.001	3120	0.0006809	0.0027236	0.0010622	0.0042488
Totals						0.0172817	0.0691268	0.0269595	0.1078378

Notes:
There are two cooling towers, each with two cells.
Constituents are listed to develop the maximum solids emissions rate (assumed as PM10) from the cooling towers.

Acronyms:
mg/l – milligrams per liter
gpm –gallons per minute

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Project: RPU-ERC
Project # 2248-2201 Date: 3/2/04
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NH_3 Emissions

MW = 17.03
Slip = 5 ppmv @ 15% O_2
O_2 = 14.38%
Flow = 228,014 DSCFM

ACTUAL NH_3 Concentration

$$= 5\text{ ppmv} \times \frac{20.9 - 14.38}{20.9 - 15}$$

$$= 5.525 \text{ ppmv @ } 14.38\% \ O_2$$

$$NH_3 \text{ LB/hr} = \text{ppmv(actual)} \times MW \times 1.557E^{-07} \times \text{DSCFM}$$

$$= 5.525 \text{ ppmv} \times 17.03 \times 1.557E^{-07} \times 228{,}014 \text{ DSCFM}$$

$$= \underline{3.325 \text{ LB/hr.}}$$