

10/8/2003

Matrix #4**Statewide TRU PM Emissions**

Scenario #2: LETRU & ULETRU = Full Cryogenic Refrigeration to LETRU & ULETRU, 1200 Hr/Yr. Scenario (revised to equalize effectiveness against lower and upper emission benefit of reg; also changed to reflect non-use w/ TRU gen sets.) (used to calculate Alternative 2 C/E)

Em = Em Rate*Pop*Activity*Avg HP*Load Fctr

<15 hp

Activity = 1038hr/yr, Avg HP = 10 hp, Load Fctr = 0.64

Em = Em Rate*Pop*1038*10*.64

| Year | Population | Emissions | | Emissions | |
|------|------------|-----------------------------|--------------------------------|------------------------|--------------------------|
| | | Avg Em Fctr New Std Only | Avg Em Fctr New&In-Use Stds | (tpd) New Stds Only | (tpd) New&In-Use Stds |
| 2000 | 4623 | 0.87 | 0.87 | 0.080 | 0.080 |
| 2001 | 4449 | 0.86 | 0.86 | 0.077 | 0.077 |
| 2002 | 4501 | 0.83 | 0.83 | 0.075 | 0.075 |
| 2003 | 4557 | 0.81 | 0.81 | 0.074 | 0.074 |
| 2004 | 4623 | 0.79 | 0.79 | 0.073 | 0.073 |
| 2005 | 4701 | 0.76 | 0.76 | 0.072 | 0.072 |
| 2006 | 4787 | 0.74 | 0.74 | 0.071 | 0.071 |
| 2007 | 4879 | 0.72 | 0.72 | 0.070 | 0.070 |
| 2008 | 4974 | 0.67 | 0.58 | 0.067 | 0.058 |
| 2009 | 5067 | 0.62 | 0.55 | 0.063 | 0.056 |
| 2010 | 5174 | 0.57 | 0.48 | 0.059 | 0.050 |
| 2011 | 5307 | 0.53 | 0.42 | 0.056 | 0.044 |
| 2012 | 5449 | 0.48 | 0.36 | 0.053 | 0.039 |
| 2013 | 5621 | 0.45 | 0.30 | 0.050 | 0.034 |
| 2014 | 5822 | 0.42 | 0.25 | 0.049 | 0.029 |
| 2015 | 6068 | 0.39 | 0.21 | 0.048 | 0.025 |
| 2016 | 6354 | 0.37 | 0.19 | 0.047 | 0.024 |
| 2017 | 6635 | 0.35 | 0.19 | 0.047 | 0.026 |
| 2018 | 6935 | 0.34 | 0.19 | 0.047 | 0.027 |
| 2019 | 7248 | 0.33 | 0.19 | 0.047 | 0.028 |
| 2020 | 7578 | 0.32 | 0.19 | 0.048 | 0.029 |

15-25 hp

Activity = 1038hr/yr, Avg HP = 17 hp, Load Fctr = 0.64

Em = Em Rate*Pop*1038*17*.64

| Year | Population | Emissions | | Emissions | |
|------|------------|-----------------------------|--------------------------------|------------------------|--------------------------|
| | | Avg Em Fctr New Std Only | Avg Em Fctr New&In-Use Stds | (tpd) New Stds Only | (tpd) New&In-Use Stds |
| 2000 | 1947 | 0.87 | 0.87 | 0.058 | 0.058 |
| 2001 | 1898 | 0.86 | 0.86 | 0.055 | 0.055 |
| 2002 | 1897 | 0.83 | 0.83 | 0.054 | 0.054 |
| 2003 | 1899 | 0.81 | 0.81 | 0.052 | 0.052 |
| 2004 | 1905 | 0.79 | 0.79 | 0.051 | 0.051 |
| 2005 | 1914 | 0.77 | 0.77 | 0.050 | 0.050 |
| 2006 | 1927 | 0.74 | 0.74 | 0.049 | 0.049 |
| 2007 | 1945 | 0.72 | 0.72 | 0.048 | 0.048 |
| 2008 | 1961 | 0.67 | 0.58 | 0.045 | 0.039 |
| 2009 | 1973 | 0.63 | 0.55 | 0.042 | 0.037 |
| 2010 | 1989 | 0.58 | 0.49 | 0.039 | 0.033 |
| 2011 | 2012 | 0.53 | 0.42 | 0.037 | 0.029 |
| 2012 | 2040 | 0.49 | 0.36 | 0.034 | 0.025 |
| 2013 | 2073 | 0.46 | 0.30 | 0.032 | 0.021 |
| 2014 | 2112 | 0.43 | 0.25 | 0.031 | 0.018 |
| 2015 | 2167 | 0.40 | 0.20 | 0.030 | 0.015 |
| 2016 | 2231 | 0.38 | 0.18 | 0.029 | 0.014 |
| 2017 | 2296 | 0.36 | 0.18 | 0.028 | 0.014 |
| 2018 | 2364 | 0.34 | 0.19 | 0.028 | 0.015 |
| 2019 | 2434 | 0.33 | 0.19 | 0.027 | 0.015 |
| 2020 | 2507 | 0.32 | 0.19 | 0.027 | 0.016 |

Relative Emission Reduction Effectiveness Compared to Limits of Reg

| Year | Em. Red. Alt.2 (tpd) | Em. Red. Reg. (low end, tpd) | Em. Red. Reg. (high end, tpd) | % More Effect. | % More Effect. |
|--------------|-------------------------|---------------------------------|----------------------------------|----------------|----------------|
| | | | | Than Reg. (l) | Than Reg. (h) |
| 2008 | 1.875 | 0.498 | 0.948 | 276 | 98 |
| 2009 | 1.719 | 0.416 | 0.853 | 313 | 102 |
| 2010 | 1.571 | 0.237 | 0.733 | 563 | 114 |
| 2011 | 1.437 | 0.234 | 0.684 | 514 | 110 |
| 2012 | 1.314 | 0.474 | 0.681 | 177 | 93 |
| 2013 | 1.140 | 0.5 | 0.639 | 128 | 78 |
| 2014 | 0.990 | 0.538 | 0.618 | 84 | 60 |
| 2015 | 0.872 | 0.61 | 0.593 | 43 | 47 |
| 2016 | 0.768 | 0.599 | 0.549 | 28 | 40 |
| 2017 | 0.673 | 0.55 | 0.497 | 22 | 36 |
| 2018 | 0.588 | 0.513 | 0.458 | 15 | 28 |
| 2019 | 0.513 | 0.488 | 0.43 | 5 | 19 |
| 2020 | 0.448 | 0.474 | 0.348 | -6 | 29 |
| Total (tpd): | 13.907 | | | | |

Tot. PM Red.(lb) 10152397

Matrix #4

25-50 hp TRUs, reefer railcars, gen sets

Activity = 1465hr/yr, Avg HP = 34 hp, Load Fctr = 0.53

Em = Em Rate*Pop*1465*34*.53

| Year | CA-Based Population | Out-of-State Population | Reefer Railcar Population | CA Gen Set Population | OOS Gen Set Population | Total 25-50 hp Population | Avg Em Fctr New Stds Only | Avg Em Fctr New&In-Use Stds | Emissions (tpd) New Stds Only | Emissions (tpd) New&In-Use Stds |
|------|---------------------|-------------------------|---------------------------|-----------------------|------------------------|---------------------------|------------------------------|--------------------------------|-------------------------------------|---------------------------------------|
| | | | | | | | | | | |
| 2000 | 22772 | 7591 | 1678 | 0 | 0 | 32041 | 0.98 | 0.98 | 2.501 | 2.501 |
| 2001 | 22606 | 7535 | 1666 | 0 | 0 | 31807 | 0.92 | 0.92 | 2.332 | 2.332 |
| 2002 | 22778 | 7593 | 1678 | 0 | 0 | 32049 | 0.89 | 0.89 | 2.281 | 2.281 |
| 2003 | 22986 | 7662 | 1694 | 0 | 0 | 32341 | 0.87 | 0.87 | 2.231 | 2.231 |
| 2004 | 23230 | 7743 | 1712 | 0 | 0 | 32685 | 0.83 | 0.83 | 2.151 | 2.151 |
| 2005 | 23515 | 7838 | 1733 | 0 | 0 | 33086 | 0.79 | 0.79 | 2.073 | 2.073 |
| 2006 | 23814 | 7938 | 1755 | 0 | 0 | 33507 | 0.75 | 0.75 | 1.992 | 1.992 |
| 2007 | 24112 | 8037 | 1777 | 0 | 0 | 33926 | 0.71 | 0.71 | 1.909 | 1.909 |
| 2008 | 24409 | 8136 | 1799 | 0 | 0 | 34343 | 0.64 | 0.48 | 1.763 | 1.324 |
| 2009 | 24714 | 8238 | 1821 | 0 | 0 | 34774 | 0.58 | 0.45 | 1.614 | 1.248 |
| 2010 | 25109 | 8370 | 1850 | 0 | 0 | 35329 | 0.52 | 0.45 | 1.473 | 1.273 |
| 2011 | 25638 | 8546 | 1889 | 0 | 0 | 36073 | 0.47 | 0.40 | 1.344 | 1.152 |
| 2012 | 26266 | 8755 | 1935 | 0 | 0 | 36957 | 0.42 | 0.28 | 1.226 | 0.826 |
| 2013 | 27033 | 9011 | 1992 | 0 | 0 | 38035 | 0.35 | 0.21 | 1.057 | 0.641 |
| 2014 | 28006 | 9335 | 2064 | 0 | 0 | 39405 | 0.29 | 0.15 | 0.911 | 0.469 |
| 2015 | 29226 | 9742 | 2154 | 0 | 0 | 41122 | 0.24 | 0.09 | 0.794 | 0.296 |
| 2016 | 30650 | 10217 | 2259 | 0 | 0 | 43126 | 0.20 | 0.06 | 0.692 | 0.208 |
| 2017 | 32165 | 10722 | 2370 | 0 | 0 | 45257 | 0.17 | 0.04 | 0.598 | 0.157 |
| 2018 | 33785 | 11262 | 2489 | 0 | 0 | 47535 | 0.14 | 0.03 | 0.513 | 0.105 |
| 2019 | 35509 | 11836 | 2616 | 0 | 0 | 49961 | 0.11 | 0.01 | 0.438 | 0.052 |
| 2020 | 37344 | 12448 | 2752 | 0 | 0 | 52543 | 0.09 | 0.00 | 0.372 | 0.000 |

Operator Cost Range (2002 \$)
(basis for calculations below)

\$78,760 \$2,346,240

Composite PM Emissions of all TRU HP ranges

| Year | Emissions (tpd) New Stds Only | Emission Red. From Reg. (low end of range) | Emission Benefit Adjustment Factor (low) | Emission Red. From Reg. (high end of range) | Emission Benefit Adjustment Factor (high) | Annual In-Use Cost | Ann. Op. Rep. Costs (low) | Ann. Op. Rep. Costs (high) | Total Ann. Oper. Cost (low) | Total Ann. Oper. Cost (high) | In-Use Only \$/lb. (low) | In-Use Only \$/lb. (high) |
|---------|-------------------------------------|--|---|---|--|-----------------------|------------------------------|-------------------------------|--------------------------------|---------------------------------|--------------------------------|---------------------------------|
| | | | | | | | | | | | | |
| 2000 | 2.640 | | | | | \$0 | \$0 | \$0 | \$0 | \$0 | | |
| 2001 | 2.464 | | | | | \$0 | \$0 | \$0 | \$0 | \$0 | | |
| 2002 | 2.410 | | | | | \$0 | \$0 | \$0 | \$0 | \$0 | | |
| 2003 | 2.357 | | | | | \$0 | \$0 | \$0 | \$0 | \$0 | | |
| 2004 | 2.276 | | | | | \$0 | \$0 | \$0 | \$0 | \$0 | | |
| 2005 | 2.194 | | | | | \$0 | \$0 | \$0 | \$0 | \$0 | | |
| 2006 | 2.112 | | | | | \$0 | \$0 | \$0 | \$0 | \$0 | | |
| 2007 | 2.028 | | | | | \$0 | \$0 | \$0 | \$0 | \$0 | | |
| 2008 | 1.875 | 0.498 | 0.266 | 0.948 | 0.506 | \$125,416,556 | \$58,772 | \$1,750,800 | \$125,475,328 | \$127,167,357 | 24.36 | 47.00 |
| 2009 | 1.719 | 0.416 | 0.242 | 0.853 | 0.496 | \$134,970,188 | \$55,973 | \$1,667,429 | \$135,026,162 | \$136,637,617 | 26.04 | 54.04 |
| 2010 | 1.571 | 0.237 | 0.151 | 0.733 | 0.466 | \$144,077,398 | \$53,308 | \$1,588,028 | \$144,130,705 | \$145,665,425 | 18.95 | 59.24 |
| 2011 | 1.437 | 0.234 | 0.163 | 0.684 | 0.476 | \$152,752,378 | \$50,769 | \$1,512,407 | \$152,803,147 | \$154,264,785 | 23.73 | 70.02 |
| 2012 | 1.314 | 0.474 | 0.361 | 0.681 | 0.518 | \$161,013,436 | \$48,352 | \$1,440,388 | \$161,061,788 | \$162,453,824 | 60.60 | 87.81 |
| 2013 | 1.140 | 0.5 | 0.439 | 0.639 | 0.561 | \$168,876,647 | \$46,049 | \$1,371,798 | \$168,922,696 | \$170,248,445 | 89.03 | 114.67 |
| 2014 | 0.990 | 0.538 | 0.543 | 0.618 | 0.624 | \$176,376,173 | \$43,857 | \$1,306,474 | \$176,420,030 | \$177,682,647 | 132.55 | 153.35 |
| 2015 | 0.872 | 0.61 | 0.700 | 0.593 | 0.680 | \$183,516,912 | \$41,768 | \$1,244,261 | \$183,558,680 | \$184,761,173 | 201.92 | 197.58 |
| 2016 | 0.768 | 0.599 | 0.779 | 0.549 | 0.714 | \$190,326,235 | \$39,779 | \$1,185,011 | \$190,366,015 | \$191,511,246 | 264.52 | 243.89 |
| 2017 | 0.673 | 0.55 | 0.817 | 0.497 | 0.738 | \$196,809,793 | \$37,885 | \$1,128,582 | \$196,847,678 | \$197,938,375 | 327.01 | 297.14 |
| 2018 | 0.588 | 0.513 | 0.872 | 0.458 | 0.779 | \$125,994,251 | \$36,081 | \$1,074,840 | \$126,030,332 | \$127,069,090 | 256.17 | 230.59 |
| 2019 | 0.513 | 0.488 | 0.952 | 0.43 | 0.839 | \$126,014,435 | \$34,363 | \$1,023,657 | \$126,048,797 | \$127,038,091 | 320.80 | 284.89 |
| 2020 | 0.448 | 0.474 | 1.059 | 0.348 | 0.777 | \$113,018,886 | \$32,726 | \$974,911 | \$113,051,613 | \$113,993,798 | 366.12 | 271.03 |
| | 11821.700 | | | | | \$579,682 | \$17,268,585 | \$1,999,742,971 | \$2,016,431,873 | | Low = 24 | H = 366 |
| Tons PM | | | | | | | | | | | | |

\$1,999,163,288 2008-2020 Total (in 2002 \$)