Given/Assume

Combustion

<table>
<thead>
<tr>
<th>Enter Value</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>167</td>
</tr>
<tr>
<td>HV</td>
<td>11,313</td>
</tr>
<tr>
<td>S1</td>
<td>0.63</td>
</tr>
</tbody>
</table>

| K2 | 0.875 | 0.95 for bituminous coals |
|    |       | 0.875 for subbituminous coals |
|    |       | = 0.55 to 0.85 for lignite, based on the Na content |
|    | 1.0   | for oil |

| F1 | 0.0019 | Fuel Impact Factor from F1 table |

| F2 (AH) | 1.00 | Technology Impact Factor from F2 tables |
| F2 (PM) | 1    | Technology Impact Factor from F2 tables |
| F2 (FGD)| 0.01 | Technology Impact Factor from F2 tables |

For SCR

| S2 | 0.03 | SCR catalyst SO2 oxidation rate (specified as a decimal, typically from 0.001- 0.03) |
|    |      | portion of time that SCR is in use |

| F2 (AH) | 1.00 | Technology Impact Factor from F2 tables |
| F2 (PM) | 1    | Technology Impact Factor from F2 tables |
| F2 (FGD)| 0.01 | Technology Impact Factor from F2 tables |

| F3SCR | 1 | Technology Impact Factors for SCR |
| Coal Type | F3SCR |
| PRB       | 0.17 |
| Other Coals | 1 (no data available) |

fsreagent = 0.95 fraction of operation with reagent injection
SNH3 = 0.75 NH3 slip from SCR/SNCR, ppmv at 6% O2, wet
Equation 4-1  \( EM_{Comb} = K \cdot F_1 \cdot E_2 \)

\[ K = 3063 \text{ lb H}_2\text{SO}_4/\text{ton SO}_2 \]

\[ F_1 = 0.0019 \text{ Fuel Impact Factor from F1 table} \]

Equation 4-3  \( E_2 = K_1 \cdot K_2 \cdot C_1 \cdot S_1 \)

\[ C_1 = 167 \text{ Coal burn, tons/hr} \]

\[ S_1 = 0.63 \text{ Coal sulfur weighted average, \%} \]

\[ K_1 = \text{Molecular weight and units conversion constant} \]

\[ = 0.02 \text{ SO}_2/\% \text{S} \]

\[ K_2 = \text{Sulfur conversion to SO}_2 \]

- 0.875 0.95 for bituminous coals
- 0.875 for subbituminous coals
- = 0.55 to 0.85 for lignite, based on the Na content
- 1.0 for oil

\[ E_2 = K_1 \cdot K_2 \cdot C_1 \cdot S_1 \]

\[ E_2 = 0.02 \cdot 0.875 \cdot 167 \cdot 0.63 \]

\[ E_2 = 2 \text{ SO}_2 \text{ mass rate, tons/hr} \]

\[ EM_{Comb} = K \cdot F_1 \cdot E_2 \]

\[ EM_{Comb} = 3063 \cdot 0.0019 \cdot 2 \]

\[ EM_{Comb} = 10.74 \text{ total H}_2\text{SO}_4 \text{ manufactured from combustion, lbs/hr} \]

Sulfuric Acid Released from Combustion (ERComb)

Equation 4-3  \( ER_{Comb} = EM_{Comb} \cdot F_2 (\text{all that apply}) \)

\[ ER_{Comb} = EM_{Comb} \cdot F_2 (AH) \cdot F_2 (PM) \cdot F_2 (FGD) \]

\[ ER_{Comb} = 11 \cdot 1 \cdot 1 \cdot 0.01 \]

\[ ER_{Comb} = 0.11 \text{ total H}_2\text{SO}_4 \text{ released from combustion, lbs/hr} \]

Sulfuric Acid Manufacture by SCR (EMSCR)

\[ EM_{SCR} = K \cdot S_2 \cdot fsops \cdot E_2 \cdot F_3_{SCR} \]

\[ = \text{Total H}_2\text{SO}_4 \text{ manufactured from SCR, lbs per hour} \]

\[ K = 3063 \text{ lb H}_2\text{SO}_4/\text{ton SO}_2 \]

\[ S_2 = 0.03 \text{ SCR catalyst SO}_2 \text{ oxidation rate (specified as a decimal, typically from 0.001-0.03)} \]

\[ fsops = 0.9647 \text{ for continuous operation} \]

\[ E_2 = 2 \text{ SO}_2 \text{ produced, tons per hour} \]

\[ F_3_{SCR} = 1 \text{ Technology Impact Factor, for SCR Table 4-2} \]

\[ EM_{SCR} = 3063 \cdot 0.03 \cdot 0.9647 \cdot 2 \cdot 1 \]

\[ EM_{SCR} = 163.66 \text{ total H}_2\text{SO}_4 \text{ manufactured from SCR, lbs per hour} \]
Equation 4-11a: Manufacture
\[ \text{TSAM} = \text{EMComb} + \text{EMSCR/SNCR} + \text{EMFGC} \]
\[ \text{TSAM} = \frac{11}{164} + 1.64 \]
\[ \text{TSAM} = 174.40 \] Total H2SO4 manufactured, lbs per hour

**Sulfuric Acid Released from SCR and SNCR**

Equation 4-5
\[ \text{ERSCR} = \left[ \text{EMSCR} - \left( \text{Ks} \cdot \text{B} \cdot \text{fsreagent} \cdot \text{SNH3} \right) \right] \cdot \text{F2x} \]
\[ \text{ERSCR} = \text{Total H2SO4 released from SCR, lbs per hour} \]
\[ \text{EMSCR} = \text{Total H2SO4 manufactured from SCR, lbs per hour} \]

\[ \text{Ks} = \frac{3799}{11,313} \] Conversion factor
\[ \text{B} = \frac{3.79E-03}{3.79E-03} \] Coal burn in TBtu/hr
\[ \text{fsreagent} = 0.95 \] fraction of SCR operation with reagent injection
\[ \text{SNH3} = 0.75 \] NH3 slip from SCR/SNCR, ppmv at 6% O2, wet
  - SCR averages 0.75 ppmv over catalyst guarantee period
  - SNCR averages 5 ppmv
  - Note: actual NH3 slip data should be used if available

\[ \text{F2x} = \] Technology Impact Factors, all that apply
\[ \text{ERSCR} = \left[ \text{EMSCR} - \left( \frac{3799 \cdot 3.79E-03 \cdot 0.95 \cdot 0.75}{164 - (1.03E+01)} \right) \right] \cdot \text{F2 (AH)} \cdot \text{F2 (PM)} \cdot \text{F2 (FGD)} \]
\[ \text{ERSCR} = 1.53 \] Total H2SO4 released from SCR, lbs per hour

Equation 4-11b: Release
\[ \text{TSAR} = \text{ERComb} + \text{ERSCR/SNCR} + \text{ERFGC} \]
\[ \text{TSAR} = \frac{0.11}{1.53} + 1.64 \]
\[ \text{TSAR} = 1.64 \] Total H2SO4 released, lbs per hour
### Table 4-1
Summary of Fuel Impact Factors (F1) for Steam Generating Units

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Equipment</th>
<th>F1</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Bituminous (all)</td>
<td>Dry Bottom Boiler</td>
<td>0.0000011163*SO2+0.0064877</td>
<td>SO2 = Boiler SO2 concentration (ppmvd, 3% O2, dry) derived from fuel sulfur content (%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>S1 = Coal sulfur weighted average, % dry = 0.63</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>KF1 = 10,003,602</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>HV = Coal heating value, Btu/lb, dry = 11,313</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SO2 = 0.63 * 10,003,602 / 11,313 = 557 ppmvd</td>
</tr>
<tr>
<td>Med-High S Eastern</td>
<td>Cyclone</td>
<td>0.016</td>
<td>One data point.</td>
</tr>
<tr>
<td>Bituminous (&gt;2.5%)</td>
<td>Dry Bottom Boiler</td>
<td>0.00111</td>
<td>One data point.</td>
</tr>
<tr>
<td>W. Bituminous</td>
<td>Cyclone</td>
<td>0.0022</td>
<td>One data point.</td>
</tr>
<tr>
<td>Subbituminous/PRB</td>
<td>All Boilers</td>
<td>0.0019</td>
<td>Average of 8 units</td>
</tr>
<tr>
<td>Lignite</td>
<td>Dry Bottom Boiler</td>
<td>0.0044</td>
<td>Two data points.</td>
</tr>
<tr>
<td>Lignite</td>
<td>Cyclone</td>
<td>0.00112</td>
<td>One data point.</td>
</tr>
<tr>
<td>Petroleum coke</td>
<td>Boiler</td>
<td>0.04</td>
<td>One data point.</td>
</tr>
<tr>
<td>Natural gas</td>
<td>Boiler</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>#2 Fuel oil</td>
<td>Boiler</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>#6 Fuel oil</td>
<td>Boiler</td>
<td>0.025</td>
<td></td>
</tr>
<tr>
<td>Used oil</td>
<td>Boiler</td>
<td>0.0175</td>
<td></td>
</tr>
<tr>
<td>Natural gas</td>
<td>CT</td>
<td>See Table 6-1</td>
<td></td>
</tr>
<tr>
<td>#2 Fuel oil</td>
<td>CT</td>
<td>See Table 6-1</td>
<td></td>
</tr>
<tr>
<td>Natural gas</td>
<td>CC</td>
<td>0.0555</td>
<td></td>
</tr>
<tr>
<td>#2 Fuel oil</td>
<td>CC</td>
<td>0.0555</td>
<td>New category in 2007.</td>
</tr>
<tr>
<td>Other Alternative Fuels</td>
<td>Any</td>
<td>0.04</td>
<td></td>
</tr>
<tr>
<td>Other Alternative Fuels,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>co-fired w/coal, &gt;75%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>heat throughput</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table 4-3
Summary of F2 Factors for Air Heater Removal of Sulfuric Acid

<table>
<thead>
<tr>
<th>Boiler Type</th>
<th>Fuel</th>
<th>F2 Factor</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Boilers</td>
<td>Low S Eastern Bit</td>
<td>0.50</td>
<td>Average of measurements at 7 units.</td>
</tr>
<tr>
<td>All Boilers</td>
<td>Med-High S Eastern Bit (&gt;2.5%)</td>
<td>0.85</td>
<td>Based on two data points.</td>
</tr>
<tr>
<td>All Boilers</td>
<td>PRB</td>
<td>0.36</td>
<td>Based on two data points.</td>
</tr>
</tbody>
</table>

### Table 3-2
Summary of F2 Factors for Particulate Control Devices (ESP, Baghouse)

<table>
<thead>
<tr>
<th>Equipment Type</th>
<th>Coal Type</th>
<th>F2 Factor</th>
<th>Comment or Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold-side ESP</td>
<td>Low S Eastern Bit</td>
<td>0.63</td>
<td>Average of measurements at 4 units.</td>
</tr>
<tr>
<td>Cold-side ESP</td>
<td>High S Eastern Bit (&gt;2.5%)</td>
<td>0.77</td>
<td>Average of measurements at 3 units.</td>
</tr>
<tr>
<td>Cold-side ESP</td>
<td>Subbituminous (PRB)</td>
<td>0.72</td>
<td>Based on one measurement at one unit.</td>
</tr>
<tr>
<td>Hot-side ESP</td>
<td>All</td>
<td>0.63</td>
<td>Based on one measurement at one unit.</td>
</tr>
<tr>
<td>Wet ESP</td>
<td>All</td>
<td>0.12</td>
<td>Average of measurements at 2 units.</td>
</tr>
<tr>
<td>Baghouse</td>
<td>Subbituminous coal</td>
<td>0.10</td>
<td>Two data points.</td>
</tr>
</tbody>
</table>

### Table 3-3
Summary of F2 Factors for Wet, Dry FGD Equipment and Additives

<table>
<thead>
<tr>
<th>FGD Type</th>
<th>Coal Type</th>
<th>F2 Factor</th>
<th>Comment or Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet: Spray Tower</td>
<td>E. Bituminous</td>
<td>0.47</td>
<td>Seven data points.</td>
</tr>
<tr>
<td>Wet: Spray Tower</td>
<td>PRB or Lignite</td>
<td>0.40</td>
<td>Two data points.</td>
</tr>
<tr>
<td>Wet: Venturi Tower</td>
<td>All coals</td>
<td>0.73</td>
<td>Four data points.</td>
</tr>
<tr>
<td>Dry FGD and baghouse</td>
<td>All coals</td>
<td>0.01</td>
<td>Two data points.</td>
</tr>
<tr>
<td>Mg-Ox mixed w/fuel oil</td>
<td>All fuel</td>
<td>0.50</td>
<td>One data point.</td>
</tr>
<tr>
<td>Mg-Ox into furnace</td>
<td>All fuel</td>
<td>0.25</td>
<td>One data point.</td>
</tr>
</tbody>
</table>
Table 4-2
F₃₅ SCR Technology Impact Factors for SCR

<table>
<thead>
<tr>
<th>Coal Type</th>
<th>F₃₅ SCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRB</td>
<td>0.17</td>
</tr>
<tr>
<td>Other Coals</td>
<td>1       (no data available)</td>
</tr>
</tbody>
</table>
Equation 4-1 \( \text{EMComb} = K \cdot F_1 \cdot E_2 \)

where,
\( \text{EMComb} \) = total \( \text{H}_2\text{SO}_4 \) manufactured from combustion, lbs/yr
\( K \) = Molecular weight and units conversion constant, equal to 3,063.
This value is derived as follows: \( 98.07/64.04 \cdot 2000 = 3,063 \).
Here, 98.07 is the molecular weight of \( \text{H}_2\text{SO}_4 \); 64.04 is the molecular weight of \( \text{SO}_2 \); conversion from tons per year to pounds per year requires multiplying by 2000.
\( F_1 \) = Fuel Impact Factor
\( E_2 \) = Sulfur dioxide (SO\(_2\)) emissions, either: (1) recorded by a continuous emissions monitor, tons/yr, or (2) calculated from coal burn data, tons/yr.

When any source uses FGD equipment or another technology to control SO\(_2\) emissions, either the fuel basis must be used for the manufacturing and release calculations, or C EMS data can be used but only when the CEMS precedes the FGD or SO\(_2\) control equipment.

As an alternative to using CEMS data, the following relationship based on coal burn data can be used to estimate the rate of SO\(_2\) emissions:

Equation 4-2b \( E_2 = K_1 \cdot K_2 \cdot C_1 \cdot S_1 \)

where,
\( E_2 \) = SO\(_2\) mass rate, tons/yr
\( C_1 \) = Coal burn, tons/yr
\( S_1 \) = Coal sulfur weighted average, %
\( K_1 \) = Molecular weight and units conversion constant, equal to 0.02. This value is derived from \( (64.04)/(100 \cdot 32.06) = 0.02 \). Here, 64.04 is the molecular weight of \( \text{SO}_2 \); 32.06 is the molecular weight of \( \text{S} \); and conversion of % \( \text{S} \) to a fraction requires multiplication.
\( K_2 \) = Sulfur conversion to SO\(_2\), implicit from EPA AP-42 (EPA, 1995b)
= 0.95 for bituminous coals
= 0.875 for subbituminous coals
= 0.55 to 0.85 for lignite, based on the Na content
= 1.0 for oil

**Sulfuric Acid Released from Combustion (ERComb)**

For units that do not employ SCR or SNCR NO\(_x\) control or FGC, the sulfuric acid released is the product of the amount manufactured and the Technology Impact Factors (F\(_2\)) for all downstream equipment (the air heater, the particulate control device, the FGD,

Equation 4-3 \( \text{ERComb} = \text{EMComb} \cdot F_2 \) (all that apply)
Sulfuric Acid Manufacture by SCR (EMSCR)
The following relationship estimates the total H2SO4 manufactured from an SCR equipped utility boiler or steam generator:

**Equation 4-4 EMSCR = K • S2 • fsops • E2 • F3SCR**

where,
EMSCR = Total H2SO4 manufactured from SCR, lbs per year
K = Conversion factor = 3063
S2 = SCR catalyst SO2 oxidation rate (specified as a decimal, typically from 0.001-0.03)
fsops = Operating factor of SCR system, or the fraction of coal burn when the flue gas is directed through the SCR, whether NH3 reagent is injected to derive NOx reduction or not. This value should reflect the hours the SCR reactor processed flue gas, whi
E2 = SO2 produced, tons per year
F3SCR = Technology Impact Factor, for SCR

An F3SCR factor for PRB coals is shown in Table 4-2. This factor is derived from measurements at two PRB-fired units. SO3 emitted from these units was lower than specified in the catalyst guarantee, which was based on laboratory test data. At present, the

<table>
<thead>
<tr>
<th>Table 4-2</th>
<th>F3SCR Technology Impact Factors for SCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal Type</td>
<td>F3SCR Technology Impact Factors for SCR</td>
</tr>
<tr>
<td>PRB</td>
<td>0.17</td>
</tr>
<tr>
<td>Other Coals</td>
<td>1 (no data available)</td>
</tr>
</tbody>
</table>
**Sulfuric Acid Released from SCR and SNCR**

The sulfuric acid released from SCR or SNCR is determined by subtracting from the sulfuric acid manufactured the amount removed by the residual ammonia, or ammonia slip. For SCR, the sulfuric acid released (ERSCR) is estimated with the following relations:

**Equation 4-5** \( ERSCR = (EMSCR - (Ks \cdot B \cdot fsreagent \cdot SNH3)) \cdot F2x \)

where,
- \( ERSCR = \) Total \( H_2SO_4 \) released from SCR, lbs per year
- \( EMSCR = \) Total \( H_2SO_4 \) manufactured from SCR, lbs per year
- \( Ks = \) Conversion factor = 3799
- \( B = \) Coal burn in TBtu/yr
- \( fsreagent = \) fraction of SCR operation with reagent injection, when residual \( NH_3 \) is produced that will remove \( SO_3 \). The value of \( fsreagent \) will be similar to, but slightly less than, the value of \( fsops \), defined for Equation 4-4.
- \( SNH3 = NH_3 \) slip from SCR/SNCR, ppmv at 6% O2, wet:
  - SCR averages 0.75 ppmv over catalyst guarantee period
  - SNCR averages 5 ppmv
  - Note: actual \( NH_3 \) slip data should be used if available
- \( F2x = \) Technology Impact Factors, all that apply

The conversion factor \( Ks \), equal to 3799, considers all relevant constants to yield the result in pounds per year of sulfuric acid. The derivation of this constant, for the case where residual \( NH_3 \) is reported in terms of 6% oxygen and “wet” flue gas at 8.1

The coal burn rate in TBtu/yr is obtained from coal use records, such as those reported to EIA in Form 767. The operating factor of the SCR describes the portion of the coal burn that reflects the period of SCR operation, based on whether the unit operate.

Accordingly, total sulfuric acid manufacture (TSAM) and release (TSAR) is estimated for a generating unit equipped with SCR and flue gas conditioning by the following equations:

**Equation 4-11a: Manufacture**

\[ TSAM = EMComb + EMSCR/SNCR + EMFGC \]

**Equation 4-11b: Release**

\[ TSAR = ERComb + ERSCR/SNCR + ERFGC \]
Equation 4-1
\[ \text{EMComb} = K \cdot F_1 \cdot E_2 \]
where:
- \( K = 3063 \text{ lb H}_2\text{SO}_4/\text{ton SO}_2 \)
- \( F_1 = 0.0019 \) Fuel Impact Factor from F1 table

Equation 4-2
\[ E_2 = K_1 \cdot K_2 \cdot C_1 \cdot S_1 \]
- \( C_1 = 186.853 \) Coal burn, tons/hr
- \( S_1 = 0.45 \) Coal sulfur weighted average, %
- \( K_1 = 0.02 \text{ SO}_2/\% \text{S} \)
- \( K_2 = 0.875 \) for bituminous coals
- \( 0.875 \) for subbituminous coals
- \( 0.875 \) for lignite, based on the Na content
- \( 1 \) for oil

\[ E_2 = K_1 \cdot K_2 \cdot C_1 \cdot S_1 = 0.02 \cdot 0.875 \cdot 186.853 \cdot 0.45 = 1.471467 \text{ SO}_2 \text{ mass rate, tons/hr} \]

\[ \text{EMComb} = 8.563499 \text{ total H}_2\text{SO}_4 \text{ manufactured from combustion, lbs/hr} \]

Sulfuric Acid Released from Combustion (ERComb)
Equation 4-3
\[ \text{ERComb} = \text{EMComb} \cdot F_2 \text{ (all that apply)} \]
- \( F_2 \text{ (AH)} = 1 \)
- \( F_2 \text{ (PM)} = 0.72 \)
- \( F_2 \text{ (FGD)} = 0.73 \)

\[ \text{ERComb} = 8.563499 \cdot 1 \cdot 0.72 \cdot 0.73 = 4.500975 \text{ total H}_2\text{SO}_4 \text{ released from combustion, lbs/hr} \]

Sulfuric Acid Manufacture by SCR (EMSCR)
Equation 4-3
\[ \text{EMSCR} = K \cdot S_2 \cdot \text{fsops} \cdot E_2 \cdot F_3\text{SCR} \]
where:
- \( K = 3063 \text{ lb H}_2\text{SO}_4/\text{ton SO}_2 \)
- \( S_2 = 0.03 \) SCR catalyst SO2 oxidation rate (specified as a decimal, typically from 0.001-0.03)
- \( \text{fsops} = 0 \) no SCR in baseline case

\[ \text{EMSCR} = 3063 \cdot 0.03 \cdot 0 \cdot 1.47 \cdot 1 = 0 \text{ Total H}_2\text{SO}_4 \text{ manufactured from SCR, lbs per hour} \]

Equation 4-11a: Manufacture
\[ \text{TSAM} = \text{EMComb} + \text{EMSCR}/\text{SNCR} + \text{EMFGC} \]

\[ \text{TSAM} = 8.563499 + 0 + 0 = 8.563499 \text{ Total H}_2\text{SO}_4 \text{ manufactured, lbs per hour} \]
Sulfuric Acid Released from SCR and SNCR

Equation 4-5 ERSCR = [EMSCR – (Ks • B • fscragent • SNH3)] • F2x

ERSCR = Total H2SO4 released from SCR, lbs per hour

EMSCR = Total H2SO4 manufactured from SCR, lbs per hour

Ks = 3799 Conversion factor

HV = 11458 Btu/lb

B = 0.004282 Coal burn in TBtu/hr

fscragent = 0 fraction of SCR operation with reagent injection

SNH3 = 0.75 NH3 slip from SCR/SNCR, ppmv at 6% O2, wet

• SCR averages 0.75 ppmv over catalyst guarantee period
• SNCR averages 5 ppmv

• Note: actual NH3 slip data should be used if available

F2x = Technology Impact Factors, all that apply

ERSCR = [ EMSCR – (Ks • B • fscragent • SNH3)] • F2 (AH) • F2 (PM) • F2 (FGD)

ERSCR = 0 – (0 • 0.004282 • 0 • 0.75)) • 1 • 1 • 0.01

ERSCR = 0 Total H2SO4 released from SCR, lbs per hour

Equation 4-11b: Release

TSAR = ERComb + ERSCR/SNCR + ERFGC

TSAR = ERComb + ERSCR + ERFGC

TSAR = 4.500975 Total H2SO4 released, lbs per hour
Equation 4-1: \[ \text{EMComb} = K \cdot F_1 \cdot E_2 \]

\[ K = 3063 \text{ lb H}_2\text{SO}_4/\text{ton SO}_2 \]

\[ F_1 = 0.0019 \text{ Fuel Impact Factor from F1 table} \]

Equation 4-2: \[ E_2 = K_1 \cdot K_2 \cdot C_1 \cdot S_1 \]

\[ C_1 = 167.456 \text{ Coal burn, tons/hr} \]

\[ S_1 = 0.63 \text{ Coal sulfur weighted average, %} \]

\[ K_1 = \text{Molecular weight and units conversion constant} \]

\[ = 0.02 \text{ SO}_2/\%S \]

\[ K_2 = \text{Sulfur conversion to SO}_2 \]

\[ = 0.875 \text{ for bituminous coals} \]

\[ = 0.875 \text{ for subbituminous coals} \]

\[ = 0.55 \text{ to 0.85 for lignite, based on the Na content} \]

\[ 1 \text{ for oil} \]

\[ E_2 = K_1 \cdot K_2 \cdot C_1 \cdot S_1 \]

\[ E_2 = 0.02 \cdot 0.875 \cdot 167.456 \cdot 0.63 \]

\[ E_2 = 1.846202 \text{ SO}_2 \text{ mass rate, tons/hr} \]

\[ \text{EMComb} = K \cdot F_1 \cdot E_2 \]

\[ \text{EMComb} = 3063 \cdot 0.0019 \cdot 1.846202 \]

\[ \text{EMComb} = 10.74434 \text{ total H}_2\text{SO}_4 \text{ manufactured from combustion, lbs/hr} \]

Sulfuric Acid Released from Combustion (ER Comb)

Equation 4-3: \[ \text{ER Comb} = \text{EMComb} \cdot F_2 \appiness all that apply) \]

\[ \text{ER Comb} = \text{EMComb} \cdot F_2 \text{ (AH)} \cdot F_2 \text{ (PM)} \cdot F_2 \text{ (FGD)} \]

\[ \text{ER Comb} = 10.74434 \cdot 1 \cdot 1 \cdot 0.01 \]

\[ \text{ER Comb} = 0.107443 \text{ total H}_2\text{SO}_4 \text{ released from combustion, lbs/hr} \]

Sulfuric Acid Manufactured by SCR (EMSCR)

\[ \text{EMSCR} = K \cdot S_2 \cdot fsops \cdot E_2 \cdot F_3\text{SCR} \]

\[ = \text{Total H}_2\text{SO}_4 \text{ manufactured from SCR, lbs per hour} \]

\[ K = 3063 \text{ lb H}_2\text{SO}_4/\text{ton SO}_2 \]

\[ S_2 = 0.03 \text{ SCR catalyst SO}_2 \text{ oxidation rate (specified as a decimal, typically from 0.001-0.03)} \]

\[ fsops = 0.9647 \text{ for continuous operation} \]

\[ E_2 = 1.846202 \text{ SO}_2 \text{ produced, tons per hour} \]

\[ F_3\text{SCR} = 1 \text{ Technology Impact Factor, for SCR Table 4-2} \]

\[ \text{EMSCR} = 3063 \cdot 0.03 \cdot 0.9647 \cdot 1.846202 \cdot 1 \]

\[ \text{EMSCR} = 163.659 \text{ Total H}_2\text{SO}_4 \text{ manufactured from SCR, lbs per hour} \]

Equation 4-11a: \[ \text{TSAM} = \text{EMComb} + \text{EMSCR}/\text{SNCR} + \]

\[ \text{TSAM} = \text{EMComb} + \text{EMSCR}/\text{SNCR} + \text{EMFGC} \]

\[ \text{TSAM} = 10.74434 + 163.659 \]

\[ \text{TSAM} = 174.4033 \text{ Total H}_2\text{SO}_4 \text{ manufactured, lbs per hour} \]
Sulfuric Acid Released from SCR and SNCR

Equation 4-5 \( \text{ERSCR} = [\text{EMSCR} - (\text{Ks} \times \text{B} \times \text{fsreagent} \times \text{SNH3})] \times F2x \)

\( \text{ERSCR} = \) Total H2SO4 released from SCR, lbs per hour

\( \text{EMSCR} = \) Total H2SO4 manufactured from SCR, lbs per hour

\( \text{Ks} = \) 3799 Conversion factor

\( \text{HV} = \) 11313 Btu/lb

\( \text{B} = \) 0.003789 Coal burn in TBtu/hr

\( \text{fsreagent} = \) 0.95 fraction of SCR operation with reagent injection

\( \text{SNH3} = \) 0.75 NH3 slip from SCR/SNCR, ppmv at 6% O2, wet

- SCR averages 0.75 ppmv over catalyst guarantee period
- SNCR averages 5 ppmv
- Note: actual NH3 slip data should be used if available

\( F2x = \) Technology Impact Factors, all that apply

\( \text{ERSCR} = [\text{EMSCR} - (\text{Ks} \times \text{B} \times \text{fsreagent} \times \text{SNH3})] \times F2 (AH) \times F2 (PM) \times F2 (FGD) \)

\( \text{ERSCR} = (163.659 - (3799 \times 0.003789 \times 0.95 \times 0.75)) \times 1 \times 1 \times 0.01 \)

\( \text{ERSCR} = 153.4033 \) Total H2SO4 released from SCR, lbs per hour

Equation 4-11b: Release

\( \text{TSAR} = \text{ERComb} + \text{ERSCR/SNCR} + \text{ERFGC} \)

\( \text{TSAR} = 0.107443 + 1.534033 + \text{ERFGC} \)

\( \text{TSAR} = 1.641477 \) Total H2SO4 released, lbs per hour
Equation 4-1
\[ \text{EMComb} = K \cdot F_1 \cdot E_2 \]
- \( K = 3063 \) lb H2SO4/ton SO2
- \( F_1 = 0.0019 \) Fuel Impact Factor from F1 table

Equation 4-2
\[ E_2 = K_1 \cdot K_2 \cdot C_1 \cdot S_1 \]
- \( C_1 = 186.747 \) Coal burn, tons/hr
- \( S_1 = 0.45 \) Coal sulfur weighted average, %
- \( K_1 = 0.02 \) SO2/%S
- \( K_2 = \) Sulfur conversion to SO2
  - 0.875 for bituminous coals
  - 0.875 for subbituminous coals
  - = 0.55 to 0.85 for lignite, based on the Na content
  - 1 for oil

\[ E_2 = 0.02 \cdot 0.875 \cdot 186.747 \cdot 0.45 \]
\[ E_2 = 1.470633 \text{ SO2 mass rate, tons/hr} \]

\[ \text{EMComb} = 3063 \cdot 0.0019 \cdot 1.470633 \]
\[ \text{EMComb} = 8.558641 \text{ total H2SO4 manufactured from combustion, lbs/hr} \]

**Sulfuric Acid Released from Combustion (ERComb)**
Equation 4-3
\[ \text{ERComb} = \text{EMComb} \cdot F_2 \text{ (all that apply)} \]
\[ \text{ERComb} = 8.558641 \cdot 0.72 \cdot 0.73 \]
\[ \text{ERComb} = 4.498422 \text{ total H2SO4 released from combustion, lbs/hr} \]

**Sulfuric Acid Manufacture by SCR (EMSCR)**
\[ \text{EMSCR} = K \cdot S_2 \cdot \text{fsops} \cdot E_2 \cdot F_3 \text{SCR} \]
- \( K = 3063 \) lb H2SO4/ton SO2
- \( S_2 = 0.03 \) SCR catalyst SO2 oxidation rate (specified as a decimal, typically from 0.001-0.03)
- \( \text{fsops} = 0 \) no SCR in baseline case

\[ E_2 = 1.470633 \text{ SO2 produced, tons per hour} \]
\[ F_3 \text{SCR} = 1 \] Technology Impact Factor, for SCR Table 4-2
\[ E_2 = 0.03 \cdot 1.470633 \cdot 1 \]
\[ \text{EMSCR} = 3063 \cdot 0.03 \cdot 0.0 \]
\[ \text{EMSCR} = 0 \text{ Total H2SO4 manufactured from SCR, lbs per hour} \]

Equation 4-11a: Manufacture
\[ \text{TSAM} = \text{EMComb} + \text{EMSCR}/\text{SNCR} + \text{EMFGC} \]
\[ \text{TSAM} = 8.558641 + 0 \]
\[ \text{TSAM} = 8.558641 \text{ Total H2SO4 manufactured, lbs per hour} \]
Sulfuric Acid Released from SCR and SNCR

Equation 4-5 ERSCR = [EMSCR – (Ks • B • fsreagent • SNH3)] • F2x

ERSCR = Total H2SO4 released from SCR, lbs per hour
EMSCR = Total H2SO4 manufactured from SCR, lbs per hour
Ks = 3799 Conversion factor
HV = 11410 Btu/lb
B = 0.004262 Coal burn in TBtu/hr
fsreagent = 0 fraction of SCR operation with reagent injection
SNH3 = 0.75 NH3 slip from SCR/SNCR, ppmv at 6% O2, wet

- SCR averages 0.75 ppmv over catalyst guarantee period
- SNCR averages 5 ppmv
- Note: actual NH3 slip data should be used if available

F2x = Technology Impact Factors, all that apply

ERSCR = (EMSCR – (Ks • B • fsreagent • SNH3)) • F2x

ERSCR = (0 – (3799 * 0.004262 * 0 * 0.75)) • 0.01
ERSCR = 0 * 0.01
ERSCR = 0 Total H2SO4 released from SCR, lbs per hour

Equation 4-11b: Release

TSAR = ERComb + ERSCR/SNCR + ERFGC
TSAR = 4.498422 Total H2SO4 released, lbs per hour
Equation 4-1
\[ \text{EMComb} = K \cdot F_1 \cdot E_2 \]
- \( K = 3063 \text{ lb H}_2\text{SO}_4/\text{ton SO}_2 \)
- \( F_1 = 0.0019 \) Fuel Impact Factor from \( F_1 \) table

Equation 4-2
\[ E_2 = K_1 \cdot K_2 \cdot C_1 \cdot S_1 \]
- \( C_1 = 163.736 \) Coal burn, tons/hr
- \( S_1 = 0.59 \) Coal sulfur weighted average, %
- \( K_1 = 0.02 \text{ SO}_2/\% \text{S} \)
- \( K_2 = 0.875 \) Sulfur conversion to \( \text{SO}_2 \)

\[ E_2 = 0.02 \cdot 0.875 \cdot 163.736 \cdot 0.59 \]
\[ E_2 = 1.690574 \text{ SO}_2 \text{ mass rate, tons/hr} \]

\[ \text{EMComb} = K \cdot F_1 \cdot E_2 \]
\[ \text{EMComb} = 3063 \cdot 0.0019 \cdot 1.690574 \]
\[ \text{EMComb} = 9.838635 \text{ total H}_2\text{SO}_4 \text{ manufactured from combustion, lbs/hr} \]

Sulfuric Acid Released from Combustion (ERComb)
Equation 4-3
\[ \text{ERComb} = \text{EMComb} \cdot F_2 \text{ (all that apply)} \]
\[ \text{ERComb} = 9.838635 \cdot 1 \cdot 1 \cdot 0.01 \]
\[ \text{ERComb} = 0.098386 \text{ total H}_2\text{SO}_4 \text{ released from combustion, lbs/hr} \]

Sulfuric Acid Manufacture by SCR (EMSCR)
Equation 4-4
\[ \text{EMSCR} = K \cdot S_2 \cdot \text{fsops} \cdot E_2 \cdot F_3\text{SCR} \]
- \( K = 3063 \text{ lb H}_2\text{SO}_4/\text{ton SO}_2 \)
- \( S_2 = 0.03 \) SCR catalyst \( \text{SO}_2 \) oxidation rate (specified as a decimal, typically from 0.001-0.03)
- \( \text{fsops} = 0.988 \) for continuous operation

\[ E_2 = 1.690574 \text{ SO}_2 \text{ produced, tons per hour} \]
\[ F_3\text{SCR} = 1 \) Technology Impact Factor, for SCR \( \text{Table 4-2} \)

\[ \text{EMSCR} = 3063 \cdot 0.03 \cdot 0.988 \cdot 1.690574 \cdot 1 \]
\[ \text{EMSCR} = 153.4827 \text{ total H}_2\text{SO}_4 \text{ manufactured from SCR, lbs per hour} \]

Equation 4-11a: Manufacture
\[ \text{TSAM} = \text{EMComb} + \text{EMSCR/SNCR} + \text{EMFGC} \]
\[ \text{TSAM} = 9.838635 + 153.4827 \]
\[ \text{TSAM} = 163.3213 \text{ total H}_2\text{SO}_4 \text{ manufactured, lbs per hour} \]
Sulfuric Acid Released from SCR and SNCR

Equation 4-5 \( \text{ERSCR} = [\text{EMSCR} - (K_s \cdot B \cdot \text{fsreagent} \cdot \text{SNH3})] \cdot F_{2x} \)

ERSCR = Total H2SO4 released from SCR, lbs per hour
EMSCR = Total H2SO4 manufactured from SCR, lbs per hour

\( K_s = 3799 \) Conversion factor

\( \text{HV} = \frac{11523}{\text{Btu/lb}} \)

\( B = 0.003773 \) Coal burn in TBtu/hr

\( \text{fsreagent} = 0.97 \) fraction of SCR operation with reagent injection

\( \text{SNH3} = 0.75 \) NH3 slip from SCR/SNCR, ppmv at 6% O2, wet

- SCR averages 0.75 ppmv over catalyst guarantee period
- SNCR averages 5 ppmv

\( F_{2x} = \) Technology Impact Factors, all that apply

\( \text{ERSCR} = \left[ \frac{\text{EMSCR} - (K_s \cdot B \cdot \text{fsreagent} \cdot \text{SNH3})}{F_{2x}} \right] \cdot F_{2x} (\text{AH}) \cdot F_{2x} (\text{PM}) \cdot F_{2x} (\text{FGD}) \)

\( \text{ERSCR} = \left( \frac{153.4827 - (3799 \cdot 0.003773 \cdot 0.97 \cdot 0.75)}{0.01} \right) \cdot 0.01 \)

\( \text{ERSCR} = 1.430537 \) Total H2SO4 released from SCR, lbs per hour

Equation 4-11b: Release

\( \text{TSAR} = \text{ERComb} + \frac{\text{ERSCR}}{\text{SNCR}} + \text{ERFGC} \)

\( \text{TSAR} = 0.098386 + 1.430537 + \)

\( \text{TSAR} = 1.528924 \) Total H2SO4 released, lbs per hour
Equation 4-1
\[ \text{EMComb} = K \cdot F1 \cdot E2 \]

\[ K = 3063 \text{ lb H}_2\text{SO}_4/\text{ton SO}_2 \]
\[ F1 = 0.0019 \text{ Fuel Impact Factor from F1 table} \]

Equation 4-2
\[ E2 = K1 \cdot K2 \cdot C1 \cdot S1 \]

C1 = 199.105 Coal burn, tons/hr
S1 = 0.45 Coal sulfur weighted average, %
K1 = Molecular weight and units conversion constant
0.02 SO2/%S
K2 = Sulfur conversion to SO2
0.875 0.95 for bituminous coals
0.875 for subbituminous coals
0.55 to 0.85 for lignite, based on the Na content
1 for oil
E2 = 1.567952 SO2 mass rate, tons/hr
E2 = K1 \cdot K2 \cdot C1 \cdot S1
E2 = 0.02 \cdot 0.875 \cdot 199.105 \cdot 0.45
E2 = 1.567952
EMComb = 3063 \cdot 0.0019 \cdot 1.567952
EMComb = 9.12501 \text{ total H}_2\text{SO}_4 \text{ manufactured from combustion, lbs/hr} \]

Sulfuric Acid Released from Combustion (ERComb)
Equation 4-3
\[ \text{ERComb} = \text{EMComb} \cdot F2 \text{ (all that apply)} \]
ERComb = EMComb \cdot F2 (AH) \cdot F2 (PM) \cdot F2 (FGD)
ERComb = 9.12501 \cdot 1 \cdot 0.1 \cdot 0.4
ERComb = 0.365 \text{ total H}_2\text{SO}_4 \text{ released from combustion, lbs/hr} \]

Sulfuric Acid Manufacture by SCR (EMSCR)
Equation 4-4
\[ \text{EMSCR} = K \cdot S2 \cdot f\text{ops} \cdot E2 \cdot F3\text{SCR} \]

K = 3063 \text{ lb H}_2\text{SO}_4/\text{ton SO}_2
S2 = 0.03 SCR catalyst SO2 oxidation rate (specified as a decimal, typically from 0.001-0.03)
fops = 0 no SCR installed at Hunter 3
E2 = 1.567952
F3SCR = 1 Technology Impact Factor, for SCR Table 4-2
EMSCR = 3063 \cdot 0.03 \cdot 0 \cdot 1.567952 \cdot 1
EMSCR = 0 \text{ Total H}_2\text{SO}_4 \text{ manufactured from SCR, lbs per hour} \]

Equation 4-11a: Manufacture
\[ \text{TSAM} = \text{EMComb} + \text{EMSCR/SNCR} + \text{EMFGC} \]
\[ \text{TSAM} = 9.12501 + 0 + \text{EMFGC} \]
\[ \text{TSAM} = 9.12501 = \text{Total H}_2\text{SO}_4 \text{ manufactured, lbs per hour} \]
Sulfuric Acid Released from SCR and SNCR

Equation 4-5 \( \text{ERSCR} = [\text{EMSCR} – (\text{Ks} \times \text{B} \times \text{fsreagent} \times \text{SNH3})] \times \text{F2x} \)

\( \text{ERSCR} = \) Total H2SO4 released from SCR, lbs per hour
\( \text{EMSCR} = \) Total H2SO4 manufactured from SCR, lbs per hour
\( \text{Ks} = \) 3799 Conversion factor
\( \text{HV} = \) 11453 Btu/lb
\( \text{B} = \) 0.004561 Coal burn in TBtu/hr
\( \text{fsreagent} = \) fraction of SCR operation with reagent injection
\( \text{SNH3} = \) 0.75 NH3 slip from SCR/SNCR, ppmv at 6% O2, wet

- SCR averages 0.75 ppmv over catalyst guarantee period
- SNCR averages 5 ppmv
- Note: actual NH3 slip data should be used if available

\( \text{F2x} = \) Technology Impact Factors, all that apply

\( \text{ERSCR} = \) Total H2SO4 released from SCR, lbs per hour

\[
\begin{align*}
\text{ERSCR} &= [ \text{EMSCR} – (\text{Ks} \times \text{B} \times \text{fsreagent} \times \text{SNH3})] \times \text{F2 (AH)} \times \text{F2 (PM)} \times \text{F2 (FGD)} \\
\text{ERSCR} &= (0 – (3799 \times 0.004561 \times 0 \times 0.75)) \times 1 \times 1 \times 0.01 \\
\text{ERSCR} &= 0 \times 1 \times 1 \times 0.01 \\
\text{ERSCR} &= 0 \ Total H2SO4 released from SCR, lbs per hour
\end{align*}
\]

Equation 4-11b: Release

\( \text{TSAR} = \text{ERComb} + \frac{\text{ERSCR}}{\text{SNCR}} + \text{ERFGC} \)

\( \text{TSAR} = \) Total H2SO4 released, lbs per hour

\[
\begin{align*}
\text{TSAR} &= 0.365 + \frac{0}{0} + 0.01 \\
\text{TSAR} &= 0.365 \ Total H2SO4 released, lbs per hour
\end{align*}
\]
Equation 4-1

\[ \text{EMComb} = K \times F_1 \times E_2 \]

- \( K = 3063 \text{ lb H}_2\text{SO}_4/\text{ton SO}_2 \)
- \( F_1 = 0.0019 \) Fuel Impact Factor from F1 table

Equation 4-2

\[ E_2 = K_1 \times K_2 \times C_1 \times S_1 \]

- \( C_1 = 199 \) Coal burn, tons/hr
- \( S_1 = 0.56 \) Coal sulfur weighted average, %
- \( K_1 = 0.02 \text{ SO}_2/\%\text{S} \)
- \( K_2 = 0.95 \) for bituminous coals
- \( = 0.55 \) to 0.85 for lignite, based on the Na content
- \( = 0.875 \) for subbituminous coals
- \( = 0.875 \) for oil
- \( = 1 \) for oil

\[ E_2 = 0.02 \times 0.875 \times 199 \times 0.56 \]

\[ E_2 = 1.9502 \text{ SO}_2 \text{ mass rate, tons/hr} \]

\[ \text{EMComb} = K \times F_1 \times E_2 \]

\[ \text{EMComb} = 3063 \times 0.0019 \times 1.9502 \]

\[ \text{EMComb} = 11.34958 \text{ total H}_2\text{SO}_4 \text{ manufactured from combustion, lbs/hr} \]

Sulfuric Acid Released from Combustion (ERComb)

Equation 4-3

\[ \text{ERComb} = \text{EMComb} \times F_2 \times F_2 (\text{AH}) \times F_2 (\text{PM}) \times F_2 (\text{FGD}) \]

\[ \text{ERComb} = 11.34958 \times 0.72 \times 0.73 \]

\[ \text{ERComb} = 5.965339 \text{ total H}_2\text{SO}_4 \text{ released from combustion, lbs/hr} \]

Sulfuric Acid Manufacture by SCR (EMSCR)

\[ \text{EMSCR} = K \times S_2 \times \text{fsops} \times E_2 \times F_3\text{SCR} \]

- \( K = 3063 \text{ lb H}_2\text{SO}_4/\text{ton SO}_2 \)
- \( S_2 = 0.03 \) SCR catalyst SO2 oxidation rate (specified as a decimal, typically from 0.001- 0.03)
- \( \text{fsops} = 0 \) no SCR in baseline case

\[ E_2 = 1.9502 \text{ SO}_2 \text{ produced, tons per hour} \]

\[ F_3\text{SCR} = 1 \text{ Technology Impact Factor, for SCR} \]

\[ \text{EMSCR} = 3063 \times 0.03 \times 0 \times 1.9502 \times 1 \]

\[ \text{EMSCR} = 0 \text{ Total H}_2\text{SO}_4 \text{ manufactured from SCR, lbs per hour} \]

Equation 4-11a: Manufacture

\[ \text{TSAM} = \text{EMComb} + \frac{\text{EMSCR}}{\text{SNCR}} + \text{EMFGC} \]

\[ \text{TSAM} = 11.34958 + 0 \]

\[ \text{TSAM} = 11.34958 \text{ Total H}_2\text{SO}_4 \text{ manufactured, lbs per hour} \]
Sulfuric Acid Released from SCR and SNCR
Equation 4-5 ERSCR = [EMSCR – (Ks • B • fsreagent • SNH3)] • F2x
ERSCR = Total H2SO4 released from SCR, lbs per hour
EMSCR = Total H2SO4 manufactured from SCR, lbs per hour
Ks = 3799 Conversion factor
HV = 11564 Btu/lb
B = 0.004602 Coal burn in TBtu/hr
fsreagent = 0 fraction of SCR operation with reagent injection
SNH3 = 0.75 NH3 slip from SCR/SNCR, ppmv at 6% O2, wet
  • SCR averages 0.75 ppmv over catalyst guarantee period
  • SNCR averages 5 ppmv
  • Note: actual NH3 slip data should be used if available
F2x = Technology Impact Factors, all that apply
ERSCR = EMSCR – (Ks • B • fsreagent • SNH3) • F2 (AH) • F2 (PM) • F2 (FGD)
ERSCR = (0 – (3799 • 0.004602 • 0 • 0.75)) • 1 • 1 • 0.01
ERSCR = 0 Total H2SO4 released from SCR, lbs per hour

Equation 4-11b: Release
TSAR = ERComb + ERSCR/SNCR + ERFGC
TSAR = 5.965339 Total H2SO4 released, lbs per hour
Equation 4-1
$$\text{EMComb} = K \cdot F_1 \cdot E_2$$

$$K = 3063 \text{ lb H}_2\text{SO}_4/\text{ton SO}_2$$

$$F_1 = 0.0019 \text{ Fuel Impact Factor from F1 table}$$

Equation 4-2
$$E_2 = K_1 \cdot K_2 \cdot C_1 \cdot S_1$$

$$C_1 = 164.883 \text{ Coal burn, tons/hr}$$

$$S_1 = 0.6 \text{ Coal sulfur weighted average, \%}$$

$$K_1 = 0.02 \text{ SO}_2/\%\text{S}$$

$$K_2 = \text{Sulfur conversion to SO}_2$$

$$0.95 \text{ for bituminous coals}$$

$$0.875 \text{ for subbituminous coals}$$

$$= 0.55 \text{ to 0.85 for lignite, based on the Na content}$$

$$1 \text{ for oil}$$

$$E_2 = K_1 \cdot K_2 \cdot C_1 \cdot S_1$$

$$E_2 = 0.02 \cdot 0.875 \cdot 164.883 \cdot 0.6$$

$$E_2 = 1.731272 \text{ SO}_2 \text{ mass rate, tons/hr}$$

$$\text{EMComb} = K \cdot F_1 \cdot E_2$$

$$\text{EMComb} = 3063 \cdot 0.0019 \cdot 1.731272$$

$$\text{EMComb} = 10.07548 \text{ total H}_2\text{SO}_4 \text{ manufactured from combustion, lbs/hr}$$

Sulfuric Acid Released from Combustion (ERComb)

Equation 4-3
$$\text{ERComb} = \text{EMComb} \cdot F_2 \text{ (all that apply)}$$

$$\text{ERComb} = 10.07548 \cdot 1 \cdot 1 \cdot 0.01$$

$$\text{ERComb} = 0.100755 \text{ total H}_2\text{SO}_4 \text{ released from combustion, lbs/hr}$$

Sulfuric Acid Manufacture by SCR (EMSCR)

$$\text{EMSCR} = K \cdot S_2 \cdot f_{\text{ops}} \cdot E_2 \cdot F_{3\text{SCR}}$$

$$K = 3063 \text{ lb H}_2\text{SO}_4/\text{ton SO}_2$$

$$S_2 = 0.03 \text{ SCR catalyst SO}_2 \text{ oxidation rate (specified as a decimal, typically from 0.001-0.03)}$$

$$f_{\text{ops}} = 0.977 \text{ for continuous operation}$$

$$E_2 = 1.731272 \text{ SO}_2 \text{ produced, tons per hour}$$

$$F_{3\text{SCR}} = 1 \text{ Technology Impact Factor, for SCR} \text{ Table 4-2}$$

$$\text{EMSCR} = 3063 \cdot 0.03 \cdot 0.977 \cdot 1.731272 \cdot 1$$

$$\text{EMSCR} = 155.4275 \text{ Total H}_2\text{SO}_4 \text{ manufactured from SCR, lbs per hour}$$

Equation 4-11a: Manufacture

$$\text{TSAM} = \text{EMComb} + \text{EMSCR/SNCR} + \text{EMFGC}$$

$$\text{TSAM} = 165.503 \text{ Total H}_2\text{SO}_4 \text{ manufactured, lbs per hour}$$
Sulfuric Acid Released from SCR and SNCR
Equation 4-5 \( ERSCR = [EMSCR - (Ks \cdot B \cdot fsreagent \cdot SNH3)] \cdot F2x \)

\( ERSCR = \text{Total H}_2\text{SO}_4 \text{ released from SCR, lbs per hour} \)

\( EMSCR = \text{Total H}_2\text{SO}_4 \text{ manufactured from SCR, lbs per hour} \)

\( Ks = 3799 \text{ Conversion factor} \)

\( HV = 12011 \text{ Btu/lb} \)

\( B = 0.003961 \text{ Coal burn in TBtu/hr} \)

\( fsreagent = 0.96 \text{ fraction of SCR operation with reagent injection} \)

\( SNH3 = 0.75 \text{ NH}_3 \text{ slip from SCR/SNCR, ppmv at 6\% O}_2, \text{ wet} \)

- SCR averages 0.75 ppmv over catalyst guarantee period
- SNCR averages 5 ppmv
- Note: actual NH3 slip data should be used if available

\( F2x = \text{Technology Impact Factors, all that apply} \)

\( ERSCR = [ EMSCR - ( Ks \cdot B \cdot fsreagent \cdot SNH3 ) ] \cdot F2 (AH) \cdot F2 (PM) \cdot F2 (FGD) \)

\( ERSCR = ( 155.4275 - ( 3799 \cdot 0.003961 \cdot 0.96 \cdot 0.75 ) ) \cdot 1 \cdot 1 \cdot 0.01 \)

\( ERSCR = 144.5936 \text{ Total H}_2\text{SO}_4 \text{ released from SCR, lbs per hour} \)

Equation 4-11b: Release

\( TSAR = \text{ERComb} + \frac{ERSCR}{\text{SNCR}} + ERFGC \)

\( TSAR = \frac{ERComb}{\text{SNCR}} + \frac{ERSCR}{\text{SNCR}} + ERFGC \)

\( TSAR = 0.100755 + 1.445936 \)

\( TSAR = 1.546691 \text{ Total H}_2\text{SO}_4 \text{ released, lbs per hour} \)
Equation 4: EMComb = K \cdot F1 \cdot E2
K = 3063 \text{ lb H}_2\text{SO}_4/\text{ton SO}_2
F1 = 0.0019 \text{ Fuel Impact Factor from F1 table}

Equation 4: E2 = K1 \cdot K2 \cdot C1 \cdot S1
C1 = 198.598 \text{ Coal burn, tons/hr}
S1 = 0.56 \text{ Coal sulfur weighted average, } %
K1 = \text{ Molecular weight and units conversion constant}
0.02 \text{ SO}_2%/S
K2 = \text{ Sulfur conversion to SO}_2
0.875 \text{ for bituminous coals}
0.875 \text{ for subbituminous coals}
= 0.55 \text{ to 0.85 for lignite, based on the Na content}
1 \text{ for oil}
E2 = K1 \cdot K2 \cdot C1 \cdot S1
E2 = 0.02 \cdot 0.875 \cdot 198.598 \cdot 0.56
E2 = 1.94626 \text{ SO}_2 \text{ mass rate, tons/hr}

\text{EMComb} = K \cdot F1 \cdot E2
\text{EMComb} = 3063 \cdot 0.0019 \cdot 1.94626
\text{EMComb} = 11.32665 \text{ total H}_2\text{SO}_4 \text{ manufactured from combustion, lbs/hr}

\text{Sulfuric Acid Released from Combustion (ERComb)}
Equation 4-3: ERComb = EMComb \cdot F2 (all that apply)
ERComb = EMComb \cdot F2 (AH) \cdot F2 (PM) \cdot F2 (FGD)
ERComb = 11.32665 \cdot 1 \cdot 0.72 \cdot 1
ERComb = 8.155189 \text{ total H}_2\text{SO}_4 \text{ released from combustion, lbs/hr}

\text{Sulfuric Acid Manufacture by SCR (EMSCR)}
EMSCR = K \cdot S2 \cdot fsops \cdot E2 \cdot F3SCR
K = 3063 \text{ lb H}_2\text{SO}_4/\text{ton SO}_2
S2 = 0.03 \text{ SCR catalyst SO}_2 \text{ oxidation rate (specified as a decimal, typically from 0.001-0.03)}
fsops = 0 \text{ no SO}_2 \text{ control at Huntington 2 baseline case}
F3SCR = 1 \text{ Technology Impact Factor, for SCR Table 4-2}
EMSCR = K \cdot S2 \cdot fsops \cdot E2 \cdot F3SCR
EMSCR = 3063 \cdot 0.03 \cdot 0 \cdot 1.94626 \cdot 1
EMSCR = 0 \text{ Total H}_2\text{SO}_4 \text{ manufactured from SCR, lbs per hour}

Equation 4-11a: Manufacture
TSAM = EMComb + EMSCR/\text{SNCR} +
TSAM = EMComb + EMSCR/\text{SP} + EMFGC
TSAM = 11.32665 + 0
TSAM = 11.32665 \text{ Total H}_2\text{SO}_4 \text{ manufactured, lbs per hour}
Sulfuric Acid Released from SCR and SNCR

Equation 4-5 ERSCR = \[EMSCR – (Ks \cdot B \cdot fsreagent \cdot SNH3)\] \cdot F2x

ERSCR = Total H2SO4 released from SCR, lbs per hour
EMSCR = Total H2SO4 manufactured from SCR, lbs per hour
Ks = 3799 Conversion factor
HV = 11560 Btu/lb
B = 0.004592 Coal burn in TBtu/hr
fsreagent = 0 fraction of SCR operation with reagent injection
SNH3 = 0.75 NH3 slip from SCR/SNCR, ppmv at 6% O2, wet

- SCR averages 0.75 ppmv over catalyst guarantee period
- SNCR averages 5 ppmv
- Note: actual NH3 slip data should be used if available

F2x = Technology Impact Factors, all that apply
ERSCR = \[ EMSCR – ( Ks \cdot B \cdot fsreagent \cdot SNH3 ) \] \cdot F2 (AH) \cdot F2 (PM) \cdot F2 (FGD)

ERSCR = ( 0 – ( 3799 \cdot 0.004592 \cdot 0 \cdot 0.75 )) \cdot 1 \cdot 1 \cdot 0.01
ERSCR = ( 0 – ( 0 \cdot 0 )) \cdot 0.01
ERSCR = 0 Total H2SO4 released from SCR, lbs per hour

Equation 4-11b: Release
TSAR = ERComb + ERSCR/SNCR + ERFGC
TSAR = ERComb + ERSCR/Sh + ERFGC
TSAR = 8.155189 + 0 +

**TSAR = 8.155189 Total H2SO4 released, lbs per hour**
\[ EM_{Comb} = K \cdot F_1 \cdot E_2 \]
\[ K = 3063 \text{ lb H}_2\text{SO}_4/\text{ton SO}_2 \]
\[ F_1 = 0.0019 \text{ Fuel Impact Factor from F1 table} \]

\[ E_2 = K_1 \cdot K_2 \cdot C_1 \cdot S_1 \]
\[ C_1 = 173.942 \text{ Coal burn, tons/hr} \]
\[ S_1 = 0.6 \text{ Coal sulfur weighted average, %} \]
\[ K_1 = \text{Molecular weight and units conversion constant} \]
\[ K_2 = \begin{align*} 
0.02 & \text{ SO}_2/%S \\
0.875 & \text{ for bituminous coals} \\
0.875 & \text{ for subbituminous coals} \\
= 0.55 & \text{ to 0.85 for lignite, based on the Na content} \\
1 & \text{ for oil} \\
0.95 & \text{ for bituminous coals} \\
\end{align*} \]
\[ E_2 = K_1 \cdot K_2 \cdot C_1 \cdot S_1 \\
E_2 = 0.02 \cdot 0.875 \cdot 173.942 \cdot 0.6 \]
\[ E_2 = 1.826391 \text{ SO}_2 \text{ mass rate, tons/hr} \]
\[ EM_{Comb} = K \cdot F_1 \cdot E_2 \]
\[ EM_{Comb} = 3063 \cdot 0.0019 \cdot 1.826391 \]
\[ EM_{Comb} = 10.62905 \text{ total H}_2\text{SO}_4 \text{ manufactured from combustion, lbs/hr} \]

**Sulfuric Acid Released from Combustion (ERComb)**

\[ ER_{Comb} = EM_{Comb} \cdot F_2 \text{ (all that apply)} \]
\[ ER_{Comb} = EM_{Comb} \cdot F_2 \text{ (AH)} \cdot F_2 \text{ (PM)} \cdot F_2 \text{ (FGD)} \]
\[ ER_{Comb} = 10.62905 \cdot 1 \cdot 1 \cdot 0.01 \]
\[ ER_{Comb} = 0.10629 \text{ total H}_2\text{SO}_4 \text{ released from combustion, lbs/hr} \]

**Sulfuric Acid Manufacture by SCR (EMSCR)**

\[ EM_{SCR} = K \cdot S_2 \cdot f_{sops} \cdot E_2 \cdot F_{3SCR} \]
\[ EM_{SCR} = \text{Total H}_2\text{SO}_4 \text{ manufactured from SCR, lbs per hour} \]
\[ K = 3063 \text{ lb H}_2\text{SO}_4/\text{ton SO}_2 \]
\[ S_2 = 0.03 \text{ SCR catalyst SO}_2 \text{ oxidation rate (specified as a decimal, typically from 0.001 - 0.03)} \]
\[ f_{sops} = 0.864 \text{ for continuous operation} \]
\[ F_{3SCR} = \begin{align*} 
1 & \text{ Technology Impact Factor, for SCR} \\
\end{align*} \]
\[ EM_{SCR} = K \cdot S_2 \cdot f_{sops} \cdot E_2 \cdot F_{3SCR} \]
\[ EM_{SCR} = 3063 \cdot 0.03 \cdot 0.864 \cdot 1.826391 \cdot 1 \]
\[ EM_{SCR} = 161.7853 \text{ Total H}_2\text{SO}_4 \text{ manufactured from SCR, lbs per hour} \]

**Equation 4-11a: Manufacture**

\[ TSAM = EM_{Comb} + EM_{SCR}/SNCR + EM_{FGC} \]
\[ TSAM = 10.62905 + 161.7853 \]
\[ TSAM = 172.4143 \text{ Total H}_2\text{SO}_4 \text{ manufactured, lbs per hour} \]
Sulfuric Acid Released from SCR and SNCR

Equation 4-5 ERSCR = [EMSCR – (Ks * B * fsreagent * SNH3)] * F2x

ERSCR = Total H2SO4 released from SCR, lbs per hour
EMSCR = Total H2SO4 manufactured from SCR, lbs per hour
Ks = 3799 Conversion factor
HV = 11995 Btu/lb
B = 0.004173 Coal burn in TBTu/hr
fsreagent = 0.95 fraction of SCR operation with reagent injection
SNH3 = 0.75 NH3 slip from SCR/SNCR, ppmv at 6% O2, wet
  - SCR averages 0.75 ppmv over catalyst guarantee period
  - SNCR averages 5 ppmv
  - Note: actual NH3 slip data should be used if available

F2x = Technology Impact Factors, all that apply
ERSCR = [ EMSCR – ( Ks * B * fsreagent * SNH3 ) ] * F2 (AH) * F2 (PM) * F2 (FGD)

ERSCR = ( 161.7853 – ( 3799 * 0.004173 * 0.95 * 0.75 ))* 1 * 1 * 0.01
ERSCR = 150.4902 Total H2SO4 released from SCR, lbs per hour

Equation 4-11b: Release
TSAR = ERComb + ERSCR/SNCR + ERFGC
TSAR = ERComb + ERSCR/SN + ERFGC
TSAR = 1.611193 Total H2SO4 released, lbs per hour
Equation 4: \( EMComb = K \times F1 \times E2 \)

- \( K = 3063 \) lb \( \text{H}_2\text{SO}_4/\)ton \( \text{SO}_2 \)
- \( F1 = 0.0019 \) Fuel Impact Factor from F1 table

Equation 4: \( E2 = K1 \times K2 \times C1 \times S1 \)

- \( C1 = 27.606 \) Coal burn, tons/hr
- \( S1 = 0.76 \) Coal sulfur weighted average, %
- \( K1 = 0.02 \) SO2%/S
- \( K2 = 0.875 \) Sulfur conversion to SO2
- \( 0.95 \) for bituminous coals
- \( 0.875 \) for subbituminous coals
- \( 0.55 \) to \( 0.85 \) for lignite, based on the Na content
- \( 1 \) for oil

\[ E2 = K1 \times K2 \times C1 \times S1 \]
\[ E2 = 0.02 \times 0.875 \times 27.606 \times 0.76 \]
\[ E2 = 0.36716 \] SO2 mass rate, tons/hr

\[ EMComb = K \times F1 \times E2 \]
\[ EMComb = 3063 \times 0.0019 \times 0.36716 \]
\[ EMComb = 2.13676 \] total \( \text{H}_2\text{SO}_4 \) manufactured from combustion, lbs/hr

Sulfuric Acid Released from Combustion (ERComb)
Equation 4-3: \( ERComb = EMComb \times F2 \) (all that apply)

\[ ERComb = EMComb \times F2(\text{AH}) \times F2(\text{PM}) \times F2(\text{FGD}) \]
\[ ERComb = 2.13676 \times 1 \times 0.72 \times 1 \]
\[ ERComb = 1.538467 \] total \( \text{H}_2\text{SO}_4 \) released from combustion, lbs/hr

Sulfuric Acid Manufacture by SCR (EMSCR)
Equation 4-3: \( EMSCR = K \times S2 \times fsops \times E2 \times F3SCR \)

- \( K = 3063 \) lb \( \text{H}_2\text{SO}_4/\)ton \( \text{SO}_2 \)
- \( S2 = 0.03 \) SCR catalyst SO2 oxidation rate (specified as a decimal, typically from 0.001-0.03)
- \( fsops = 0 \) no SO2 control installed at Carbon 1

\[ E2 = 0.36716 \] SO2 produced, tons per hour

\[ F3SCR = 1 \] Technology Impact Factor, for SCR

\[ EMSCR = 3063 \times 0.03 \times 0.36716 \times 1 \]
\[ EMSCR = 0 \] = Total \( \text{H}_2\text{SO}_4 \) manufactured from SCR, lbs per hour

Equation 4-11a: Manufacture
\[ TSAM = EMComb + EMSCR/\text{SNCR} + EMFGC \]
\[ TSAM = 2.13676 + 0 \]
\[ TSAM = 2.13676 \] Total \( \text{H}_2\text{SO}_4 \) manufactured, lbs per hour
Sulfuric Acid Released from SCR and SNCR

Equation 4-5 $ERSCR = [EMSCR - (Ks \cdot B \cdot fsreagent \cdot SNH3)] \cdot F2x$

$ERSCR = $ Total H$_2$SO$_4$ released from SCR, lbs per hour

$EMSCR = $ Total H$_2$SO$_4$ manufactured from SCR, lbs per hour

$Ks = $ 3799 Conversion factor

$HV = $ 12125 Btu/lb

$B = $ 0.000669 Coal burn in TBtu/hr

$fsreagent = $ 0 fraction of SCR operation with reagent injection

$SNH3 = $ 0.75 NH$_3$ slip from SCR/SNCR, ppmv at 6% O$_2$, wet

SCR averages 0.75 ppmv over catalyst guarantee period
SNCR averages 5 ppmv

Note: actual NH$_3$ slip data should be used if available

$F2x = $ Technology Impact Factors, all that apply

$ERSCR = [EMSCR - (Ks \cdot B \cdot fsreagent \cdot SNH3)] \cdot F2 (AH) \cdot F2 (PM) \cdot F2 (FGD)$

$ERSCR = (0 - (3799 \cdot 0.000669 \cdot 0 \cdot 0.75)) \cdot 1 \cdot 1 \cdot 1$

$ERSCR = 0 Total H$_2$SO$_4$ released from SCR, lbs per hour$

Equation 4-11b: Release

$TSAR = ERComb + ERSCR/SNCR + ERFGC$

$TSAR = ERComb + ERSCR/Sh + ERFGC$

$TSAR = 1.538467 Total H$_2$SO$_4$ released, lbs per hour$
Equation 4 EMComb = K • F1 • E2
K = 3063 lb H2SO4/ton SO2
F1 = 0.0019 Fuel Impact Factor from F1 table

Equation 4 E2 = K1 • K2 • C1 • S1
C1 = 42.229 Coal burn, tons/hr
S1 = 0.75 Coal sulfur weighted average, %
K1 = Molecular weight and units conversion constant
0.02 SO2%S
K2 = Sulfur conversion to SO2
0.875 0.95 for bituminous coals
0.875 for subbituminous coals
= 0.55 to 0.85 for lignite, based on the Na content
1 for oil
E2 = K1 • K2 • C1 • S1
E2 = 0.02 * 0.875 * 42.229 * 0.75
E2 = 0.554256 SO2 mass rate, tons/hr

EMComb = K • F1 • E2
EMComb = 3063 * 0.0019 * 0.554256
EMComb = 3.225601 total H2SO4 manufactured from combustion, lbs/hr

Sulfuric Acid Released from Combustion (ERComb)
Equation 4-3 ERComb = EMComb • F2 (all that apply)
ERComb = EMComb • F2 (AH) • F2 (PM) • F2 (FGD)
ERComb = 3.225601 * 1 * 0.72 * 1
ERComb = 2.322433 total H2SO4 released from combustion, lbs/hr

Sulfuric Acid Manufacture by SCR (EMSCR)
EMSCR = K • S2 • fsops • E2 • F3SCR
K = 3063 lb H2SO4/ton SO2
S2 = 0.03 SCR catalyst SO2 oxidation rate (specified as a decimal, typically from 0.001- 0.03)
fsops = no SO2 controls installed at Carbon 2
F3SCR = Technology Impact Factor, for SCR
EMSCR = 3063 * 0.03 * 0 * 0.554256 * 1
EMSCR = 0 = Total H2SO4 manufactured from SCR, lbs per hour

Equation 4-11a: Manufacture
TSAM = EMComb + EMSCR/SNCR + EMFGC
TSAM = 3.225601 + 0 + 0
TSAM = 3.225601 = Total H2SO4 manufactured, lbs per hour
Sulfuric Acid Released from SCR and SNCR
Equation 4-5 $\text{ERSCR} = [\text{EMSCR} - (Ks \cdot B \cdot f\text{reagent} \cdot SNH3)] \cdot F2x$

- $\text{ERSCR} =$ Total H2SO4 released from SCR, lbs per hour
- $\text{EMSCR} =$ Total H2SO4 manufactured from SCR, lbs per hour
- $Ks =$ 3799 Conversion factor
- $B =$ 12128 Btu/lb
- $f\text{reagent} =$ fraction of SCR operation with reagent injection
- $SNH3 =$ 0.75 NH3 slip from SCR/SNCR, ppmv at 6% O2, wet
  - SCR averages 0.75 ppmv over catalyst guarantee period
  - SNCR averages 5 ppmv
  - Note: actual NH3 slip data should be used if available
- $F2x =$ Technology Impact Factors, all that apply

$\text{ERSCR} = \left[ \frac{\text{EMSCR}}{3799} - (0.001024 \cdot 0.75) \right] \cdot F2 (AH) \cdot F2 (PM) \cdot F2 (FGD)$

$\text{ERSCR} = (0 - (0.001024 \cdot 0.75)) \cdot 1 \cdot 1 \cdot 1$  

$\text{ERSCR} = 0 \text{ Total H2SO4 released from SCR, lbs per hour}$

Equation 4-11b: Release

$\text{TSAR} = \text{ERComb} + \text{ERSCR/SNCR} + \text{ERFGC}$

$\text{TSAR} = \text{ERComb} + \frac{\text{ERSCR/SNCR}}{0} + \text{ERFGC}$

$\text{TSAR} = 2.322433 \text{ Total H2SO4 released, lbs per hour}$
The following are the special assumptions, knowns and other items of interest involved in the calculations expressed in the previous tabs:

1. The spreadsheet calculations were made according to the version of the spreadsheet sent to UDAQ by EPA. This appears to correspond to a version of the EPRI document from 2012. However, it does not match the document 1023790 downloaded from EPA's website. This can be verified by referencing the equation numbers referred to within the 1023790 document and those listed on the "Explain" tab. The equation reference numbers tend to differ slightly, although the content of the equation itself is identical.

2. In several places throughout this methodology specific values needed to be supplied which were unavailable at the time of calculation. These values were typically site specific values or estimations of SCR performance (SCR oxidation rate) based on available coal data which could only be obtained through testing. The plants in question - Hunter Units 1, 2, and 3; Huntington 1 and 2; and Carbon Units 1 and 2 - burn a blend of Western sub-bituminous and bituminous (primarily sub-bituminous), low sulfur, low alkaline, coal which is unlike any other fuel type tested or estimated through the EPRI estimation methodology. The closest analogue would be PRB coal, which is higher in both alkalinity and heating value, and was tested primarily in Eastern plants which had switched over from higher sulfur coal to PRB. Although this allowed for some reasonable estimation in the assigning of the various factors - in other cases, some experimentation with the equations was called for.

3. As no power plant burning Utah coal currently operates with an SCR system installed, determining an appropriate SCR oxidation value to use required an analysis of the equation. Eventually, it was determined that using the highest oxidation value of 3% (yielding an S2 factor of 0.03) resulted in the highest possible sulfate value, and the most realistic release totals.

4. The FGD system at Hunter 3 is an upgraded wet scrubber followed by a particulate filter baghouse. Although the total control for this system in terms of SO2 emission is similar to the dry lime injection/baghouse systems currently installed at Hunter Units 1 and 2 and Huntington 1 and 2, the EPRI technology factors (F2) for this system are not precisely defined. Rather than using a single F2 factor of 0.01 as was the case for the Post-Control scenarios for the BART units, a hybrid F2 factor of 0.1 * 0.4 was generated by using the F2(PM) and F2(FGD) factors as found on the "F2" tab. This yielded a resulting F2 factor of 0.04 which is quite similar, and agrees well with observed SO2 emissions from Unit 3.

5. The BART units (Hunter 1 and 2 and Huntington 1 and 2) were previously equipped with cold side ESPs for particulate control, and (with the exception of Huntington 2) first generation wet scrubbers for control of SO2 emissions. Huntington Unit 2 was uncontrolled for SO2 in the baseline case. Therefore, the technology factors chosen were F2(PM) = 0.72 and F2(FGD) = 0.73, Huntington 2's F2(FGD) was set at 1.

6. Following the installation of Modeling Scenario 1 controls (LNB/OFA + FGD/Baghouse) these technology factors were updated. As the installation of the Dry FGD system includes the effect of the baghouse, no particulate control mechanism needs to be included. Although not specifically discussed in the EPRI document under particulate control. UDAQ believes that the effect of "double counting" the impact of particulate control upon H2SO4 release would be excessive. Although the purpose of FGD systems is to remove acid gas emissions; no system is perfectly efficient, and the technology factor assigned to FGD/baghouse systems is already quite good. Therefore for all BART Post scenarios, F2(PM) was set at 1, while F2(FGD) was set at 0.01 as per Table 4-5.

7. Baseline emissions were based on 2003 emission inventory values. This year contained the most up-to-date record of coal burn data, hours of operation coal sulfur weight percentage, and emission inventory data available from the baseline period (2001-2003). Post-control emissions were based on the 2012 and 2013 emission year inventories. Coal sulfur contents rose slightly between 2003 and 2013, although sulfate emissions generally dropped.

8. Carbon Units 1 and 2 are based solely on emissions from 2012/2013. As the effect of shutting down the Carbon Plant is based on removing actual emissions. Those emissions must be calculated using the definition of actual emissions - most commonly this is defined as the emissions from the two-year period immediately preceding the change. Without inventory data currently available from the 2014 reporting year, the two-year period immediately preceding this action would be the 2012-2013 inventory periods.
9. Although each tab shows a section where the "effect" of SCR/SNCR is apparently included, a quick review of the baseline tabs will reveal that this is reduced to zero (0) by setting Fsops = 0. Similarly, the effect of ammonia slip is also reduced to zero (0) in the baseline tabs as Fsreagent has also been set to 0.

10. The GivenAssume tab was used as an input tab, and is not to be used as a representation of the values for all individual calculation tabs. Rather each individual calculation tab (such as "Hunter 1 Baseline") should be viewed independently of the others. These tabs were generated by plugging the appropriate values into the "GivenAssume" tab and then copying/pasting the values directly from the "Calculate" tab once generated. This way the work could be replicated by inserting the same input values. The appropriate values have been highlighted on each tab. Red highlights serve as inputs, these items can be found on both the "Baseline" and "Post" tabs. Purple highlights on the "Post" tabs designate the ERcomb values which is also the release value for each plant under Modeling Scenario 1 (LNB/OFA +FGD/Baghouse) but prior to the installation of SCR. Finally Green highlights designate the final release values for each plant for that particular tab. For the Baseline tabs, this is the total amount. For the Post tabs, this value represents the effect of SCR - in addition to the Scenario 1 controls already present.