

**ATTACHMENT 4.10-A: CADNAA NOISE MODEL INPUT AND CALCULATION SHEETS**



## ATTACHMENT 4.10-A: CADNAA NOISE MODEL INPUTS AND CALCULATION SHEETS

### 1.0 EAST COUNTY SUBSTATION

#### 1.0.0 CadnaA Model Input – Construction

##### Area Source

| ID   | Result. PWL  | Result. P    | Lw / Li |        |                | Correction   |
|------|--------------|--------------|---------|--------|----------------|--------------|
|      | Day<br>(dBA) | Day<br>(dBA) | Type    | Value  | norm.<br>dB(A) | Day<br>dB(A) |
| Work | 134.9        | 78.3         | Lw      | Diesel |                | 139.6        |

##### Sound Levels

| ID     | Type | Octave Spectrum (dB) |     |     |     |     |      |      |      |      |      |     | Source  |
|--------|------|----------------------|-----|-----|-----|-----|------|------|------|------|------|-----|---------|
|        |      | 31.5                 | 63  | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | A    | lin |         |
| Diesel | Lw   | -10                  | -11 | -6  | -3  | -8  | -10  | -13  | -19  | -25  | -4.7 | 1   | EEl EPP |

##### Roads

| Name             | ID   | Lme  | Exact Count Data |                     |                                | Speed Limit    |                 | SCS | Surface |               |      |
|------------------|------|------|------------------|---------------------|--------------------------------|----------------|-----------------|-----|---------|---------------|------|
|                  |      |      | Day<br>(dBA)     | Vehicles/ hr<br>Day | Percentage<br>Trucks(%)<br>Day | Auto<br>(km/h) | Truck<br>(km/h) |     | Dist.   | Dstro<br>(dB) | Type |
|                  |      |      |                  |                     |                                |                |                 |     |         |               |      |
| 1 Entrance       | ROAD | 52.2 | 13               | 61                  | 40                             | 30             | 0               | 1.5 | 2       |               |      |
| 1 Construction   | ROAD | 50.6 | 8                | 100                 | 25                             | 25             | 0               | 0   | 1       |               |      |
| 1 Construction   | ROAD | 51.6 | 8                | 100                 | 25                             | 25             | 0               | 1   | 2       |               |      |
| 1 Construction   | ROAD | 51.6 | 8                | 100                 | 25                             | 25             | 0               | 1   | 2       |               |      |
| 1 Old Highway 80 | ROAD | 55.8 | 13               | 61                  | 90                             | 75             | 0               | 0   | 1       |               |      |

Lw = Sound Power Level

Lw" = Sound Power Level/sqm

EEl EPP. Edison Electric Institute, *Electric Power Plant Environmental Noise Guide*, page 4-17, 1984.

Lme = Mean Emission Level

1.0.1 CadnaA Modeling Input and Calculation Sheets – Operation

|  |   |                                   |                |                       |           |           |          |          |         |           |          |
|--|---|-----------------------------------|----------------|-----------------------|-----------|-----------|----------|----------|---------|-----------|----------|
| <b>Acentech</b>  |   | West Coast                        | Job No. 617109 |                       |           |           |          |          |         |           |          |
| Acoustical and Environmental Technologies  |   | Consultant: Mark Leger            |                | Date: 6/24/2009       |           |           |          |          |         |           |          |
| <b>Project:</b>  | San Diego Gas & Electric Company (SDG&E) East County (ECO) Substation Project |                                   |                |                       |           |           |          |          |         |           |          |
| <b>Client:</b>   | Insignia Environmental  |                                   |                |                       |           |           |          |          |         |           |          |
| <b>Subject:</b>  | ECO 520/230 kV Transformer  |                                   |                |                       |           |           |          |          |         |           |          |
| <b>Source ID:</b>  | XFORM1_S, XFORM1_L, XFORM1_T  |                                   |                |                       |           |           |          |          |         |           |          |
| <b>Applied to:</b>   | Xformer1  |                                   |                |                       |           |           |          |          |         |           |          |
| <i>Use the EEI Spectrum correction<sup>1</sup> to obtain a sound pressure level spectrum.</i>  |   |                                   |                |                       |           |           |          |          |         |           |          |
| Hz   | 31.5  | 63                                | 125            | 250                   | 500       | 1000      | 2000     | 4000     | 8000    |           |          |
| NEMA Rating  | 70  |                                   |                |                       |           |           |          |          |         |           |          |
| Spectrum Correction  | -3  | 3                                 | 5              | 0                     | 0         | -6        | -11      | -16      | -23     |           |          |
| Close-in Lp, at 1 ft   | 67  | 73                                | 75             | 70                    | 70        | 64        | 59       | 54       | 47      |           |          |
| <i>Calculate the areas of each source in order to obtain the correction to convert from pressure to power (10*log(1/S)).</i>   |   |                                   |                |                       |           |           |          |          |         |           |          |
|  | L (m)   | W (m)                             | S (m2)         | Area Power Correction |           |           |          |          |         |           |          |
| Xformer, Short   | 3.64  | 5.49                              | 19.98          | -13.0                 |           |           |          |          |         |           |          |
| Xformer, Long  | 10.78   | 5.49                              | 59.18          | -17.7                 |           |           |          |          |         |           |          |
| Xformer, Top   | 3.44  | 10.58                             | 36.40          | -15.6                 |           |           |          |          |         |           |          |
| <i>Subtract the power correction to obtain sound power levels. Divide the power by the area to obtain power per square meter.</i>  |   |                                   |                |                       |           |           |          |          |         |           |          |
|  | 31.5  | 63                                | 125            | 250                   | 500       | 1000      | 2000     | 4000     | 8000    | Sum       | PWL"     |
| Xformer, Short, Lw   | 80.0  | 86.0                              | 88.0           | 83.0                  | 83.0      | 77.0      | 72.0     | 67.0     | 60.0    |           |          |
| A-wt Correction  | -39.4   | -26.2                             | -16.1          | -8.6                  | -3.2      | 0.0       | 1.2      | 1.0      | -1.1    |           |          |
| A-weighted   | 40.6  | 59.8                              | 71.9           | 74.4                  | 79.8      | 77.0      | 73.2     | 68.0     | 58.9    | 83.4      | 70.4     |
| A-weighted Energy  | 11499   | 956475                            | 15512212       | 27585047              | 95647523  | 50196534  | 20925398 | 6319369  | 777452  | 217931510 | 10905518 |
| Xformer, Long, Lw  | 84.7  | 90.7                              | 92.7           | 87.7                  | 87.7      | 81.7      | 76.7     | 71.7     | 64.7    |           |          |
| A-wt Correction  | -39.4   | -26.2                             | -16.1          | -8.6                  | -3.2      | 0.0       | 1.2      | 1.0      | -1.1    |           |          |
| A-weighted   | 45.3  | 64.5                              | 76.6           | 79.1                  | 84.5      | 81.7      | 77.9     | 72.7     | 63.6    | 88.1      | 70.4     |
| A-weighted Energy  | 34056   | 2832638                           | 45940012       | 81694178              | 283263818 | 148658965 | 61971371 | 18715055 | 2302455 | 645412548 | 10905518 |
| Xformer, Top, Lw   | 82.6  | 88.6                              | 90.6           | 85.6                  | 85.6      | 79.6      | 74.6     | 69.6     | 62.6    |           |          |
| A-wt Correction  | -39.4   | -26.2                             | -16.1          | -8.6                  | -3.2      | 0.0       | 1.2      | 1.0      | -1.1    |           |          |
| A-weighted   | 43.2  | 62.4                              | 74.5           | 77.0                  | 82.4      | 79.6      | 75.8     | 70.6     | 61.5    | 86.0      | 70.4     |
| A-weighted Energy  | 20943   | 1741984                           | 28251669       | 50239361              | 174198379 | 91420609  | 38110453 | 11509173 | 1415938 | 396908509 | 10905518 |
| <i>In CadnaA, specify that the sound power level is the total sound power level. Calculate the sound power level at receivers located 1 ft from transformer. Confirm that average pressure level gives NEMA rating. Apply calibration factor if necessary.</i> |   |                                   |                |                       |           |           |          |          |         |           |          |
| Calibration Factor   | -0.1  |                                   |                |                       |           |           |          |          |         |           |          |
| <b>Receiver Location</b>   | <b>Sound Level</b>  | <b>Energy</b>                     |                |                       |           |           |          |          |         |           |          |
| 1  | 70.1  | 10232930                          |                |                       |           |           |          |          |         |           |          |
| 2  | 70.4  | 10964782                          |                |                       |           |           |          |          |         |           |          |
| 3  | 71  | 12589254                          |                |                       |           |           |          |          |         |           |          |
| 4  | 70.4  | 10964782                          |                |                       |           |           |          |          |         |           |          |
| 5  | 70  | 10000000                          |                |                       |           |           |          |          |         |           |          |
| 6  | 70.4  | 10964782                          |                |                       |           |           |          |          |         |           |          |
| 7  | 71  | 12589254                          |                |                       |           |           |          |          |         |           |          |
| 8  | 70.4  | 10964782                          |                |                       |           |           |          |          |         |           |          |
| AVERAGE  | 70  | 11158821 Agrees with NEMA rating. |                |                       |           |           |          |          |         |           |          |

<sup>1</sup> - EEI, 1984. Electric Power Plant Environmental Noise Guide, page 4-17.

|   |   |                        |                          |                 |           |          |          |          |         |           |
|---|---|------------------------|--------------------------|-----------------|-----------|----------|----------|----------|---------|-----------|
| <b>Acentech</b>   |   | West Coast             | Job No. 617109           |                 |           |          |          |          |         |           |
| Acoustical and Environmental Technologies   |   | Consultant: Mark Leger |                          | Date: 6/24/2009 |           |          |          |          |         |           |
| <b>Project:</b>   | San Diego Gas & Electric Company (SDG&E) East County (ECO) Substation Project |                        |                          |                 |           |          |          |          |         |           |
| <b>Client:</b>  | Insignia Environmental  |                        |                          |                 |           |          |          |          |         |           |
| <b>Subject:</b>   | ECO 520/230 kV Transformer  |                        |                          |                 |           |          |          |          |         |           |
| <b>Source ID:</b>   | FAN   |                        |                          |                 |           |          |          |          |         |           |
| <b>Applied to :</b>   | Xformer1 Fan  |                        |                          |                 |           |          |          |          |         |           |
| <i>Use the EEI Spectrum correction<sup>1</sup> to obtain a sound pressure level spectrum.</i>   |   |                        |                          |                 |           |          |          |          |         |           |
| Hz  | 31.5  | 63                     | 125                      | 250             | 500       | 1000     | 2000     | 4000     | 8000    |           |
| NEMA Rating   | 71  |                        |                          |                 |           |          |          |          |         |           |
| Correction  | -3  | 3                      | 5                        | 0               | 0         | -6       | -11      | -16      | -23     |           |
| Close-in Lp, at 2 m   | 68  | 74                     | 76                       | 71              | 71        | 65       | 60       | 55       | 48      |           |
| <i>The NEMA rating for fan is obtained at 2 m. Calculate the sound power correction based on distance (<math>10 \cdot \log(1/(4 \cdot \% \cdot \pi \cdot r^2))</math>). The sphere part is assumed to be 60% because measurements made on flat surface (ground) that is slightly absorptive.</i>    |   |                        |                          |                 |           |          |          |          |         |           |
| Distance, m   | 2   |                        |                          |                 |           |          |          |          |         |           |
| Sphere Part, %  | 60.00   |                        |                          |                 |           |          |          |          |         |           |
| Distance Power Correction   | -14.79421   |                        |                          |                 |           |          |          |          |         |           |
| <i>Subtract the power correction to obtain sound power levels.</i>  |   |                        |                          |                 |           |          |          |          |         |           |
|   | 31.5  | 63                     | 125                      | 250             | 500       | 1000     | 2000     | 4000     | 8000    | Sum       |
| Fan Power, Lw   | 82.8  | 88.8                   | 90.8                     | 85.8            | 85.8      | 79.8     | 74.8     | 69.8     | 62.8    |           |
| A-wt Correction   | -39.4   | -26.2                  | -16.1                    | -8.6            | -3.2      | 0.0      | 1.2      | 1.0      | -1.1    |           |
| A-weighted  | 43.4  | 62.6                   | 74.7                     | 77.2            | 82.6      | 79.8     | 76.0     | 70.8     | 61.7    | 86.2      |
| A-weighted Energy   | 21848   | 1817277                | 29472780                 | 52410838        | 181727690 | 95372047 | 39757687 | 12006629 | 1477138 | 414063935 |
| <i>In CadnaA, rather than calculating the area of each surface of the fan to ensure the same PWL', specify that the sound power level is the sound power level per square foot. Then estimate a calibration factor that will give the NEMA rating at receivers placed 2m from the fan surfaces.</i> |   |                        |                          |                 |           |          |          |          |         |           |
| Calibration Factor  | -10.2   |                        |                          |                 |           |          |          |          |         |           |
|   | <b>Receiver Location</b>  | <b>Sound Level</b>     | <b>Energy</b>            |                 |           |          |          |          |         |           |
|   | 1   | 70.6                   | 11481536                 |                 |           |          |          |          |         |           |
|   | 2   | 71.8                   | 15135612                 |                 |           |          |          |          |         |           |
|   | 3   | 70.7                   | 11748976                 |                 |           |          |          |          |         |           |
|   | 4   | 70.7                   | 11748976                 |                 |           |          |          |          |         |           |
|   | 5   | 71.8                   | 15135612                 |                 |           |          |          |          |         |           |
|   | 6   | 70.7                   | 11748976                 |                 |           |          |          |          |         |           |
| AVERAGE   | 71  | 12833281               | Agrees with NEMA rating. |                 |           |          |          |          |         |           |

<sup>1</sup> - EEI, 1984. Electric Power Plant Environmental Noise Guide, page 4-17.

Attachment 4.10-A: CadnaA Noise Model Inputs and Calculation Sheets

|  |   |                                  |                |                       |           |          |          |          |         |           |          |
|--|---|----------------------------------|----------------|-----------------------|-----------|----------|----------|----------|---------|-----------|----------|
| <b>Acentech</b>  |   | West Coast                       | Job No. 617109 |                       |           |          |          |          |         |           |          |
| Acoustical and Environmental Technologies  |   | Consultant: Mark Leger           |                | Date: 6/24/2009       |           |          |          |          |         |           |          |
| <b>Project:</b>  | San Diego Gas & Electric Company (SDG&E) East County (ECO) Substation Project |                                  |                |                       |           |          |          |          |         |           |          |
| <b>Client:</b>   | Insignia Environmental  |                                  |                |                       |           |          |          |          |         |           |          |
| <b>Subject:</b>  | ECO 230 kV Transformer  |                                  |                |                       |           |          |          |          |         |           |          |
| <b>Source ID:</b>  | XFORM2_S, XFORM2_L, XFORM2_T  |                                  |                |                       |           |          |          |          |         |           |          |
| <b>Applied to :</b>  | Xformer2  |                                  |                |                       |           |          |          |          |         |           |          |
| <i>Use the EEI Spectrum correction<sup>1</sup> to obtain a sound pressure level spectrum.</i>  |   |                                  |                |                       |           |          |          |          |         |           |          |
| Hz   | 31.5  | 63                               | 125            | 250                   | 500       | 1000     | 2000     | 4000     | 8000    |           |          |
| NEMA Rating  | 70  |                                  |                |                       |           |          |          |          |         |           |          |
| Spectrum Correction  | -3  | 3                                | 5              | 0                     | 0         | -6       | -11      | -16      | -23     |           |          |
| Close-in Lp, at 1 ft   | 67  | 73                               | 75             | 70                    | 70        | 64       | 59       | 54       | 47      |           |          |
| <i>Calculate the areas of each source in order to obtain the correction to convert from pressure to power (10*log(1/S)).</i>   |   |                                  |                |                       |           |          |          |          |         |           |          |
|  | L (m)   | W (m)                            | S (m2)         | Area Power Correction |           |          |          |          |         |           |          |
| Xformer, Short   | 3.04  | 5.2                              | 15.81          | -12.0                 |           |          |          |          |         |           |          |
| Xformer, Long  | 6.98  | 5.2                              | 36.30          | -15.6                 |           |          |          |          |         |           |          |
| Xformer, Top   | 2.84  | 6.78                             | 19.26          | -12.8                 |           |          |          |          |         |           |          |
| <i>Subtract the power correction to obtain sound power levels. Divide the power by the area to obtain power per square meter.</i>  |   |                                  |                |                       |           |          |          |          |         |           |          |
|  | 31.5  | 63                               | 125            | 250                   | 500       | 1000     | 2000     | 4000     | 8000    | Sum       | PWL"     |
| Xformer, Short, Lw   | 79.0  | 85.0                             | 87.0           | 82.0                  | 82.0      | 76.0     | 71.0     | 66.0     | 59.0    |           |          |
| A-wt Correction  | -39.4   | -26.2                            | -16.1          | -8.6                  | -3.2      | 0.0      | 1.2      | 1.0      | -1.1    |           |          |
| A-weighted   | 39.6  | 58.8                             | 70.9           | 73.4                  | 78.8      | 76.0     | 72.2     | 67.0     | 57.9    | 82.4      | 70.4     |
| A-weighted Energy  | 9097  | 756618                           | 12270914       | 21821114              | 75661845  | 39707901 | 16553008 | 4998929  | 615003  | 172394429 | 10905518 |
| Xformer, Long, Lw  | 82.6  | 88.6                             | 90.6           | 85.6                  | 85.6      | 79.6     | 74.6     | 69.6     | 62.6    |           |          |
| A-wt Correction  | -39.4   | -26.2                            | -16.1          | -8.6                  | -3.2      | 0.0      | 1.2      | 1.0      | -1.1    |           |          |
| A-weighted   | 43.2  | 62.4                             | 74.5           | 77.0                  | 82.4      | 79.6     | 75.8     | 70.6     | 61.5    | 86.0      | 70.4     |
| A-weighted Energy  | 20886   | 1737236                          | 28174665       | 50102427              | 173723578 | 91171430 | 38006578 | 11477803 | 1412078 | 395826682 | 10905518 |
| Xformer, Top, Lw   | 79.8  | 85.8                             | 87.8           | 82.8                  | 82.8      | 76.8     | 71.8     | 66.8     | 59.8    |           |          |
| A-wt Correction  | -39.4   | -26.2                            | -16.1          | -8.6                  | -3.2      | 0.0      | 1.2      | 1.0      | -1.1    |           |          |
| A-weighted   | 40.4  | 59.6                             | 71.7           | 74.2                  | 79.6      | 76.8     | 73.0     | 67.8     | 58.7    | 83.2      | 70.4     |
| A-weighted Energy  | 11080   | 921612                           | 14946793       | 26579575              | 92161182  | 48366876 | 20162670 | 6089029  | 749114  | 209987930 | 10905518 |
| <i>In CadnaA, specify that the sound power level is the total sound power level. Calculate the sound power level at receivers located 1 ft from transformer. Confirm that average pressure level gives NEMA rating. Apply calibration factor if necessary.</i> |   |                                  |                |                       |           |          |          |          |         |           |          |
| Calibration Factor   | -0.8  |                                  |                |                       |           |          |          |          |         |           |          |
| <b>Receiver Location</b>   | <b>Sound Level</b>  | <b>Energy</b>                    |                |                       |           |          |          |          |         |           |          |
| 1  | 70  | 10000000                         |                |                       |           |          |          |          |         |           |          |
| 2  | 69.6  | 9120108                          |                |                       |           |          |          |          |         |           |          |
| 3  | 70.4  | 10964782                         |                |                       |           |          |          |          |         |           |          |
| 4  | 69.8  | 9549926                          |                |                       |           |          |          |          |         |           |          |
| 5  | 70  | 10000000                         |                |                       |           |          |          |          |         |           |          |
| 6  | 69.8  | 9549926                          |                |                       |           |          |          |          |         |           |          |
| 7  | 70.3  | 10715193                         |                |                       |           |          |          |          |         |           |          |
| 8  | 69.8  | 9549926                          |                |                       |           |          |          |          |         |           |          |
| AVERAGE  | 70  | 9931233 Agrees with NEMA rating. |                |                       |           |          |          |          |         |           |          |

<sup>1</sup> - EEI, 1984. Electric Power Plant Environmental Noise Guide, page 4-17.

Attachment 4.10-A: CadnaA Noise Model Inputs and Calculation Sheets

|   |   |                        |                |                          |           |          |          |          |         |           |
|---|---|------------------------|----------------|--------------------------|-----------|----------|----------|----------|---------|-----------|
| <b>Acentech</b>   |   | West Coast             | Job No. 617109 |                          |           |          |          |          |         |           |
| Acoustical and Environmental Technologies   |   | Consultant: Mark Leger |                | Date: 6/24/2009          |           |          |          |          |         |           |
| <b>Project:</b>   | San Diego Gas & Electric Company (SDG&E) East County (ECO) Substation Project |                        |                |                          |           |          |          |          |         |           |
| <b>Client:</b>  | Insignia Environmental  |                        |                |                          |           |          |          |          |         |           |
| <b>Subject:</b>   | ECO 230 kV Transformer  |                        |                |                          |           |          |          |          |         |           |
| <b>Source ID:</b>   | FAN   |                        |                |                          |           |          |          |          |         |           |
| <b>Applied to :</b>   | Xformer2 Fan  |                        |                |                          |           |          |          |          |         |           |
| <i>Use the EEI Spectrum correction<sup>1</sup> to obtain a sound pressure level spectrum.</i>   |   |                        |                |                          |           |          |          |          |         |           |
| Hz  | 31.5  | 63                     | 125            | 250                      | 500       | 1000     | 2000     | 4000     | 8000    |           |
| NEMA Rating   | 71  |                        |                |                          |           |          |          |          |         |           |
| Correction  | -3  | 3                      | 5              | 0                        | 0         | -6       | -11      | -16      | -23     |           |
| Close-in Lp, at 2 m   | 68  | 74                     | 76             | 71                       | 71        | 65       | 60       | 55       | 48      |           |
| <i>The NEMA rating for fan is obtained at 2 m. Calculate the sound power correction based on distance (<math>10 \cdot \log(1/(4 \cdot \pi \cdot r^2))</math>). The sphere part is assumed to be 60% because measurements made on flat surface (ground) that is slightly absorptive.</i>             |   |                        |                |                          |           |          |          |          |         |           |
| Distance, m   | 2   |                        |                |                          |           |          |          |          |         |           |
| Sphere Part, %  | 60.00   |                        |                |                          |           |          |          |          |         |           |
| Distance Power Correction   | -14.79421106  |                        |                |                          |           |          |          |          |         |           |
| <i>Subtract the power correction to obtain sound power levels.</i>  |   |                        |                |                          |           |          |          |          |         |           |
|   | 31.5  | 63                     | 125            | 250                      | 500       | 1000     | 2000     | 4000     | 8000    | Sum       |
| Fan Power, Lw   | 82.8  | 88.8                   | 90.8           | 85.8                     | 85.8      | 79.8     | 74.8     | 69.8     | 62.8    |           |
| A-wt Correction   | -39.4   | -26.2                  | -16.1          | -8.6                     | -3.2      | 0.0      | 1.2      | 1.0      | -1.1    |           |
| A-weighted  | 43.4  | 62.6                   | 74.7           | 77.2                     | 82.6      | 79.8     | 76.0     | 70.8     | 61.7    | 86.2      |
| A-weighted Energy   | 21848   | 1817277                | 29472780       | 52410838                 | 181727690 | 95372047 | 39757687 | 12006629 | 1477138 | 414063935 |
| <i>In CadnaA, rather than calculating the area of each surface of the fan to ensure the same PWL", specify that the sound power level is the sound power level per square foot. Then estimate a calibration factor that will give the NEMA rating at receivers placed 2m from the fan surfaces.</i> |   |                        |                |                          |           |          |          |          |         |           |
| Calibration Factor  | -9.7  |                        |                |                          |           |          |          |          |         |           |
| <b>Receiver Location</b>  | <b>Sound Level</b>  | <b>Energy</b>          |                |                          |           |          |          |          |         |           |
| 1   | 70.7  | 11748976               |                |                          |           |          |          |          |         |           |
| 2   | 71.7  | 14791084               |                |                          |           |          |          |          |         |           |
| 3   | 70.7  | 11748976               |                |                          |           |          |          |          |         |           |
| 4   | 70.6  | 11481536               |                |                          |           |          |          |          |         |           |
| 5   | 71.6  | 14454398               |                |                          |           |          |          |          |         |           |
| 6   | 70.6  | 11481536               |                |                          |           |          |          |          |         |           |
| AVERAGE   | 71.0  | 12617751               |                | Agrees with NEMA rating. |           |          |          |          |         |           |

<sup>1</sup> - EEI, 1984. Electric Power Plant Environmental Noise Guide, page 4-17.

Attachment 4.10-A: CadnaA Noise Model Inputs and Calculation Sheets

|  |   |                                   |                |                       |          |          |          |         |        |           |          |
|--|---|-----------------------------------|----------------|-----------------------|----------|----------|----------|---------|--------|-----------|----------|
| <b>Acentech</b>  |   | West Coast                        | Job No. 617109 |                       |          |          |          |         |        |           |          |
| Acoustical and Environmental Technologies  |   | Consultant: Mark Leger            |                | Date: 6/24/2009       |          |          |          |         |        |           |          |
| <b>Project:</b>  | San Diego Gas & Electric Company (SDG&E) East County (ECO) Substation Project |                                   |                |                       |          |          |          |         |        |           |          |
| <b>Client:</b>   | Insignia Environmental  |                                   |                |                       |          |          |          |         |        |           |          |
| <b>Subject:</b>  | ECO 69 kV Transformer   |                                   |                |                       |          |          |          |         |        |           |          |
| <b>Source ID:</b>  | XFORM3_S, XFORM3_L, XFORM3_T  |                                   |                |                       |          |          |          |         |        |           |          |
| <b>Applied to :</b>  | Xformer3  |                                   |                |                       |          |          |          |         |        |           |          |
| <i>Use the EEI Spectrum correction<sup>1</sup> to obtain a sound pressure level spectrum.</i>  |   |                                   |                |                       |          |          |          |         |        |           |          |
| Hz   | 31.5  | 63                                | 125            | 250                   | 500      | 1000     | 2000     | 4000    | 8000   |           |          |
| NEMA Rating  | 70  |                                   |                |                       |          |          |          |         |        |           |          |
| Spectrum Correction  | -3  | 3                                 | 5              | 0                     | 0        | -6       | -11      | -16     | -23    |           |          |
| Close-in Lp, at 1 ft   | 67  | 73                                | 75             | 70                    | 70       | 64       | 59       | 54      | 47     |           |          |
| <i>Calculate the areas of each source in order to obtain the correction to convert from pressure to power (10*log(1/S)).</i>   |   |                                   |                |                       |          |          |          |         |        |           |          |
|  | L (m)   | W (m)                             | S (m2)         | Area Power Correction |          |          |          |         |        |           |          |
| Xformer, Short   | 2.53  | 3.66                              | 9.26           | -9.7                  |          |          |          |         |        |           |          |
| Xformer, Long  | 4.89  | 3.66                              | 17.90          | -12.5                 |          |          |          |         |        |           |          |
| Xformer, Top   | 2.33  | 4.69                              | 10.93          | -10.4                 |          |          |          |         |        |           |          |
| <i>Subtract the power correction to obtain sound power levels. Divide the power by the area to obtain power per square meter.</i>  |   |                                   |                |                       |          |          |          |         |        |           |          |
|  | 31.5  | 63                                | 125            | 250                   | 500      | 1000     | 2000     | 4000    | 8000   | Sum       | PWL"     |
| Xformer, Short, Lw   | 76.7  | 82.7                              | 84.7           | 79.7                  | 79.7     | 73.7     | 68.7     | 63.7    | 56.7   |           |          |
| A-wt Correction  | -39.4   | -26.2                             | -16.1          | -8.6                  | -3.2     | 0.0      | 1.2      | 1.0     | -1.1   |           |          |
| A-weighted   | 37.3  | 56.5                              | 68.6           | 71.1                  | 76.5     | 73.7     | 69.9     | 64.7    | 55.6   | 80.0      | 70.4     |
| A-weighted Energy  | 5328  | 443202                            | 7187893        | 12782082              | 44320189 | 23259566 | 9696201  | 2928206 | 360248 | 100982916 | 10905518 |
| Xformer, Long, Lw  | 79.5  | 85.5                              | 87.5           | 82.5                  | 82.5     | 76.5     | 71.5     | 66.5    | 59.5   |           |          |
| A-wt Correction  | -39.4   | -26.2                             | -16.1          | -8.6                  | -3.2     | 0.0      | 1.2      | 1.0     | -1.1   |           |          |
| A-weighted   | 40.1  | 59.3                              | 71.4           | 73.9                  | 79.3     | 76.5     | 72.7     | 67.5    | 58.4   | 82.9      | 70.4     |
| A-weighted Energy  | 10299   | 856623                            | 13892805       | 24705289              | 85662342 | 44956236 | 18740878 | 5659655 | 696290 | 195180418 | 10905518 |
| Xformer, Top, Lw   | 77.4  | 83.4                              | 85.4           | 80.4                  | 80.4     | 74.4     | 69.4     | 64.4    | 57.4   |           |          |
| A-wt Correction  | -39.4   | -26.2                             | -16.1          | -8.6                  | -3.2     | 0.0      | 1.2      | 1.0     | -1.1   |           |          |
| A-weighted   | 38.0  | 57.2                              | 69.3           | 71.8                  | 77.2     | 74.4     | 70.6     | 65.4    | 56.3   | 80.8      | 70.4     |
| A-weighted Energy  | 6288  | 523033                            | 8482596        | 15084425              | 52303261 | 27449141 | 11442707 | 3455642 | 425137 | 119172229 | 10905518 |
| <i>In CadnaA, specify that the sound power level is the total sound power level. Calculate the sound power level at receivers located 1 ft from transformer. Confirm that average pressure level gives NEMA rating. Apply calibration factor if necessary.</i> |   |                                   |                |                       |          |          |          |         |        |           |          |
| Calibration Factor   | 0   |                                   |                |                       |          |          |          |         |        |           |          |
| <b>Receiver Location</b>   | <b>Sound Level</b>  | <b>Energy</b>                     |                |                       |          |          |          |         |        |           |          |
| 1  | 70.2  | 10471285                          |                |                       |          |          |          |         |        |           |          |
| 2  | 69.9  | 9772372.2                         |                |                       |          |          |          |         |        |           |          |
| 3  | 70.2  | 10471285                          |                |                       |          |          |          |         |        |           |          |
| 4  | 70.5  | 11220185                          |                |                       |          |          |          |         |        |           |          |
| 5  | 70.1  | 10232930                          |                |                       |          |          |          |         |        |           |          |
| 6  | 69.9  | 9772372.2                         |                |                       |          |          |          |         |        |           |          |
| 7  | 70.1  | 10232930                          |                |                       |          |          |          |         |        |           |          |
| AVERAGE  | 70  | 10310480 Agrees with NEMA rating. |                |                       |          |          |          |         |        |           |          |

<sup>1</sup> - EEI, 1984. Electric Power Plant Environmental Noise Guide, page 4-17.



Attachment 4.10-A: CadnaA Noise Model Inputs and  
Calculation Sheets

|  |   |                        |               |                 |                |                          |          |          |         |           |
|--|---|------------------------|---------------|-----------------|----------------|--------------------------|----------|----------|---------|-----------|
| <b>Acentech</b>  |   | West Coast             |               |                 | Job No. 617109 |                          |          |          |         |           |
| Acoustical and Environmental Technologies  |   | Consultant: Mark Leger |               | Date: 6/24/2009 |                |                          |          |          |         |           |
| <b>Project:</b>  | San Diego Gas & Electric Company (SDG&E) East County (ECO) Substation Project |                        |               |                 |                |                          |          |          |         |           |
| <b>Client:</b>   | Insignia Environmental  |                        |               |                 |                |                          |          |          |         |           |
| <b>Subject:</b>  | ECO 69 kV Transformer   |                        |               |                 |                |                          |          |          |         |           |
| <b>Source ID:</b>  | FAN   |                        |               |                 |                |                          |          |          |         |           |
| <b>Applied to :</b>  | Xformer3 Fan  |                        |               |                 |                |                          |          |          |         |           |
| <i>Use the EEI Spectrum correction<sup>1</sup> to obtain a sound pressure level spectrum.</i>  |   |                        |               |                 |                |                          |          |          |         |           |
| Hz   | 31.5  | 63                     | 125           | 250             | 500            | 1000                     | 2000     | 4000     | 8000    |           |
| NEMA Rating  | 71  |                        |               |                 |                |                          |          |          |         |           |
| Correction   | -3  | 3                      | 5             | 0               | 0              | -6                       | -11      | -16      | -23     |           |
| Close-in Lp, at 2 m  | 68  | 74                     | 76            | 71              | 71             | 65                       | 60       | 55       | 48      |           |
| <i>The NEMA rating for fan is obtained at 2 m. Calculate the sound power correction based on distance (<math>10 \cdot \log(1/(4 \cdot \pi \cdot r^2))</math>). The sphere part is assumed to be 60% because measurements made on flat surface (ground) that is slightly absorptive.</i>                        |   |                        |               |                 |                |                          |          |          |         |           |
| Distance, m  | 2   |                        |               |                 |                |                          |          |          |         |           |
| Sphere Part, %   | 60.00   |                        |               |                 |                |                          |          |          |         |           |
| Distance Power Correction  | -14.79421106  |                        |               |                 |                |                          |          |          |         |           |
| <i>Subtract the power correction to obtain sound power levels.</i>   |   |                        |               |                 |                |                          |          |          |         |           |
|  | 31.5  | 63                     | 125           | 250             | 500            | 1000                     | 2000     | 4000     | 8000    | Sum       |
| Fan Power, Lw  | 82.8  | 88.8                   | 90.8          | 85.8            | 85.8           | 79.8                     | 74.8     | 69.8     | 62.8    |           |
| A-wt Correction  | -39.4   | -26.2                  | -16.1         | -8.6            | -3.2           | 0.0                      | 1.2      | 1.0      | -1.1    |           |
| A-weighted   | 43.4  | 62.6                   | 74.7          | 77.2            | 82.6           | 79.8                     | 76.0     | 70.8     | 61.7    | 86.2      |
| A-weighted Energy  | 21848   | 1817277                | 29472780      | 52410838        | 181727690      | 95372047                 | 39757687 | 12006629 | 1477138 | 414063935 |
| <i>In CadnaA, rather than calculating the area of each surface of the fan to ensure the same PWL<sup>1</sup>, specify that the sound power level is the sound power level per square foot. Then estimate a calibration factor that will give the NEMA rating at receivers placed 2m from the fan surfaces.</i> |   |                        |               |                 |                |                          |          |          |         |           |
| Calibration Factor   | -8.3  |                        |               |                 |                |                          |          |          |         |           |
|  | <b>Receiver Location</b>  | <b>Sound Level</b>     | <b>Energy</b> |                 |                |                          |          |          |         |           |
|  | 1   | 71.3                   | 13489629      |                 |                |                          |          |          |         |           |
|  | 2   | 71                     | 12589254      |                 |                |                          |          |          |         |           |
|  | 3   | 72                     | 15848932      |                 |                |                          |          |          |         |           |
|  | 4   | 71                     | 12589254      |                 |                |                          |          |          |         |           |
|  | 5   | 71.4                   | 13803843      |                 |                |                          |          |          |         |           |
| AVERAGE  |   | 71.4                   | 13664182      |                 |                | Agrees with NEMA rating. |          |          |         |           |

<sup>1</sup> - EEI, 1984. Electric Power Plant Environmental Noise Guide, page 4-17.

Attachment 4.10-A: CadnaA Noise Model Inputs and Calculation Sheets

|   |   |                        |               |                            |      |           |      |      |      |           |
|---|---|------------------------|---------------|----------------------------|------|-----------|------|------|------|-----------|
| <b>Acentech</b>   |   | West Coast             |               | Job No. 617109             |      |           |      |      |      |           |
| Acoustical and Environmental Technologies   |   | Consultant: Mark Leger |               | Date: 6/24/2009            |      |           |      |      |      |           |
| <b>Project:</b>   | San Diego Gas & Electric Company (SDG&E) East County (ECO) Substation Project |                        |               |                            |      |           |      |      |      |           |
| <b>Client:</b>  | Insignia Environmental  |                        |               |                            |      |           |      |      |      |           |
| <b>Subject:</b>   | ECO Shunt Reactors  |                        |               |                            |      |           |      |      |      |           |
| <b>Source ID:</b>   | SHUNT   |                        |               |                            |      |           |      |      |      |           |
| <b>Applied to :</b>   | Shunt Reactor   |                        |               |                            |      |           |      |      |      |           |
| <i>Shunt reactors are specified as having sound pressure level of 68 dBA at 6 ft.</i>   |   |                        |               |                            |      |           |      |      |      |           |
| Hz  | 31.5  | 63                     | 125           | 250                        | 500  | 1000      | 2000 | 4000 | 8000 |           |
| Lp, 6 ft  | 0   | 0                      | 0             | 0                          | 0    | 68        | 0    | 0    | 0    |           |
| <i>Calculate the sound power correction based on distance (<math>10 \cdot \log(1/(4 \cdot \% \cdot \pi \cdot r^2))</math>). The sphere part is assumed to be 60% because measurements made on flat surface (ground) that is slightly absorptive.</i>                              |   |                        |               |                            |      |           |      |      |      |           |
| Distance, m   | 1.83  |                        |               |                            |      |           |      |      |      |           |
| Sphere Part, %  | 60.00   |                        |               |                            |      |           |      |      |      |           |
| Distance Power Correction   | -14.02263294  |                        |               |                            |      |           |      |      |      |           |
| <i>Subtract the power correction to obtain sound power levels.</i>  |   |                        |               |                            |      |           |      |      |      |           |
|   | 31.5  | 63                     | 125           | 250                        | 500  | 1000      | 2000 | 4000 | 8000 | Sum       |
| Fan Power, Lw   | 14.0  | 14.0                   | 14.0          | 14.0                       | 14.0 | 82.0      | 14.0 | 14.0 | 14.0 |           |
| A-wt Correction   | -39.4   | -26.2                  | -16.1         | -8.6                       | -3.2 | 0.0       | 1.2  | 1.0  | -1.1 |           |
| A-weighted  | -25.4   | -12.2                  | -2.1          | 5.4                        | 10.8 | 82.0      | 15.2 | 15.0 | 12.9 | 82.0      |
| A-weighted Energy   | 0.0   | 0.1                    | 0.6           | 3.5                        | 12.1 | 159317431 | 33.3 | 31.8 | 19.6 | 159317532 |
| <i>In CadnaA, rather than calculating the area of each surface of the shunt reactor to ensure the same PWL, specify that the sound power level is the sound power level per square foot. Then estimate a calibration factor that will give 68 dBA at receivers placed 6 feet.</i> |   |                        |               |                            |      |           |      |      |      |           |
| Calibration Factor  | -5.6  |                        |               |                            |      |           |      |      |      |           |
|   | <b>Receiver Location</b>  | <b>Sound Level</b>     | <b>Energy</b> |                            |      |           |      |      |      |           |
|   | 1   | 67.8                   | 6025596       |                            |      |           |      |      |      |           |
|   | 2   | 68.2                   | 6606934       |                            |      |           |      |      |      |           |
|   | 3   | 68.1                   | 6456542       |                            |      |           |      |      |      |           |
|   | 4   | 67.8                   | 6025596       |                            |      |           |      |      |      |           |
|   | 5   | 68.1                   | 6456542       |                            |      |           |      |      |      |           |
|   | 6   | 67.9                   | 6165950       |                            |      |           |      |      |      |           |
| AVERAGE   |   | 68.0                   | 6289527       | Agrees with specification. |      |           |      |      |      |           |

## 1.0.2 CadnaA Model Input – Operation

### Area Source

| ID            | PWL          | PWL"         | Lw / Li |          |                | Correction   |
|---------------|--------------|--------------|---------|----------|----------------|--------------|
|               | Day<br>(dBA) | Day<br>(dBA) | Type    | Value    | norm.<br>dB(A) | Day<br>dB(A) |
| Shunt Reactor | 93.1         | 76.4         | Lw"     | SHUNT    |                | -5.6         |
| Xformer1      | 85.9         | 70.3         | Lw      | XFORM1_T |                | -0.1         |
| Xformer1 Fan  | 87           | 76           | Lw"     | FAN      |                | -10.2        |
| Xformer2      | 82.4         | 69.6         | Lw      | XFORM2_T |                | -0.8         |
| Xformer2 Fan  | 84.9         | 76.5         | Lw"     | FAN      |                | -9.7         |
| Xformer3      | 80.8         | 70.4         | Lw      | XFORM3_T |                | 0            |
| Xformer3 Fan  | 85.9         | 77.9         | Lw"     | FAN      |                | -8.3         |

### Vertical Area Source

| ID              | PWL          | PWL"         | Lw / Li |          |                | Correction   |
|-----------------|--------------|--------------|---------|----------|----------------|--------------|
|                 | Day<br>(dBA) | Day<br>(dBA) | Type    | Value    | norm.<br>dB(A) | Day<br>dB(A) |
| Shunt Reactor N | 84.8         | 76.4         | Lw"     | SHUNT    |                | -5.6         |
| Shunt Reactor E | 85           | 76.4         | Lw"     | SHUNT    |                | -5.6         |
| Shunt Reactor S | 84.8         | 76.4         | Lw"     | SHUNT    |                | -5.6         |
| Shunt Reactor W | 85           | 76.4         | Lw"     | SHUNT    |                | -5.6         |
| Xformer1 W      | 88           | 70.3         | Lw      | XFORM1_L |                | -0.1         |
| Xformer1 E      | 88           | 70.3         | Lw      | XFORM1_L |                | -0.1         |
| Xformer1 N      | 83.3         | 70.3         | Lw      | XFORM1_S |                | -0.1         |
| Xformer1 S      | 83.3         | 70.3         | Lw      | XFORM1_S |                | -0.1         |
| Xformer1 Fan N  | 86.3         | 76           | Lw"     | FAN      |                | -10.2        |
| Xformer1 Fan E  | 92.1         | 76           | Lw"     | FAN      |                | -10.2        |
| Xformer1 Fan S  | 86.3         | 76           | Lw"     | FAN      |                | -10.2        |
| Xformer1 Fan W  | 92.1         | 76           | Lw"     | FAN      |                | -10.2        |
| Xformer2 E      | 85.2         | 69.6         | Lw      | XFORM2_L |                | -0.8         |
| Xformer2 W      | 85.2         | 69.6         | Lw      | XFORM2_L |                | -0.8         |
| Xformer2 N      | 81.6         | 69.6         | Lw      | XFORM2_S |                | -0.8         |
| Xformer2 S      | 81.6         | 69.6         | Lw      | XFORM2_S |                | -0.8         |
| Xformer2 Fan N  | 85.7         | 76.5         | Lw"     | FAN      |                | -9.7         |
| Xformer2 Fan E  | 90.7         | 76.5         | Lw"     | FAN      |                | -9.7         |
| Xformer2 Fan S  | 85.7         | 76.5         | Lw"     | FAN      |                | -9.7         |
| Xformer2 Fan W  | 90.7         | 76.5         | Lw"     | FAN      |                | -9.7         |
| Xformer3 N      | 82.9         | 70.4         | Lw      | XFORM3_L |                | 0            |
| Xformer3 S      | 82.9         | 70.4         | Lw      | XFORM3_L |                | 0            |
| Xformer3 W      | 80           | 70.4         | Lw      | XFORM3_S |                | 0            |
| Xformer3 E      | 80           | 70.4         | Lw      | XFORM3_S |                | 0            |
| Xformer3 Fan W  | 85.7         | 77.9         | Lw"     | FAN      |                | -8.3         |
| Xformer3 Fan N  | 90.1         | 77.9         | Lw"     | FAN      |                | -8.3         |
| Xformer3 Fan E  | 85.7         | 77.9         | Lw"     | FAN      |                | -8.3         |
| Xformer3 Fan S  | 90.1         | 77.9         | Lw"     | FAN      |                | -8.3         |

### Sound Levels

| Name                     | ID       | Type   | Octave Spectrum (dB) |      |      |      |      |      |      |      |      |      | A    | lin      | Source |
|--------------------------|----------|--------|----------------------|------|------|------|------|------|------|------|------|------|------|----------|--------|
|                          |          |        | 31.5                 | 63   | 125  | 250  | 500  | 1000 | 2000 | 4000 | 8000 |      |      |          |        |
| Transformer Top          | XFORM1_T | Lw (c) | 82.6                 | 88.6 | 90.6 | 85.6 | 85.6 | 79.6 | 74.6 | 69.6 | 62.6 | 86   | 94.7 | E EI EPP |        |
| Transformer, Short Side  | XFORM1_S | Lw (c) | 80                   | 86   | 88   | 83   | 83   | 77   | 72   | 67   | 60   | 83.4 | 92   | E EI EPP |        |
| Transformer, Long Side   | XFORM1_L | Lw (c) | 84.7                 | 90.7 | 92.7 | 87.7 | 87.7 | 81.7 | 76.7 | 71.7 | 64.7 | 88.1 | 96.8 | E EI EPP |        |
| Transformer Fan          | FAN      | Lw (c) | 82.8                 | 88.8 | 90.8 | 85.8 | 85.8 | 79.8 | 74.8 | 69.8 | 62.8 | 86.2 | 94.8 | E EI EPP |        |
| Transformer Top          | XFORM2_T | Lw (c) | 79.8                 | 85.8 | 87.8 | 82.8 | 82.8 | 76.8 | 71.8 | 66.8 | 59.8 | 83.2 | 91.9 | E EI EPP |        |
| Transformer Short Side   | XFORM2_S | Lw (c) | 79                   | 85   | 87   | 82   | 82   | 76   | 71   | 66   | 59   | 82.4 | 91   | E EI EPP |        |
| Transformer Long Side    | XFORM2_L | Lw (c) | 82.6                 | 88.6 | 90.6 | 85.6 | 85.6 | 79.6 | 74.6 | 69.6 | 62.6 | 86   | 94.6 | E EI EPP |        |
| Transformer 3 Top        | XFORM3_T | Lw (c) | 77.4                 | 83.4 | 85.4 | 80.4 | 80.4 | 74.4 | 69.4 | 64.4 | 57.4 | 80.8 | 89.4 | E EI EPP |        |
| Transformer 3 Short Side | XFORM3_S | Lw (c) | 76.7                 | 82.7 | 84.7 | 79.7 | 79.7 | 73.7 | 68.7 | 63.7 | 56.7 | 80   | 88.7 | E EI EPP |        |
| Transformer 3 Long Side  | XFORM3_L | Lw (c) | 79.5                 | 85.5 | 87.5 | 82.5 | 82.5 | 76.5 | 71.5 | 66.5 | 59.5 | 82.9 | 91.6 | E EI EPP |        |
| Shunt Reactor            | SHUNT    | Lw (c) | 14                   | 14   | 14   | 14   | 14   | 82   | 14   | 14   | 14   | 82   | 82   | E EI EPP |        |

Lw = Sound Power Level

Lw" = Sound Power Level/sqm

E EI EPP. Edison Electric Institute, *Electric Power Plant Environmental Noise Guide*, page 4-17, 1984.

## 1.1 BOULEVARD SUBSTATION

### 1.1.0 CadnaA Model Input – Construction

#### Area Source

| Name              | Result. PWL |         |       | Result. PWL'' |         |       | Lw / Li |              |         |
|-------------------|-------------|---------|-------|---------------|---------|-------|---------|--------------|---------|
|                   | Day         | Evening | Night | Day           | Evening | Night | Type    | Value        | norm.   |
|                   | (dBA)       | (dBA)   | (dBA) | (dBA)         | (dBA)   | (dBA) |         |              | (dB(A)) |
| Site Construction | 124.7       | 124.7   | 124.7 | 82.4          | 82.4    | 82.4  | Lw      | DIESEL+129.4 |         |

#### Sound Levels

| Name   | ID     | Type | Octave Spectrum (dB) |     |     |     |     |      |      |      |      |      | Source |     |         |
|--------|--------|------|----------------------|-----|-----|-----|-----|------|------|------|------|------|--------|-----|---------|
|        |        |      | 31.5                 | 63  | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | A    |        | lin |         |
| Diesel | DIESEL | Lw   | -10                  | -11 | -6  | -3  | -8  | -10  | -13  | -19  | -25  | -4.7 |        | 1   | EEL EPP |

#### Roads

| Name        | ID      | Lme   |         |       | Exact Count Data   |         |       |            |         |       | Speed Limit |        |
|-------------|---------|-------|---------|-------|--------------------|---------|-------|------------|---------|-------|-------------|--------|
|             |         | Day   | Evening | Night | Number of Vehicles |         |       | Trucks (%) |         |       | Auto        | Truck  |
|             |         | (dBA) | (dBA)   | (dBA) | Day                | Evening | Night | Day        | Evening | Night | (km/h)      | (km/h) |
| Access Road | ROAD_01 | 42.6  | -5.8    | -5.8  | 3                  | 0       | 0     | 17         | 0       | 0     | 24          | 16     |
| Access Road | ROAD_02 | 42.6  | -5.8    | -5.8  | 3                  | 0       | 0     | 17         | 0       | 0     | 24          | 16     |

### 1.1.1 CadnaA Model Input and Calculation Sheets – Operation

|  |   |                                    |                     |                       |            |            |            |           |          |             |           |
|--|---|------------------------------------|---------------------|-----------------------|------------|------------|------------|-----------|----------|-------------|-----------|
| <b>Acentech</b>  |   | West Coast                         | Job No. 617109      |                       |            |            |            |           |          |             |           |
| Acoustical and Environmental Technologies  |   | Consultant: Mark Leger             |                     | Date: 6/24/2009       |            |            |            |           |          |             |           |
| <b>Project:</b>  | San Diego Gas & Electric Company (SDG&E) East County (ECO) Substation Project |                                    |                     |                       |            |            |            |           |          |             |           |
| <b>Client:</b>   | Insignia Environmental  |                                    |                     |                       |            |            |            |           |          |             |           |
| <b>Subject:</b>  | Boulevard 138/12 kV Transformer, Off-Peak                                     |                                    |                     |                       |            |            |            |           |          |             |           |
| <b>Source ID:</b>  | XFORM_01_S, XFORM_01_L, XFORM_01_T  |                                    |                     |                       |            |            |            |           |          |             |           |
| <b>Applied to :</b>  | Xformer 1, Xformer 2  |                                    |                     |                       |            |            |            |           |          |             |           |
| <i>Use the EEI Spectrum correction<sup>1</sup> to obtain a sound pressure level spectrum.</i>  |   |                                    |                     |                       |            |            |            |           |          |             |           |
| Hz   | 31.5  | 63                                 | 125                 | 250                   | 500        | 1000       | 2000       | 4000      | 8000     |             |           |
| NEMA Rating  | 67  |                                    |                     |                       |            |            |            |           |          |             |           |
| Spectrum Correction  | -3  | 3                                  | 5                   | 0                     | 0          | -6         | -11        | -16       | -23      |             |           |
| Close-in Lp, at 1 ft   | 64  | 70                                 | 72                  | 67                    | 67         | 61         | 56         | 51        | 44       |             |           |
| <i>Calculate the areas of each source in order to obtain the correction to convert from pressure to power (10*log(1/S)).</i>   |   |                                    |                     |                       |            |            |            |           |          |             |           |
|  | L (m)   | W (m)                              | S (m <sup>2</sup> ) | Area Power Correction |            |            |            |           |          |             |           |
| Xformer, Short   | 2.57  | 3.66                               | 9.4062              | -9.7                  |            |            |            |           |          |             |           |
| Xformer, Long  | 5.65  | 3.66                               | 20.679              | -13.2                 |            |            |            |           |          |             |           |
| Xformer, Top   | 2.37  | 5.45                               | 12.9165             | -11.1                 |            |            |            |           |          |             |           |
| <i>Subtract the power correction to obtain sound power levels. Divide the power by the area to obtain power per square meter.</i>  |   |                                    |                     |                       |            |            |            |           |          |             |           |
|  | 31.5  | 63                                 | 125                 | 250                   | 500        | 1000       | 2000       | 4000      | 8000     | Sum         | PWL"      |
| Xformer, Short, Lw   | 73.7  | 79.7                               | 81.7                | 76.7                  | 76.7       | 70.7       | 65.7       | 60.7      | 53.7     |             |           |
| A-wt Correction  | -39.4   | -26.2                              | -16.1               | -8.6                  | -3.2       | 0.0        | 1.2        | 1.0       | -1.1     |             |           |
| A-weighted   | 34.3  | 53.5                               | 65.6                | 68.1                  | 73.5       | 70.7       | 66.9       | 61.7      | 52.6     | 77.1        | 67.4      |
| A-weighted Energy  | 2712.8  | 225639.0                           | 3659436.4           | 6507500.5             | 22563902.2 | 11841704.2 | 4936443.9  | 1490782.2 | 183406.3 | 51411527.6  | 5465706.4 |
| Xformer, Long, Lw  | 77.2  | 83.2                               | 85.2                | 80.2                  | 80.2       | 74.2       | 69.2       | 64.2      | 57.2     |             |           |
| A-wt Correction  | -39.4   | -26.2                              | -16.1               | -8.6                  | -3.2       | 0.0        | 1.2        | 1.0       | -1.1     |             |           |
| A-weighted   | 37.8  | 57.0                               | 69.1                | 71.6                  | 77.0       | 74.2       | 70.4       | 65.2      | 56.1     | 80.5        | 67.4      |
| A-weighted Energy  | 5963.9  | 496054.7                           | 8045064.6           | 14306372.6            | 49605465.9 | 26033318.6 | 10852493.5 | 3277400.6 | 403208.4 | 113025342.7 | 5465706.4 |
| Xformer, Top, Lw   | 75.1  | 81.1                               | 83.1                | 78.1                  | 78.1       | 72.1       | 67.1       | 62.1      | 55.1     |             |           |
| A-wt Correction  | -39.4   | -26.2                              | -16.1               | -8.6                  | -3.2       | 0.0        | 1.2        | 1.0       | -1.1     |             |           |
| A-weighted   | 35.7  | 54.9                               | 67.0                | 69.5                  | 74.9       | 72.1       | 68.3       | 63.1      | 54.0     | 78.5        | 67.4      |
| A-weighted Energy  | 3725.2  | 309845.3                           | 5025101.6           | 8936034.7             | 30984525.4 | 16260910.1 | 6778675.6  | 2047127.3 | 251851.7 | 70597796.8  | 5465706.4 |
| <i>In CadnaA, specify that the sound power level is the total sound power level. Calculate the sound power level at receivers located 1 ft from transformer. Confirm that average pressure level gives NEMA rating. Apply calibration factor if necessary.</i> |   |                                    |                     |                       |            |            |            |           |          |             |           |
| Calibration Factor   | 0   |                                    |                     |                       |            |            |            |           |          |             |           |
| <b>Receiver Location</b>   | <b>Sound Level</b>  | <b>Energy</b>                      |                     |                       |            |            |            |           |          |             |           |
| 1  | 66.9  | 4897788.2                          |                     |                       |            |            |            |           |          |             |           |
| 2  | 66.3  | 4265795.2                          |                     |                       |            |            |            |           |          |             |           |
| 3  | 67.6  | 5754399.4                          |                     |                       |            |            |            |           |          |             |           |
| 4  | 66.4  | 4365158.3                          |                     |                       |            |            |            |           |          |             |           |
| 5  | 67  | 5011872.3                          |                     |                       |            |            |            |           |          |             |           |
| 6  | 66.3  | 4265795.2                          |                     |                       |            |            |            |           |          |             |           |
| 7  | 67.9  | 6165950                            |                     |                       |            |            |            |           |          |             |           |
| 8  | 66.3  | 4265795.2                          |                     |                       |            |            |            |           |          |             |           |
| AVERAGE  | 67  | 4874069.2 Agrees with NEMA rating. |                     |                       |            |            |            |           |          |             |           |

<sup>1</sup> - EEI, 1984. Electric Power plant Environmental Noise Guide, page 4-17.

Attachment 4.10-A: CadnaA Noise Model Inputs and Calculation Sheets

|  |   |                        |               |                          |            |            |            |           |          |             |
|--|---|------------------------|---------------|--------------------------|------------|------------|------------|-----------|----------|-------------|
| <b>Acentech</b>  |   | West Coast             |               | Job No. 617109           |            |            |            |           |          |             |
| Acoustical and Environmental Technologies  |   | Consultant: Mark Leger |               | Date: 6/24/2009          |            |            |            |           |          |             |
| <b>Project:</b>  | San Diego Gas & Electric Company (SDG&E) East County (ECO) Substation Project |                        |               |                          |            |            |            |           |          |             |
| <b>Client:</b>   | Insignia Environmental  |                        |               |                          |            |            |            |           |          |             |
| <b>Subject:</b>  | Boulevard 138/12 kV Transformer Fan, Off-Peak                                 |                        |               |                          |            |            |            |           |          |             |
| <b>Source ID:</b>  | FAN   |                        |               |                          |            |            |            |           |          |             |
| <b>Applied to :</b>  | Xformer 1 Fan, Xformer 2 Fan  |                        |               |                          |            |            |            |           |          |             |
| <i>Use the EEI Spectrum correction<sup>1</sup> to obtain a sound pressure level spectrum.</i>  |   |                        |               |                          |            |            |            |           |          |             |
| Hz   | 31.5  | 63                     | 125           | 250                      | 500        | 1000       | 2000       | 4000      | 8000     |             |
| NEMA Rating  | 68  |                        |               |                          |            |            |            |           |          |             |
| Correction   | -3  | 3                      | 5             | 0                        | 0          | -6         | -11        | -16       | -23      |             |
| Close-in Lp, at 2 m  | 65  | 71                     | 73            | 68                       | 68         | 62         | 57         | 52        | 45       |             |
| <i>The NEMA rating for fan is obtained at 2 m. Calculate the sound power correction based on distance (<math>10 \cdot \log(1/(4 \cdot \pi \cdot r^2))</math>). The sphere part is assumed to be 60% because measurements made on flat surface (ground) that is slightly absorptive.</i>                        |   |                        |               |                          |            |            |            |           |          |             |
| Distance, m  | 2   |                        |               |                          |            |            |            |           |          |             |
| Sphere Part, %   | 60.00   |                        |               |                          |            |            |            |           |          |             |
| Distance Power Correction  | -14.79421106  |                        |               |                          |            |            |            |           |          |             |
| <i>Subtract the power correction to obtain sound power levels.</i>   |   |                        |               |                          |            |            |            |           |          |             |
|  | 31.5  | 63                     | 125           | 250                      | 500        | 1000       | 2000       | 4000      | 8000     | Sum         |
| Fan Power, Lw  | 79.8  | 85.8                   | 87.8          | 82.8                     | 82.8       | 76.8       | 71.8       | 66.8      | 59.8     |             |
| A-wt Correction  | -39.4   | -26.2                  | -16.1         | -8.6                     | -3.2       | 0.0        | 1.2        | 1.0       | -1.1     |             |
| A-weighted   | 40.4  | 59.6                   | 71.7          | 74.2                     | 79.6       | 76.8       | 73.0       | 67.8      | 58.7     | 83.2        |
| A-weighted Energy  | 10950.2   | 910796.0               | 14771381.2    | 26267643.0               | 91079598.1 | 47799252.6 | 19926045.0 | 6017569.4 | 740322.8 | 207523558.2 |
| <i>In CadnaA, rather than calculating the area of each surface of the fan to ensure the same PWL<sup>1</sup>, specify that the sound power level is the sound power level per square foot. Then estimate a calibration factor that will give the NEMA rating at receivers placed 2m from the fan surfaces.</i> |   |                        |               |                          |            |            |            |           |          |             |
| Calibration Factor   | -9  |                        |               |                          |            |            |            |           |          |             |
|  | <b>Receiver Location</b>  | <b>Sound Level</b>     | <b>Energy</b> |                          |            |            |            |           |          |             |
|  | 1   | 67                     | 5011872       |                          |            |            |            |           |          |             |
|  | 2   | 68.3                   | 6760830       |                          |            |            |            |           |          |             |
|  | 3   | 68.6                   | 7244360       |                          |            |            |            |           |          |             |
|  | 4   | 68.1                   | 6456542       |                          |            |            |            |           |          |             |
|  | 5   | 67.9                   | 6165950       |                          |            |            |            |           |          |             |
|  | 6   | 66.8                   | 4786301       |                          |            |            |            |           |          |             |
| AVERAGE  |   | 68                     | 6070976       | Agrees with NEMA rating. |            |            |            |           |          |             |

<sup>1</sup> - EEI, 1984. Electric Power plant Environmental Noise Guide, page 4-17.

Attachment 4.10-A: CadnaA Noise Model Inputs and Calculation Sheets

|  |   |                                    |                        |                       |                |            |            |           |          |             |           |
|--|---|------------------------------------|------------------------|-----------------------|----------------|------------|------------|-----------|----------|-------------|-----------|
| <b>Acentech</b>  |   | West Coast                         | Consultant: Mark Leger |                       | Job No. 617109 |            |            |           |          |             |           |
| Acoustical and Environmental Technologies  |   |                                    |                        | Date: 6/24/2009       |                |            |            |           |          |             |           |
| <b>Project:</b>  | San Diego Gas & Electric Company (SDG&E) East County (ECO) Substation Project |                                    |                        |                       |                |            |            |           |          |             |           |
| <b>Client:</b>   | Insignia Environmental  |                                    |                        |                       |                |            |            |           |          |             |           |
| <b>Subject:</b>  | Boulevard 138/69 kV Transformer, Off-Peak                                     |                                    |                        |                       |                |            |            |           |          |             |           |
| <b>Source ID:</b>  | XFORM_02_S, XFORM_02_L, XFORM_02_T  |                                    |                        |                       |                |            |            |           |          |             |           |
| <b>Applied to:</b>   | Big Xformer   |                                    |                        |                       |                |            |            |           |          |             |           |
| <i>Use the EEI Spectrum correction<sup>1</sup> to obtain a sound pressure level spectrum.</i>  |   |                                    |                        |                       |                |            |            |           |          |             |           |
| Hz   | 31.5  | 63                                 | 125                    | 250                   | 500            | 1000       | 2000       | 4000      | 8000     |             |           |
| NEMA Rating  | 67  |                                    |                        |                       |                |            |            |           |          |             |           |
| Spectrum Correction  | -3  | 3                                  | 5                      | 0                     | 0              | -6         | -11        | -16       | -23      |             |           |
| Close-in Lp, at 1 ft   | 64  | 70                                 | 72                     | 67                    | 67             | 61         | 56         | 51        | 44       |             |           |
| <i>Calculate the areas of each source in order to obtain the correction to convert from pressure to power (10*log(1/S)).</i>   |   |                                    |                        |                       |                |            |            |           |          |             |           |
|  | L (m)   | W (m)                              | S (m <sup>2</sup> )    | Area Power Correction |                |            |            |           |          |             |           |
| Xformer, Short   | 2.77  | 4.65                               | 12.8805                | -11.099327            |                |            |            |           |          |             |           |
| Xformer, Long  | 8.47  | 4.65                               | 39.3855                | -15.953364            |                |            |            |           |          |             |           |
| Xformer, Top   | 2.57  | 8.27                               | 21.2539                | -13.274386            |                |            |            |           |          |             |           |
| <i>Subtract the power correction to obtain sound power levels. Divide the power by the area to obtain power per square meter.</i>  |   |                                    |                        |                       |                |            |            |           |          |             |           |
|  | 31.5  | 63                                 | 125                    | 250                   | 500            | 1000       | 2000       | 4000      | 8000     | Sum         | PWL"      |
| Xformer, Short, Lw   | 75.1  | 81.1                               | 83.1                   | 78.1                  | 78.1           | 72.1       | 67.1       | 62.1      | 55.1     |             |           |
| A-wt Correction  | -39.4   | -26.2                              | -16.1                  | -8.6                  | -3.2           | 0.0        | 1.2        | 1.0       | -1.1     |             |           |
| A-weighted   | 35.7  | 54.9                               | 67.0                   | 69.5                  | 74.9           | 72.1       | 68.3       | 63.1      | 54.0     | 78.5        | 67.4      |
| A-weighted Energy  | 3714.8  | 308981.7                           | 5011096.0              | 8911128.8             | 30898167.4     | 16215588.8 | 6759782.5  | 2041421.7 | 251149.7 | 70401031.3  | 5465706.4 |
| Xformer, Long, Lw  | 80.0  | 86.0                               | 88.0                   | 83.0                  | 83.0           | 77.0       | 72.0       | 67.0      | 60.0     |             |           |
| A-wt Correction  | -39.4   | -26.2                              | -16.1                  | -8.6                  | -3.2           | 0.0        | 1.2        | 1.0       | -1.1     |             |           |
| A-weighted   | 40.6  | 59.8                               | 71.9                   | 74.4                  | 79.8           | 77.0       | 73.2       | 68.0      | 58.9     | 83.3        | 67.4      |
| A-weighted Energy  | 11358.9   | 944792.3                           | 15322737.6             | 27248108.7            | 94479233.9     | 49583406.8 | 20669804.2 | 6242181.1 | 767956.0 | 215269579.6 | 5465706.4 |
| Xformer, Top, Lw   | 77.3  | 83.3                               | 85.3                   | 80.3                  | 80.3           | 74.3       | 69.3       | 64.3      | 57.3     |             |           |
| A-wt Correction  | -39.4   | -26.2                              | -16.1                  | -8.6                  | -3.2           | 0.0        | 1.2        | 1.0       | -1.1     |             |           |
| A-weighted   | 37.9  | 57.1                               | 69.2                   | 71.7                  | 77.1           | 74.3       | 70.5       | 65.3      | 56.2     | 80.7        | 67.4      |
| A-weighted Energy  | 6129.7  | 509845.5                           | 8268726.6              | 14704106.3            | 50984555.0     | 26757074.8 | 11154205.3 | 3368516.1 | 414418.0 | 116167577.4 | 5465706.4 |
| <i>In CadnaA, specify that the sound power level is the total sound power level. Calculate the sound power level at receivers located 1 ft from transformer. Confirm that average pressure level gives NEMA rating. Apply calibration factor if necessary.</i> |   |                                    |                        |                       |                |            |            |           |          |             |           |
| Calibration Factor   | 0   |                                    |                        |                       |                |            |            |           |          |             |           |
| <b>Receiver Location</b>   | <b>Sound Level</b>  | <b>Energy</b>                      |                        |                       |                |            |            |           |          |             |           |
| 1  | 67.1  | 5128613.8                          |                        |                       |                |            |            |           |          |             |           |
| 2  | 66.7  | 4677351.4                          |                        |                       |                |            |            |           |          |             |           |
| 3  | 67.9  | 6165950                            |                        |                       |                |            |            |           |          |             |           |
| 4  | 66.7  | 4677351.4                          |                        |                       |                |            |            |           |          |             |           |
| 5  | 67.1  | 5128613.8                          |                        |                       |                |            |            |           |          |             |           |
| 6  | 66.7  | 4677351.4                          |                        |                       |                |            |            |           |          |             |           |
| 7  | 68  | 6309573.4                          |                        |                       |                |            |            |           |          |             |           |
| 8  | 66.7  | 4677351.4                          |                        |                       |                |            |            |           |          |             |           |
| AVERAGE  | 67  | 5180269.6 Agrees with NEMA rating. |                        |                       |                |            |            |           |          |             |           |

<sup>1</sup> - EEI, 1984. Electric Power plant Environmental Noise Guide, page 4-17.

Attachment 4.10-A: CadnaA Noise Model Inputs and Calculation Sheets

|  |   |                        |               |                          |            |            |            |           |          |             |
|--|---|------------------------|---------------|--------------------------|------------|------------|------------|-----------|----------|-------------|
| <b>Acentech</b>  |   | West Coast             |               | Job No. 617109           |            |            |            |           |          |             |
| Acoustical and Environmental Technologies  |   | Consultant: Mark Leger |               | Date: 6/24/2009          |            |            |            |           |          |             |
| <b>Project:</b>  | San Diego Gas & Electric Company (SDG&E) East County (ECO) Substation Project |                        |               |                          |            |            |            |           |          |             |
| <b>Client:</b>   | Insignia Environmental  |                        |               |                          |            |            |            |           |          |             |
| <b>Subject:</b>  | Boulevard 138/12 kV Transformer Fan, Off-Peak                                 |                        |               |                          |            |            |            |           |          |             |
| <b>Source ID:</b>  | FAN   |                        |               |                          |            |            |            |           |          |             |
| <b>Applied to :</b>  | Xformer 1 Fan, Xformer 2 Fan  |                        |               |                          |            |            |            |           |          |             |
| <i>Use the EEI Spectrum correction<sup>1</sup> to obtain a sound pressure level spectrum.</i>  |   |                        |               |                          |            |            |            |           |          |             |
| Hz   | 31.5  | 63                     | 125           | 250                      | 500        | 1000       | 2000       | 4000      | 8000     |             |
| NEMA Rating  | 68  |                        |               |                          |            |            |            |           |          |             |
| Correction   | -3  | 3                      | 5             | 0                        | 0          | -6         | -11        | -16       | -23      |             |
| Close-in Lp, at 2 m  | 65  | 71                     | 73            | 68                       | 68         | 62         | 57         | 52        | 45       |             |
| <i>The NEMA rating for fan is obtained at 2 m. Calculate the sound power correction based on distance (<math>10 \cdot \log(1/(4 \cdot \pi \cdot r^2))</math>). The sphere part is assumed to be 60% because measurements made on flat surface (ground) that is slightly absorptive.</i>                        |   |                        |               |                          |            |            |            |           |          |             |
| Distance, m  | 2   |                        |               |                          |            |            |            |           |          |             |
| Sphere Part, %   | 60.00   |                        |               |                          |            |            |            |           |          |             |
| Distance Power Correction  | -14.79421106  |                        |               |                          |            |            |            |           |          |             |
| <i>Subtract the power correction to obtain sound power levels.</i>   |   |                        |               |                          |            |            |            |           |          |             |
|  | 31.5  | 63                     | 125           | 250                      | 500        | 1000       | 2000       | 4000      | 8000     | Sum         |
| Fan Power, Lw  | 79.8  | 85.8                   | 87.8          | 82.8                     | 82.8       | 76.8       | 71.8       | 66.8      | 59.8     |             |
| A-wt Correction  | -39.4   | -26.2                  | -16.1         | -8.6                     | -3.2       | 0.0        | 1.2        | 1.0       | -1.1     |             |
| A-weighted   | 40.4  | 59.6                   | 71.7          | 74.2                     | 79.6       | 76.8       | 73.0       | 67.8      | 58.7     | 83.2        |
| A-weighted Energy  | 10950.2   | 910796.0               | 14771381.2    | 26267643.0               | 91079598.1 | 47799252.6 | 19926045.0 | 6017569.4 | 740322.8 | 207523558.2 |
| <i>In CadnaA, rather than calculating the area of each surface of the fan to ensure the same PWL<sup>1</sup>, specify that the sound power level is the sound power level per square foot. Then estimate a calibration factor that will give the NEMA rating at receivers placed 2m from the fan surfaces.</i> |   |                        |               |                          |            |            |            |           |          |             |
| Calibration Factor   | -9.4  |                        |               |                          |            |            |            |           |          |             |
|  | <b>Receiver Location</b>  | <b>Sound Level</b>     | <b>Energy</b> |                          |            |            |            |           |          |             |
|  | 1   | 67.9                   | 6165950       |                          |            |            |            |           |          |             |
|  | 2   | 69                     | 7943282       |                          |            |            |            |           |          |             |
|  | 3   | 67.9                   | 6165950       |                          |            |            |            |           |          |             |
|  | 4   | 67.9                   | 6165950       |                          |            |            |            |           |          |             |
|  | 5   | 68                     | 6309573       |                          |            |            |            |           |          |             |
|  | 6   | 67.7                   | 5888437       |                          |            |            |            |           |          |             |
| AVERAGE  |   | 68                     | 6439857       | Agrees with NEMA rating. |            |            |            |           |          |             |

<sup>1</sup> - EEI, 1984. Electric Power plant Environmental Noise Guide, page 4-17.



### 1.1.2 CadnaA Model Input – Daytime Operation

#### Area Source

| Name                   | Result. PWL  | Result.      | Lw / Li |            |                | Correction   |
|------------------------|--------------|--------------|---------|------------|----------------|--------------|
|                        | Day<br>(dBA) | Day<br>(dBA) | Type    | Value      | norm.<br>dB(A) | Day<br>dB(A) |
| Big Xformer            | 83.7         | 70.4         | Lw      | XFORM_02_T |                | 0            |
| Big Xformer Fan Bank 1 | 86.6         | 76.8         | Lw"     | FAN        |                | -9.4         |
| Big Xformer Fan Bank 2 | 85.9         | 76.8         | Lw"     | FAN        |                | -9.4         |
| Xformer                | 81.5         | 70.4         | Lw      | XFORM_01_T |                | 0            |
| Xformer Fan            | 80.9         | 77.2         | Lw"     | FAN        |                | -9           |

#### Vertical Area Source

| Name                     | Result. PWL  | Result.      | Lw / Li |            |                | Correction   |
|--------------------------|--------------|--------------|---------|------------|----------------|--------------|
|                          | Day<br>(dBA) | Day<br>(dBA) | Type    | Value      | norm.<br>dB(A) | Day<br>dB(A) |
| Big Xformer E            | 86.3         | 70.4         | Lw      | XFORM_02_L |                | 0            |
| Big Xformer W            | 86.3         | 70.4         | Lw      | XFORM_02_L |                | 0            |
| Big Xformer N            | 81.5         | 70.4         | Lw      | XFORM_02_S |                | 0            |
| Big Xformer S            | 81.5         | 70.4         | Lw      | XFORM_02_S |                | 0            |
| Big Xformer Fan Bank 1 N | 86           | 76.8         | Lw"     | FAN        |                | -9.4         |
| Big Xformer Fan Bank 1 S | 86           | 76.8         | Lw"     | FAN        |                | -9.4         |
| Big Xformer Fan Bank 2 N | 86           | 76.8         | Lw"     | FAN        |                | -9.4         |
| Big Xformer Fan Bank 2 S | 86           | 76.8         | Lw"     | FAN        |                | -9.4         |
| Big Xformer Fan Bank 2 E | 90.6         | 76.8         | Lw"     | FAN        |                | -9.4         |
| Big Xformer Fan Bank 2 W | 90.6         | 76.8         | Lw"     | FAN        |                | -9.4         |
| Big Xformer Fan Bank 1 E | 91.3         | 76.8         | Lw"     | FAN        |                | -9.4         |
| Big Xformer Fan Bank 1 W | 91.3         | 76.8         | Lw"     | FAN        |                | -9.4         |
| Xformer E                | 83.5         | 70.4         | Lw      | XFORM_01_L |                | 0            |
| Xformer W                | 83.5         | 70.4         | Lw      | XFORM_01_L |                | 0            |
| Xformer N                | 80.1         | 70.4         | Lw      | XFORM_01_S |                | 0            |
| Xformer S                | 80.1         | 70.4         | Lw      | XFORM_01_S |                | 0            |
| Xformer Fan W            | 84.6         | 77.2         | Lw"     | FAN        |                | -9           |
| Xformer Fan N            | 85.8         | 77.2         | Lw"     | FAN        |                | -9           |
| Xformer Fan E            | 84.6         | 77.2         | Lw"     | FAN        |                | -9           |
| Xformer Fan S            | 85.8         | 77.2         | Lw"     | FAN        |                | -9           |

#### Sound Levels

| Name  | ID         | Type   | Octave Spectrum (dB) |      |      |      |      |      |      |      |      |      |      | Source  |
|---|------------|--------|----------------------|------|------|------|------|------|------|------|------|------|------|---------|
|   |            |        | 31.5                 | 63   | 125  | 250  | 500  | 1000 | 2000 | 4000 | 8000 | A    | lin  |         |
| Transformer Fan Power Levels                  | FAN        | Lw (c) | 82.8                 | 88.8 | 90.8 | 85.8 | 85.8 | 79.8 | 74.8 | 69.8 | 62.8 | 86.2 | 94.8 | EEl EPP |
| Transformer Power Levels, Xform 1, Long Side  | XFORM_01_L | Lw (c) | 80.2                 | 86.2 | 88.2 | 83.2 | 83.2 | 77.2 | 72.2 | 67.2 | 60.2 | 83.5 | 92.2 | EEl EPP |
| Transformer Power Levels, Xform 1, Short Side | XFORM_01_S | Lw (c) | 76.7                 | 82.7 | 84.7 | 79.7 | 79.7 | 73.7 | 68.7 | 63.7 | 56.7 | 80.1 | 88.8 | EEl EPP |
| Transformer Power Levels, Xform 1, Top Side   | XFORM_01_T | Lw (c) | 78.1                 | 84.1 | 86.1 | 81.1 | 81.1 | 75.1 | 70.1 | 65.1 | 58.1 | 81.5 | 90.2 | EEl EPP |
| Transformer Power Levels, Xform 2, Long Side  | XFORM_02_L | Lw (c) | 83                   | 89   | 91   | 86   | 86   | 80   | 75   | 70   | 63   | 86.3 | 95   | EEl EPP |
| Transformer Power Levels, Xform 2, Short Side | XFORM_02_S | Lw (c) | 78.1                 | 84.1 | 86.1 | 81.1 | 81.1 | 75.1 | 70.1 | 65.1 | 58.1 | 81.5 | 90.1 | EEl EPP |
| Transformer Power Levels, Xform 2, Top Side   | XFORM_02_T | Lw (c) | 80.3                 | 86.3 | 88.3 | 83.3 | 83.3 | 77.3 | 72.3 | 67.3 | 60.3 | 83.7 | 92.3 | EEl EPP |

Lw = Sound Poser Level

Lw" = Sound Power Level/sqm

EEl EPP. Edison Electric Institute, *Electric Power Plant Environmental Noise Guide*, page 4-17, 1984.

### 1.1.3 CadnaA Model Input – Offpeak Operation

#### Area Source

| Name                   | ID | Result. PWL  |                  |                | Result. PWL'' |                  |                | Lw / Li |            |                | Correction   |                  |                |   |
|------------------------|----|--------------|------------------|----------------|---------------|------------------|----------------|---------|------------|----------------|--------------|------------------|----------------|---|
|                        |    | Day<br>(dBA) | Evening<br>(dBA) | Night<br>(dBA) | Day<br>(dBA)  | Evening<br>(dBA) | Night<br>(dBA) | Type    | Value      | norm.<br>dB(A) | Day<br>dB(A) | Evening<br>dB(A) | Night<br>dB(A) |   |
| Big Xformer            | 0  | 80.7         | 80.7             | 80.7           | 67.4          | 67.4             | 67.4           | Lw      | XFORM_02_T |                |              | 0                | 0              | 0 |
| Big Xformer Fan Bank 1 | 0  | 83.6         | 93               | 93             | 73.8          | 83.2             | 83.2           | Lw''    | FAN        |                |              | -9.4             | 0              | 0 |
| Big Xformer Fan Bank 2 | 0  | 82.9         | 92.3             | 92.3           | 73.8          | 83.2             | 83.2           | Lw''    | FAN        |                |              | -9.4             | 0              | 0 |
| Xformer                | 0  | 78.5         | 78.5             | 78.5           | 67.4          | 67.4             | 67.4           | Lw      | XFORM_01_T |                |              | 0                | 0              | 0 |
| Xformer Fan            | 0  | 77.9         | 86.9             | 86.9           | 74.2          | 83.2             | 83.2           | Lw''    | FAN        |                |              | -9               | 0              | 0 |

#### Vertical Area Source

| Name                     | ID | Result. PWL  |                  |                | Result. PWL'' |                  |                | Lw / Li |            |                | Correction   |                  |                |   |
|--------------------------|----|--------------|------------------|----------------|---------------|------------------|----------------|---------|------------|----------------|--------------|------------------|----------------|---|
|                          |    | Day<br>(dBA) | Evening<br>(dBA) | Night<br>(dBA) | Day<br>(dBA)  | Evening<br>(dBA) | Night<br>(dBA) | Type    | Value      | norm.<br>dB(A) | Day<br>dB(A) | Evening<br>dB(A) | Night<br>dB(A) |   |
| Big Xformer E            | 0  | 83.3         | 83.3             | 83.3           | 67.4          | 67.4             | 67.4           | Lw      | XFORM_02_L |                |              | 0                | 0              | 0 |
| Big Xformer W            | 0  | 83.3         | 83.3             | 83.3           | 67.4          | 67.4             | 67.4           | Lw      | XFORM_02_L |                |              | 0                | 0              | 0 |
| Big Xformer N            | 0  | 78.5         | 78.5             | 78.5           | 67.4          | 67.4             | 67.4           | Lw      | XFORM_02_S |                |              | 0                | 0              | 0 |
| Big Xformer S            | 0  | 78.5         | 78.5             | 78.5           | 67.4          | 67.4             | 67.4           | Lw      | XFORM_02_S |                |              | 0                | 0              | 0 |
| Big Xformer Fan Bank 1 N | 0  | 83           | 92.4             | 92.4           | 73.8          | 83.2             | 83.2           | Lw''    | FAN        |                |              | -9.4             | 0              | 0 |
| Big Xformer Fan Bank 1 S | 0  | 83           | 92.4             | 92.4           | 73.8          | 83.2             | 83.2           | Lw''    | FAN        |                |              | -9.4             | 0              | 0 |
| Big Xformer Fan Bank 2 N | 0  | 83           | 92.4             | 92.4           | 73.8          | 83.2             | 83.2           | Lw''    | FAN        |                |              | -9.4             | 0              | 0 |
| Big Xformer Fan Bank 2 S | 0  | 83           | 92.4             | 92.4           | 73.8          | 83.2             | 83.2           | Lw''    | FAN        |                |              | -9.4             | 0              | 0 |
| Big Xformer Fan Bank 2 E | 0  | 87.6         | 97               | 97             | 73.8          | 83.2             | 83.2           | Lw''    | FAN        |                |              | -9.4             | 0              | 0 |
| Big Xformer Fan Bank 2 W | 0  | 87.6         | 97               | 97             | 73.8          | 83.2             | 83.2           | Lw''    | FAN        |                |              | -9.4             | 0              | 0 |
| Big Xformer Fan Bank 1 E | 0  | 88.3         | 97.7             | 97.7           | 73.8          | 83.2             | 83.2           | Lw''    | FAN        |                |              | -9.4             | 0              | 0 |
| Big Xformer Fan Bank 1 W | 0  | 88.3         | 97.7             | 97.7           | 73.8          | 83.2             | 83.2           | Lw''    | FAN        |                |              | -9.4             | 0              | 0 |
| Xformer E                | 0  | 80.5         | 80.5             | 80.5           | 67.4          | 67.4             | 67.4           | Lw      | XFORM_01_L |                |              | 0                | 0              | 0 |
| Xformer W                | 0  | 80.5         | 80.5             | 80.5           | 67.4          | 67.4             | 67.4           | Lw      | XFORM_01_L |                |              | 0                | 0              | 0 |
| Xformer N                | 0  | 77.1         | 77.1             | 77.1           | 67.4          | 67.4             | 67.4           | Lw      | XFORM_01_S |                |              | 0                | 0              | 0 |
| Xformer S                | 0  | 77.1         | 77.1             | 77.1           | 67.4          | 67.4             | 67.4           | Lw      | XFORM_01_S |                |              | 0                | 0              | 0 |
| Xformer Fan W            | 0  | 81.6         | 90.6             | 90.6           | 74.2          | 83.2             | 83.2           | Lw''    | FAN        |                |              | -9               | 0              | 0 |
| Xformer Fan N            | 0  | 82.8         | 91.8             | 91.8           | 74.2          | 83.2             | 83.2           | Lw''    | FAN        |                |              | -9               | 0              | 0 |
| Xformer Fan E            | 0  | 81.6         | 90.6             | 90.6           | 74.2          | 83.2             | 83.2           | Lw''    | FAN        |                |              | -9               | 0              | 0 |
| Xformer Fan S            | 0  | 82.8         | 91.8             | 91.8           | 74.2          | 83.2             | 83.2           | Lw''    | FAN        |                |              | -9               | 0              | 0 |

#### Sound Levels

| Name  | ID         | Type   | Octave Spectrum (dB) |      |      |      |      |      |      |      |      |      | Source |        |
|---|------------|--------|----------------------|------|------|------|------|------|------|------|------|------|--------|--------|
|   |            |        | 31.5                 | 63   | 125  | 250  | 500  | 1000 | 2000 | 4000 | 8000 | A    |        | lin    |
| Transformer Fan Power Levels                  | FAN        | Lw (c) | 79.8                 | 85.8 | 87.8 | 82.8 | 82.8 | 76.8 | 71.8 | 66.8 | 59.8 | 83.2 | 91.8   | EI EPP |
| Transformer Power Levels, Xform 1, Long Side  | XFORM_01_L | Lw (c) | 77.2                 | 83.2 | 85.2 | 80.2 | 80.2 | 74.2 | 69.2 | 64.2 | 57.2 | 80.5 | 89.2   | EI EPP |
| Transformer Power Levels, Xform 1, Short Side | XFORM_01_S | Lw (c) | 73.7                 | 79.7 | 81.7 | 76.7 | 76.7 | 70.7 | 65.7 | 60.7 | 53.7 | 77.1 | 85.8   | EI EPP |
| Transformer Power Levels, Xform 1, Top Side   | XFORM_01_T | Lw (c) | 75.1                 | 81.1 | 83.1 | 78.1 | 78.1 | 72.1 | 67.1 | 62.1 | 55.1 | 78.5 | 87.2   | EI EPP |
| Transformer Power Levels, Xform 2, Long Side  | XFORM_02_L | Lw (c) | 80                   | 86   | 88   | 83   | 83   | 77   | 72   | 67   | 60   | 83.3 | 92     | EI EPP |
| Transformer Power Levels, Xform 2, Short Side | XFORM_02_S | Lw (c) | 75.1                 | 81.1 | 83.1 | 78.1 | 78.1 | 72.1 | 67.1 | 62.1 | 55.1 | 78.5 | 87.1   | EI EPP |
| Transformer Power Levels, Xform 2, Top Side   | XFORM_02_T | Lw (c) | 77.3                 | 83.3 | 85.3 | 80.3 | 80.3 | 74.3 | 69.3 | 64.3 | 57.3 | 80.7 | 89.3   | EI EPP |

Lw = Sound Power Level

Lw'' = Sound Power Level/sqm

EI EPP. Edison Electric Institute, *Electric Power Plant Environmental Noise Guide*, page 4-17, 1984.