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*STACK Infrastructure*

## CEC Submittal

# Trade Zone Park Second Revised Modeling Assessment

San Jose, California

Prepared for


Prepared by

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# Second Revised Analyses for Air Quality and Public Health for Operations and Construction

The revised analysis presented herein for the Stack Infrastructure Trade Zone Park Data Center addresses the following changes and revisions:

- The advanced manufacturing building will now incorporate one (1) Caterpillar C-32 engine
- Data center buildings SVY-05 and SVY-06 will still utilize 36 Caterpillar 3516E engines and two (2) Caterpillar C-32 engines (no change)
- The total number of engines will now be 39
- There will be no changes to the maximum hourly or daily emissions as the previous emissions associated with the testing the 8 larger Caterpillar 3516E engines will remain the worst-case scenario
- The annual emissions have been revised to reflect the addition of the single Caterpillar C-32 engine

The tables which follow have been revised for the operational air quality and HRA results and for the construction/operations overlap period. There are no revisions to the construction analysis based on the small revisions to the building designs.

**Revised Annual Emissions**

Facility wise emission associated with the additional one (1) Caterpillar C-32 are provide in Attachment 1. Since there will be no changes to the hourly or daily emissions from the project associated with the routine testing and maintenance (R&M), only the annual emissions based on both 50 hours of R&M plus the 100 hours of emergency operation are provided in Table 1.

**Table 1**

**Scenario 2 and 4 Emissions Summary for CAT 3516E and CAT C32 Engines**

| Period | $NO_x$ | CO | VOC | $SO_2$ | PM10/2.5 | $CO_2e$ |
|---|---|---|---|---|---|---|
| **CAT C-32 (50 hours)** | | | | | | |
| Max Annual, tons | 0.37 | 0.63 | 0.03 | 0.001 | 0.004 | 121.54 |
| **CAT C32 (100 hours emergency operation)** | | | | | | |
| Max Annual, tons | 0.24 | 1.27 | 0.07 | 0.002 | 0.007 | 243.07 |
| **CAT C32 (150 hours of operation)** | | | | | | |
| Max Annual, tons | 0.615 | 1.901 | 0.102 | 0.004 | 0.011 | 346.6 |
| **Total Facility Wide Emissions (M&R)** | | | | | | |
| Tons per Year | 12.52 | 21.38 | 1.15 | 0.041 | 0.131 | 4,368.4 |

**Revised Impact Assessment (Air Quality and Public Health)**

The following tables 2 through 5 summarize the revised modeled concentrations based on the 50 hours per year of operation with the daily testing hours occurring between 7:00 AM and 7:00 PM. The total number of engines will now be 39 and the placement of the engines are depicted in Figure 1. There are no changes to the stack parameters on either the 3516E or the C-32 engines.

**Table 2**
**Modeled Operational Concentrations and Ambient Air Quality Standards**

| Pollutant | Averaging Period | Maximum Concentration (µg/m³) | Background (µg/m³) | Total (µg/m³) | Ambient Air Quality Standards (µg/m³) | |
|---|---|---|---|---|---|---|
| | | | | | CAAQS | NAAQS |
| ***3-/8-/24-Hour Maxima shown for one engine operating up to 12 hours/day (7AM-7PM)*** | | | | | | |
| $NO_2$* | 1-hour maximum (CAAQS) | 90.49 | 112.9 | 203.39 | 339 | - |
| | 3-year average of 1-hour yearly 98th % (NAAQS)** | 2.37 | 85.3 | 87.7 | - | 188 |
| | Annual maximum | 1.28 | 20.0 | 21.3 | 57 | 100 |
| CO | 1-hour maximum | 269.94 | 2,061 | 2,330.9 | 23,000 | Top 40,000 |
| | 8-hour maximum | 208.02 | 1,680 | 1,888.0 | 10,000 | 10,000 |
| $SO_2$ | 1-hour maximum (CAAQS) | 0.52 | 38.0 | 38.5 | 655 | - |
| | 3-year average of 1-hour yearly 99th % (NAAQS)** | 0.44 | 5.2 | 5.6 | - | 196 |
| | 24-hour maximum | 0.11 | 3.9 | 4.01 | 105 | 365 |
| | Annual maximum | 0.011 | 0.44 | 0.45 | - | 80 |
| PM10 | 24-hour maximum (CAAQS) | 0.33 | 134 | 134.3 | 50 | - |
| | 24-hour 6th highest over 5 years (NAAQS) | 0.27 | 74.8 | 75.1 | - | 150 |
| | Annual maximum (CAAQS) | 0.032 | 24.8 | 24.8 | 20 | - |
| PM2.5 | 3-year average of 24-hour yearly 98th % | 0.24 | 33.3 | 33.5 | - | 35 |
| | Annual maximum (CAAQS) | 0.032 | 11.5 | 11.5 | 12 | - |
| | 3-year average of annual concentrations (NAAQS) | 0.029 | 9.8 | 9.8 | - | 12.0 |

*1-hour $NO_2$ impacts evaluated with Ambien Ratio Method #2 (ARM2), with the maximum hourly background added in separately. Annual $NO_2$ impacts evaluated with ARM2. Modeling utilized USEPA-default minimum/maximum $NO_2$/NOx ambient ratios of 0.5/0.9.

** Impacts for the 1-hour statistical-based $NO_2$ and $SO_2$ NAAQS are based on the annual average emissions per USEPA guidance documents for intermittent sources like emergency generators. Impacts for the 1-hour $NO_2$ and $SO_2$ CAAQS are based on the 1-hour emission rate since these CAAQS are "values that are not to be exceeded".

## Table 3
## SVYBGF Residential/Sensitive/Worker Health Risk Assessment Summary

| Location | Receptor # | UTM (meters) | Cancer Risk | Chronic HI | Acute HI | Cancer Burden |
|---|---|---|---|---|---|---|
| PMI | 876 | 597880 E<br>4139965 N | 2.50E-05 | 0.00577 | - | NA |
| MEIR | 1112 | 597740 E<br>4140265 N | 3.15E-06 | 0.000728 | - | NA |
| MEIS | 1620 | 597500 E<br>4140405 N | 1.45E-06 | 0.000376 | - | NA |
| MEIW | 951 | 597840 E<br>4140025 N | 5.71E-06 | 0.00439 | - | NA |

Notes: See acronym definitions above.
The PMI noted above is located in a parking lot due east of the project.
All MEIR maximum impacts were on the first floor of the multistory structure.

## Table 4
## Modeled Overlap (Construction + Operation) Concentrations and Ambient Air Quality Standards

| Pollutant | Averaging Period | Maximum Concentration (µg/m³) | Background (µg/m³) | Total (µg/m³) | Ambient Air Quality Standards (µg/m³) | |
|---|---|---|---|---|---|---|
| | | | | | CAAQS | NAAQS |
| ***Construction occurs for up to 12 hours/day (7AM-7PM)*** | | | | | | |
| $NO_2$* | 1-hour maximum (CAAQS) | 80.19 | 112.9 | 193.1 | 339 | - |
| | 3-year average of 1-hour yearly 98th % (NAAQS) | 5.16 | 85.3 | 90.5 | - | 188 |
| | Annual maximum | 1.43 | 20.0 | 22.1 | 57 | 100 |
| CO | 1-hour maximum | 280.54 | 2,061 | 2,341.5 | 23,000 | 40,000 |
| | 8-hour maximum | 219.44 | 1,680 | 1,899.4 | 10,000 | 10,000 |
| $SO_2$ | 1-hour maximum (CAAQS) | 0.51 | 38 | 38.5 | 655 | - |
| | 3-year average of 1-hour yearly 99th % (NAAQS) | 0.071 | 5.2 | 5.3 | - | 196 |
| | 24-hour maximum | 0.12 | 3.9 | 4.0 | 105 | 365 |
| | Annual maximum | 0.010 | 0.55 | 0.56 | - | 80 |
| PM10 | 24-hour maximum (CAAQS) | 12.52 | 134 | 146.5 | 50 | - |
| | Annual maximum (CAAQS) | 4.12 | 24.8 | 28.9 | 20 | - |
| PM2.5 | 3-year average of 24-hour yearly 98th % | 4.19 | 33.3 | 37.5 | - | 35 |
| | 3-year average of annual concentrations (NAAQS) | 1.49 | 9.8 | 11.3 | - | 12.0 |

*1-hour $NO_2$ impacts evaluated with Ambien Ratio Method #2 (ARM2), with the maximum hourly background added in separately. Annual $NO_2$ impacts evaluated with ARM2. Modeling utilized USEPA-default minimum/maximum $NO_2$/NOx ambient ratios of 0.5/0.9.

**Table 5**

**SVYBGF Overlap (Construction + Operation) Health Risk Assessment Summary**

| Location | Receptor # | UTM (meters) | Cancer Risk | Chronic HI | Acute HI | Cancer Burden |
|---|---|---|---|---|---|---|
| PMI | 987 | 597820 E<br>4140085 N | 5.12E-06 | 0.00299 | - | NA |
| MEIR | 1112 | 597740 E<br>4140265 N | 7.22E-07 | 0.000422 | - | NA |
| MEIS | 1620 | 597500 E<br>4140405 N | 1.13E-06 | 0.000188 | - | NA |
| MEIW | 949 | 597840 E<br>4140065 N | 3.20E-07 | 0.00295 | - | NA |

Notes: See acronym definitions above.

The PMI noted above is located in a parking lot due east of the project.

Testing hours for the overlap of construction and operation was set to 50 hours per engine.
DPM is the surrogate compound for construction equipment diesel exhaust. No acute REL has been established for DPM.
SVY06 construction period is 16.5 months (HRA used 2-year exposure period.)
FAH=1 for all age groups from 3rd trimester to 16 years, for MEIR and MEIS.
FAH not used for MEIW.
* MEIS – Mabel Mattos Elementary School

All MEIR maximum impacts were on the first floor of the multistory structure.

**Combined Community Risk Impacts**

As discussed in the SPPE, the project site is affected by several sources of TACs. Table 5 presents the revised cancer and non-cancer risks associated with each source affecting the project site. The sum of impacts from combined sources (i.e., all sources within 1,000 feet of the project) plus the operations of the project would be below the BAAQMD risk thresholds. Therefore, the impact from combined community risk would be considered less than significant.

**Table 6**

**Impacts from Combined Sources**

| Source | Maximum Cancer Risk (per million) | Hazard Index | Annual $PM_{2.5}$ concentration ($\mu g/m^3$) |
|---|---|---|---|
| Montague Expressway Traffic | 5.0 | <0.01 | 0.51 |
| Existing Background Sources. | 38.6 | 0.272 | 0.0096 |
| SGBF | 3.15 | <0.01 | 0.029 |
| *Combined Sources*[1] | 46.75 | 0.273 | 0.55 |
| ***BAAQMD Threshold – Combined Sources*** | ***100*** | ***10.0*** | ***0.8*** |

Note: [1]The combined source level is an overestimate because the maximum impact from each source is assumed to occur at the same location.

**Conclusion**

Based on the revised project layout and the revised dispersal of the engines, the overall project air quality and public health impacts continue to demonstrate compliance with the applicable

ambient air quality standards and Bay Area Air Quality Management District (BAAQMD) CEQA significance thresholds.

## Attachments

All modeling input and output files, support files, and HRA files will be supplied in electronic format.

**Figure 1**

**Revised Project General Arrangement**

# Attachment 1

**Table AQ1-1 Emissions Estimates for Emergency Standby Generators**

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Engine Mfg: | **CAT** | # of Units: | 36 | | Max # of Engines Tested per Day: | 8 | | # Redundant Engines: | 6 | | | | | | | |
| Model #: | **3516E** | | | | *(engines are not tested concurrently)* | | | Emer Ops Engines: | 30 | | | | | | | |
| Fuel: | ULSD | **Engine Data** | | | | | | | | | | | | | ***METRIC UNITs*** | |
| | | | | | | | | | | | | **Stk Flow,** | **Stack Vel,** | | **Stk Temp,** | |
| Fuel S, %wt: | 0.0015 | **BHP** | **kWe** | **Load %** | **RPM** | **Fuel, gph** | **Stk Ht, ft** | **Stk Diam, in** | **Stk Temp, F** | **mmbtu/hr** | | **ACFM** | **f/s** | **Stk Diam, m** | **Kelvins** | **Stk Vel, m/s** |
| Fuel wt, lb/gal: | 7.05 | 4023 | 3000 | 100 | 1800 | 208.2 | 61 | 20 | 902 | 28.94 | | 22806 | 174.2250 | 0.5080 | 756.48 | 53.1038 |
| Btu/gal: | 139000 | | | | | | | | | | | | | | | |
| Lbs S/1000 gal: | 0.10575 | | | | | | | | | | | | | | | |
| Lbs SO2/1000 gal: | 0.2115 | equals | 0.0050 | g/bhp-hr | (use 0.005 g/bhp-hr as default SO2 factor for all loads) | | | | | | | | | | | |
| EPA Tier: | 2 | | | | | | | | | | | | | | | |
| Control System: | Miratech Catalyst + DPF to Meet T4 | | | | | | | | | | | | | | | |
| Turbocharged: | Yes | | | | | | | | Stack Exit Area (sq.ft) = | 2.181662 | | | | | | |
| Aftercooled: | Yes | | | | | | | | | | | | | | | |

| | **Emissions Factor Scenarios (all values in g/bhp-hr)** | | | | | | **CO2e** |
|---|---|---|---|---|---|---|---|
| **Scenarios** | **NOx** | **CO** | **VOC** | **SO2** | **PM10** | **PM2.5** | **lb/mmbtu** |
| Emergency Ops, 100 hrs/yr, Tier 4 Controlled EFs, 100% Load | 0.5 | 2.6 | 0.14 | 0.005 | 0.015 | 0.015 | 163.052 |
| Maint/Readiness Testing, 50 hrs/yr, EFs, 100% Load | 1.53 | 2.6 | 0.14 | 0.005 | 0.015 | 0.015 | |
| 0.25 hr Uncontrolled, Tier 2 Stds Efs, 100% Load, w/DPF | 4.6 | | | | | | |
| 0.75 hr Controlled, T4 Efs, 100% Load, w/DPF | 0.5 | | | | | | |

| | **Controlled Emissions Factor Scenarios (all values in g/bhp-hr)** | | | | | | **CO2e** |
|---|---|---|---|---|---|---|---|
| | **NOx** | **CO** | **VOC** | **SO2** | **PM10** | **PM2.5** | **lb/mmbtu** |
| Emergency Ops, 100 hrs/yr, Tier 4 Controlled EFs, 100% Load | 0.500 | 2.6 | 0.14 | 0.005 | 0.015 | 0.015 | 163.052 |
| Maint/Readiness Testing, 50 hrs/yr, EFs, 100% Load | 1.53 | 2.6 | 0.14 | 0.005 | 0.015 | 0.015 | 163.052 |

**Scenario 1:** **Emergency Ops, 100 hrs/yr, Tier 4 Controlled EFs, 100% Load**

*Redundant engines do NOT operate during emergency operations.*

Max Hourly Runtime: 1
Max Daily Runtime: 24
Max Annual Runtime: 100

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Single Engine** | **NOx** | **CO** | **VOC** | **SO2** | **PM10** | **PM2.5** | **CO2e** |
| lbs/hr | 4.435 | 23.060 | 1.242 | 0.044 | 0.133 | 0.133 | na |
| lbs/day | 106.431 | 553.441 | 29.801 | 1.064 | 3.193 | 3.193 | na |
| TPY | 0.222 | 1.153 | 0.062 | 0.002 | 0.007 | 0.007 | 235.9 |
| **All Engines** | | | | | | | |
| | **NOx** | **CO** | **VOC** | **SO2** | **PM10** | **PM2.5** | **CO2e** |
| lbs/hr | 133.04 | 691.80 | 37.25 | 1.33 | 3.99 | 3.99 | na |
| lbs/day | 3192.93 | 16603.22 | 894.02 | 31.93 | 95.79 | 95.79 | na |
| TPY | 6.65 | 34.59 | 1.86 | 0.07 | 0.20 | 0.20 | 7078.04 |

**Scenario 2:** **Maint/Readiness Testing, 50 hrs/yr, EFs, 100% Load**

Max Hourly Runtime: 1
Max Daily Runtime: 1
Max Annual Runtime: 50

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Single Engine** | **NOx** | **CO** | **VOC** | **SO2** | **PM10** | **PM2.5** | **CO2e** |
| lbs/hr | 13.526 | 23.060 | 1.242 | 0.044 | 0.133 | 0.133 | na |
| lbs/day | 13.526 | 23.060 | 1.242 | 0.044 | 0.133 | 0.133 | na |
| TPY | 0.338 | 0.577 | 0.031 | 0.001 | 0.003 | 0.003 | 118.0 |
| **8 Engines** | | | | | | | |
| | **NOx** | **CO** | **VOC** | **SO2** | **PM10** | **PM2.5** | **CO2e** |
| lbs/hr | 13.526 | 23.060 | 1.242 | 0.044 | 0.133 | 0.133 | na |
| lbs/day | 108.205 | 184.480 | 9.934 | 0.355 | 1.064 | 1.064 | na |
| **All Engines** | | | | | | | |
| TPY | 12.17 | 20.75 | 1.12 | 0.04 | 0.12 | 0.12 | 4246.82 |

| **BAAQMD 150 Hrs/Yr Emissions Totals, TPY:** | **NOx** | **CO** | **VOC** | **SO2** | **PM10** | **PM2.5** | **CO2e** |
|---|---|---|---|---|---|---|---|
| | 18.825 | 55.344 | 2.980 | 0.106 | 0.319 | 0.319 | 11324.9 |

**Table AQ1-2 Emissions Estimates for Emergency Standby Generators**

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Engine Mfg: | **CAT** | | # of Units: | 3 | | Max # of Engines Tested per Day: | | 1 | | # Redundant Engines: | | 0 | | | | |
| Model #: | **C32** | | | | | *(engines are not tested concurrently)* | | | | Emer Ops Engines: | | 3 | | | | |
| Fuel: | ULSD | | **Engine Data** | | | | | | | | | | | | ***METRIC UNITs*** | |
| | | | | | | | | | | | | **Stk Flow,** | **Stack Vel,** | | **Stk Temp,** | |
| Fuel S, %wt: | 0.0015 | | **BHP** | **kWe** | **Load %** | **RPM** | **Fuel, gph** | **Stk Ht, ft** | **Stk Diam, in** | **Stk Temp, F** | **mmbtu/hr** | **ACFM** | **f/s** | **Stk Diam, m** | **Kelvins** | **Stk Vel, m/s** |
| Fuel wt, lb/gal: | 7.05 | | 1474 | 1000 | 100 | 1800 | 71.5 | 18 | 8 | 892.5 | 9.94 | 8115.3 | 387.4769 | 0.2032 | 751.21 | 118.1029 |
| Btu/gal: | 139000 | | | | | | | | | | | | | | | |
| Lbs S/1000 gal: | 0.10575 | | | | | | | | | | | | | | | |
| Lbs SO2/1000 gal: | 0.2115 | equals | 0.0047 | g/bhp-hr | (use 0.005 g/bhp-hr as default SO2 factor for all loads) | | | | | | | | | | | |
| EPA Tier: | 2 | | | | | | | | | | | | | | | |
| Control System: | Miratech Catalyst + DPF to Meet T4 | | | | | | | | | | | | | | | |
| Turbocharged: | Yes | | | | | | | | Stack Exit Area (sq.ft) = | | 0.349066 | | | | | |
| Aftercooled: | Yes | | | | | | | | | | | | | | | |

| | **Emissions Factor Scenarios (all values in g/bhp-hr)** | | | | | | **CO2e** |
|---|---|---|---|---|---|---|---|
| **Scenarios** | **NOx** | **CO** | **VOC** | **SO2** | **PM10** | **PM2.5** | **lb/mmbtu** |
| Emergency Ops, 100 hrs/yr, Tier 4 Controlled EFs, 100% Load | 0.5 | 2.6 | 0.14 | 0.005 | 0.015 | 0.015 | 163.052 |
| Maint/Readiness Testing, 50 hrs/yr, EFs, 100% Load | 1.53 | 2.6 | 0.14 | 0.005 | 0.015 | 0.015 | 163.052 |
| 0.25 hr Uncontrolled, Tier 2 Stds Efs, 100% Load, w/DPF | 4.6 | | | | | | 163.052 |
| 0.75 hr Controlled, T4 Efs, 100% Load, w/DPF | 0.5 | | | | | | 163.052 |

| | **Controlled Emissions Factor Scenarios (all values in g/bhp-hr)** | | | | | | **CO2e** |
|---|---|---|---|---|---|---|---|
| | **NOx** | **CO** | **VOC** | **SO2** | **PM10** | **PM2.5** | **lb/mmbtu** |
| Emergency Ops, 100 hrs/yr, Tier 4 Controlled EFs, 100% Load | 0.500 | 2.600 | 0.140 | 0.005 | 0.015 | 0.015 | 163.052 |
| Maint/Readiness Testing, 50 hrs/yr, EFs, 100% Load | 1.53 | 2.600 | 0.140 | 0.005 | 0.015 | 0.015 | 163.052 |

**Scenario 3:** **Emergency Ops, 100 hrs/yr, Tier 4 Controlled EFs, 100% Load**

Max Hourly Runtime: 1
Max Daily Runtime: 24
Max Annual Runtime: 100

**Single Engine**

| | **NOx** | **CO** | **VOC** | **SO2** | **PM10** | **PM2.5** | **CO2e** |
|---|---|---|---|---|---|---|---|
| lbs/hr | 1.625 | 8.449 | 0.455 | 0.016 | 0.049 | 0.049 | na |
| lbs/day | 38.996 | 202.777 | 10.919 | 0.390 | 1.170 | 1.170 | na |
| TPY | 0.081 | 0.422 | 0.023 | 0.001 | 0.002 | 0.002 | 81.0 |

**All Engines**

| | **NOx** | **CO** | **VOC** | **SO2** | **PM10** | **PM2.5** | **CO2e** |
|---|---|---|---|---|---|---|---|
| lbs/hr | 4.87 | 25.35 | 1.36 | 0.05 | 0.15 | 0.15 | na |
| lbs/day | 116.99 | 608.33 | 32.76 | 1.17 | 3.51 | 3.51 | na |
| TPY | 0.24 | 1.27 | 0.07 | 0.002 | 0.007 | 0.007 | 243.07 |

**Scenario 4:** **Maint/Readiness Testing, 50 hrs/yr, EFs, 100% Load**

Max Hourly Runtime: 1
Max Daily Runtime: 1
Max Annual Runtime: 50

**Single Engine**

| | **NOx** | **CO** | **VOC** | **SO2** | **PM10** | **PM2.5** | **CO2e** |
|---|---|---|---|---|---|---|---|
| lbs/hr | 4.956 | 8.449 | 0.455 | 0.016 | 0.049 | 0.049 | na |
| lbs/day | 4.956 | 8.449 | 0.455 | 0.016 | 0.049 | 0.049 | na |
| TPY | 0.124 | 0.211 | 0.011 | 0.0004 | 0.001 | 0.001 | 40.5 |

**1 Engine**

| | **NOx** | **CO** | **VOC** | **SO2** | **PM10** | **PM2.5** | **CO2e** |
|---|---|---|---|---|---|---|---|
| lbs/hr | 4.956 | 8.449 | 0.455 | 0.016 | 0.049 | 0.049 | na |
| lbs/day | 4.956 | 8.449 | 0.455 | 0.016 | 0.049 | 0.049 | na |

**All Engines**

| | **NOx** | **CO** | **VOC** | **SO2** | **PM10** | **PM2.5** | **CO2e** |
|---|---|---|---|---|---|---|---|
| TPY | 0.37 | 0.63 | 0.03 | 0.001 | 0.004 | 0.004 | 121.54 |

| **BAAQMD 150 Hrs/Yr Emissions Totals, TPY:** | **NOx** | **CO** | **VOC** | **SO2** | **PM10** | **PM2.5** | **CO2e** |
|---|---|---|---|---|---|---|---|
| | 0.615 | 1.901 | 0.102 | 0.004 | 0.011 | 0.011 | 364.6 |