DOCKETED	
Docket Number:	23-SPPE-01
Project Title:	STACK SVY03A Data Center Campus
TN #:	259547
Document Title:	STACK SVY03A Air Quality Modeling Memo
Description:	N/A
Filer:	Scott Galati
Organization:	DayZenLLC
Submitter Role:	Applicant Representative
Submission Date:	10/15/2024 4:37:27 PM
Docketed Date:	10/15/2024

ATMOSPHERIC DYNAMICS, INC
Meteorological & Air Quality Modeling

Memorandum

To: Wenjun Qian: CEC
From: Greg Darvin: Atmospheric Dynamics, Inc.
Date: October 15, 2024

Subject: Revised STACK SVY03A Caterpillar D175 Modeling Summary

The STACKS SVY03A Data Center Campus is proposing to revise the application by replacing the previously modeled Caterpillar 3512C Tier 4 engine at 2,400 BHP with a smaller Caterpillar D175 Tier 3 diesel engine, rated at 175 BHP. While there will be an emission decrease with the proposed D175 diesel engine, the new proposed engine was modeled to determine if the engine would also result in a decrease in project air quality impacts.

The new proposed engine Caterpillar D175 is shown in Figure 1 along with the replaced Caterpillar 3512C diesel engine. Along with the replacement of engines, the previously existing small data center, called the Ski Lodge, will not be constructed. Instead, a small guard shack is proposed to be located next to the D175 engine.

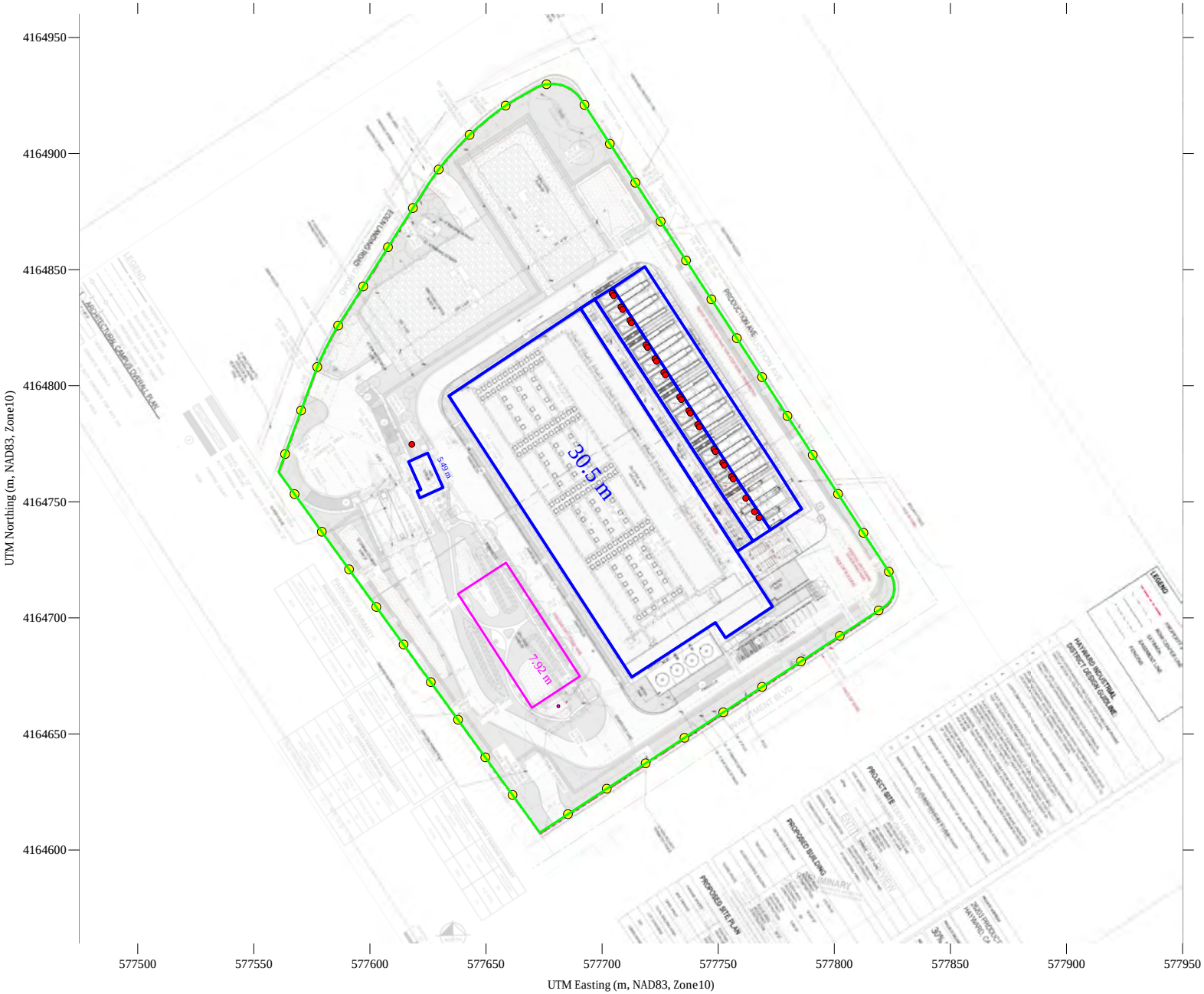
The potential emissions and stack parameters from the D175 engine is included as an attachment to the memorandum. There is a decrease in criteria pollutant emissions from the D175 engine as compared to the 3512C. This also implies a decrease in diesel particulate matter.

Both the proposed D175 and 3512C engines were modeled as separate source groups with the most recent version of AERMOD. No changes to the receptor grids, meteorology or other existing sources were made. The revised modeling only evaluated the two engines as separate sources so the modeling results could be compared against each other. The revised modeling results are presented in Table 1 along with the difference between the modeled source groups (engines). The results indicate a decrease in concentrations for both the NO_2 (1-hour and annual) and CO results (both 1 and 8-hour). There was a small increase in the modeled concentration for both the 24-hour and annual PM2.5 and PM10 concentrations but the increase is much less than the established significance thresholds for these pollutants. Additionally, the project impacts for PM2.5 and PM10 based on the previous modeling of the entire project were also less than the applicable SILs of 5 and 1 *u*g/m^3 for PM10 and 0.2 and 1.2 *u*g/m^3 for PM2.5. And the previous project health risk assessment (HRA) was also far below the 10 in a million SIL at 0.0523 in a million (sensitive receptor) and 0.0824 at the worker receptor.

Based on the comparison of the modeling results for the two engines, the replacement of the Caterpillar 3512C engine with the D175 will not result in any meaningful changes to the proposed project and thus, the project will not contribute to any exceedances of the ambient air quality standards or health risk thresholds.

Table 1 AERMOD Modeling Results				
Pollutant	**Averaging Period – Rank**	**D175 (ug/m³)**	**3512C (ug/m³)**	**Difference (ug/m³)**
NO_2	1-hr CAAQS (highest)	110.8528	138.7179	-27.8651
	1-hr NAAQS (98th percentile)	0.9239	1.5903	-0.6664
	Annual Maximum	0.0427	0.0583	-0.0156
CO	1-hr (highest)	134.9040	408.2242	-273.3203
	8-hr (highest)	9.8221	14.9171	-5.0950
PM10	24-hr (highest)	0.1810	0.0333	0.1477
	24-hr (6th highest)	0.1285	0.0195	0.1091
PM2.5	24-hr (98th percentile)	0.0597	0.0135	0.0462
	5-year average annual	0.0023	0.0007	0.0016

Figure 1


4164950
4164900
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4164650
4164600
UTM Northing (m, NAD83, Zone10)
577500
577550
577600
577650
577700
577750
577800
577850
577900
577950
UTM Easting (m, NAD83, Zone10)
30.5m
5.49m
7.92m

Table AQ1-3 Emissions Estimates for Emergency Standby Generators

Use Area: Ski Lodge Bldg

Engine Mfg:	**CAT**	# of Units:	1		Max # of Engines Tested per Day:	1		# Redundant Engines:	0							
Model #:	**D175**				*(engines are not tested concurrently)*			Emer Ops Engines:	1							
Fuel:	ULSD	**Engine Data**											***METRIC UNITs***			**NOx**
Fuel S, %wt:	0.0015	**BHP**	**kWe**	**Load %**	**RPM**	**Fuel, gph**	**Stk Ht, ft**	**Stk Diam, in**	**Stk Temp, F**	**mmbtu/hr**	**Stk Flow, ACFM**	**Stack Vel, f/s**	**Stk Diam, m**	**Stk Temp, Kelvins**	**Stk Vel, m/s**	**lb/hr**
Fuel wt, lb/gal:	7.05	235	175	100	1800	13.5	9	6	948	1.85	1229	104.3205	0.1524	782.04	31.7969	1.468
Btu/gal:	137000															
Lbs S/1000 gal:	0.10575															
Lbs SO2/1000 gal:	0.2115															
EPA Tier:	3															
Control System:	Design compliance with Tier 3 Stds.															
Turbocharged:	Yes							Stack Exit Area (sq.ft) =	0.19635							
Aftercooled:	Yes															
Fuel Tank Cap.	400 gals															

	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, T3 Compliant EFs, 100% Load	2.834	2.6	0.149	0.005	0.15	0.15	163.052
Maint/Readiness Testing, 50 hrs/yr, T3 Compliant EFs, 100% Load	2.834	2.6	0.149	0.005	0.15	0.15	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, T3 Compliant EFs, 100% Load	2.834	2.600	0.149	0.005	0.150	0.150	163.052
Maint/Readiness Testing, 50 hrs/yr, T3 Compliant EFs, 100% Load	2.834	2.600	0.149	0.005	0.150	0.150	163.052

Scenario 1: **Emergency Ops, 100 hrs/yr, T3 Compliant 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	1.468	1.347	0.077	0.003	0.078	0.078	na
lbs/day	35.238	32.329	1.853	0.062	1.865	1.865	na
TPY	0.073	0.067	0.004	0.000	0.004	0.004	15.1

All Engines

	NOx	**CO**	**VOC**	**SO2**	**PM10**	**PM2.5**	**CO2e**
lbs/hr	1.47	1.35	0.08	0.00	0.08	0.08	na
lbs/day	35.24	32.33	1.85	0.06	1.87	1.87	na
TPY	0.07	0.07	0.00	0.000	0.004	0.004	15.08

Scenario 2: **Maint/Readiness Testing, 50 hrs/yr, T3 Compliant 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	1.468	1.347	0.077	0.003	0.078	0.078	na
lbs/day	1.468	1.347	0.077	0.003	0.078	0.078	na
TPY	0.037	0.034	0.002	0.0001	0.002	0.002	7.5

1 Engine

	NOx	**CO**	**VOC**	**SO2**	**PM10**	**PM2.5**	**CO2e**
lbs/hr	1.468	1.347	0.077	0.003	0.078	0.078	na
lbs/day	1.468	1.347	0.077	0.003	0.078	0.078	na

All Engines

	NOx	**CO**	**VOC**	**SO2**	**PM10**	**PM2.5**	**CO2e**
TPY	0.04	0.03	0.00	0.0001	0.002	0.002	7.54

BAAQMD 150 Hrs/Yr Emissions Totals, TPY:	**NOx**	**CO**	**VOC**	**SO2**	**PM10**	**PM2.5**	**CO2e**
	0.110	0.101	0.006	0.0002	0.006	0.006	22.6

Table AQ1-3 Emissions Estimates for Emergency Standby Generators

Use Area: Ski Lodge Bldg

Engine Mfg:	**CAT**	# of Units:	1		Max # of Engines Tested per Day:		1		# Redundant Engines:		0					
Model #:	**3512C**				*(engines are not tested concurrently)*				Emer Ops Engines:		1					
Fuel:	ULSD	**Engine Data**											***METRIC UNITs***			**NOx**
Fuel S, %wt:	0.0015	**BHP**	**kWe**	**Load %**	**RPM**	**Fuel, gph**	**Stk Ht, ft**	**Stk Diam, in**	**Stk Temp, F**	**mmbtu/hr**	**Stk Flow, ACFM**	**Stack Vel, f/s**	**Stk Diam, m**	**Stk Temp, Kelvins**	**Stk Vel, m/s**	**lb/hr**
Fuel wt, lb/gal:	7.05	2400	1750	100	1800	109.4	36	16	820.4	14.99	12943.5	154.5017	0.4064	711.15	47.0921	8.069
Btu/gal:	137000	1799	1200	75	1800	86.1	36	16	819.4	-	10575.9	126.2405	0.4064	710.59	38.4781	6.048
Lbs S/1000 gal:	0.10575	1237	800	50	1800	63.8	36	16	813.5	-	8410	100.3870	0.4064	707.32	30.598	4.159
Lbs SO2/1000 gal:	0.2115	1012	640	40	1800	54.6	36	16	805.6	-	7410.8	88.4599	0.4064	702.93	26.9626	3.402
EPA Tier:	2															
Control System:	SCR + DPF to Meet T4															
Turbocharged:	Yes								Stack Exit Area (sq.ft) =		1.396263					
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	0.02	0.02	163.052
Maint/Readiness Testing, 50 hrs/yr, T2/T4 SU Adjusted EFs, 100% Load	1.53	2.6	0.14	0.005	0.02	0.02	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	0.020	0.020	163.052
Maint/Readiness Testing, 50 hrs/yr, T2/T4 SU Adjusted EFs, 100% Load	1.53	2.600	0.140	0.005	0.020	0.020	163.052

Scenario 1: **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	2.646	13.757	0.741	0.026	0.106	0.106	na
lbs/day	63.493	330.166	17.778	0.635	2.540	2.540	na
TPY	0.132	0.688	0.037	0.001	0.005	0.005	122.2

All Engines

	NOx	**CO**	**VOC**	**SO2**	**PM10**	**PM2.5**	**CO2e**
lbs/hr	2.65	13.76	0.74	0.03	0.11	0.11	na
lbs/day	63.49	330.17	17.78	0.63	2.54	2.54	na
TPY	0.13	0.69	0.04	0.001	0.005	0.005	122.19

Scenario 2: **Maint/Readiness Testing, 50 hrs/yr, T2/T4 SU Adjusted 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	8.069	13.757	0.741	0.026	0.106	0.106	na
lbs/day	8.069	13.757	0.741	0.026	0.106	0.106	na
TPY	0.202	0.344	0.019	0.0007	0.003	0.003	61.1

1 Engine

	NOx	**CO**	**VOC**	**SO2**	**PM10**	**PM2.5**	**CO2e**
lbs/hr	8.069	13.757	0.741	0.026	0.106	0.106	na
lbs/day	8.069	13.757	0.741	0.026	0.106	0.106	na

All Engines

	NOx	**CO**	**VOC**	**SO2**	**PM10**	**PM2.5**	**CO2e**
TPY	0.20	0.34	0.02	0.001	0.003	0.003	61.09

BAAQMD 150 Hrs/Yr Emissions Totals, TPY:	**NOx**	**CO**	**VOC**	**SO2**	**PM10**	**PM2.5**	**CO2e**
	0.334	1.032	0.056	0.002	0.008	0.008	183.3