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MEMORANDUM

To:	California Energy Commission Staff
From:	Compass Energy Storage LLC
Subject:	Hazardous Consequence Analysis
Date:	June 26, 2025

Compass Energy Storage LLC has prepared a draft Hazardous Consequence Analysis (Part 1 of 2) for the Compass Energy Storage Project at the request of the California Energy Commission staff. The analysis was requested by CEC staff as a supplemental component and was not required to deem the application complete. The analysis is also supplemental to the primary plume analysis provided to the CEC in the Community Risk Assessment (Tracking Number 261906) utilizing the PHAST methodology.

The analysis (Part 1) evaluates potential impacts of toxic air contaminants from a thermal runaway event and the potential for a thermal runaway event to cause or contribute to a violation of an ambient air quality standard. CEC staff reviewed the Part 1 analysis and provided comments. Part 2 of 2 responds to CEC staff's comments. As such, Part 1 and Part 2 comprise the final Hazardous Consequence Analysis.

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PART 2

MEMORANDUM

To:	Renee Robin, ENGIE
From:	Adam Poll, Dudek
Subject:	Responses to CEC Questions on Plume Analysis
Date:	June 13, 2025
cc:	Erin Phillips, Dudek

Dudek has prepared the following responses to the California Energy Commission's (CEC's) questions to the Supplemental AERMOD Air Quality Analysis.

1. The AERMOD input parameters for gas exit velocity (0.87 m/s) and gas exit temperature (1,160 °F) appear to be from the VISTRA MORRO BAY BESS project analysis. Could you provide justification for why these values are representative of the Compass project? Additionally, the release height (9.14 ft) and stack inside diameter (1.36 ft) differ from the open-door release case discussed in our previous meeting. Please explain how these values were derived.

Response: The source parameters in our draft report for the gas exit velocity and temperature were taken from the Vistra Morro Bay BESS (original) because Dudek considered the temperature ranges in that report to be conservative assumptions that would err on the side of caution The actual temperature from the project UL9540A testing is lower than that assumed in the original calculations - which would reduce dispersion away from the site compared to the higher temperature assumed.

The gas exit velocity was higher in the draft report compared to that calculated based on the volume of gases emitted under this scenario based on the UL9540A test (0.87m/s compared to 0.017 m/s). The reduced velocity would reduce dispersion away from the site and result in lower concentration at the MEIR. The higher the velocity the further the emissions would travel away from the site.

Using the UL9540A testing results for basis of assumptions alone resulted in a 2% increase in concentration at the MEIR (88.67 µg/m^3 vs. 86.76 µg/m^3). In both scenarios, project contributions are well below the REL, AEGL, acute hazard index, and AAQS. The release height represents the height of the overpressure vents of the MPXL2, which is where gases would vent. The stack diameter also represents the area of an overpressure vent of one rack.

It is unclear where the reference in the comment to the open-door release case comes from. This is not appropriate for the MPXL2 as emissions would be released through the thermal vents near the roof.

The original concentrations compared to the revised based on the UL9540A are shown in Attachment A compared to the respective thresholds. This also includes the revised emission calculations based on the temperature and

pressure taken from the UL9540A from question 6. It should be noted that the majority of the increase in results are driven by the change in emission rates from the revised temperature and pressure assumptions, while still remaining significantly below any threshold of significance.

2. The Thermal Runway Analysis Emissions spreadsheet dated May 16, 2025, lists the test duration as 1.83 hours, which differs from the 85.19 minutes reported in the UL 9540A module testing data you provided previously in the file "Compass BESS – Model Inputs 1.pdf". Could you clarify this discrepancy?

Response: The test duration of 1.83 hours represents the total duration of which the smoke and volume of smoke was emitted during the UL9540A test. The 85.19 minutes refers to the largest potential peak release of post combustion products, not the entirety of the smoke being released. However, as shown in Attachment A, when using the 85.19 minutes in the emission calculations, the results still show project contributions at the MEIR would still be well below the REL, AEGL, acute hazard index, and AAQS.

3. It appears that the cell testing volume fractions for the toxic air contaminants were used instead of module testing data. Please explain the difference and justify the selection of the cell testing data.

Response: We chose to use results from the cell testing volume fractions because they are more conservative than that from the module level testing data (meaning likely to yield the greatest potential emissions). If they are evaluated side by side, there are toxic air contaminants that are not detected at the module level (such as propane, butane, and hexane) that are detected at the cell level. Furthermore, the volume fractions at the cell level are higher per pollutant than at the module level test. Therefore, scaling up the cell level test is considered conservative.

4. Could you provide a justification for selecting the specific unit (UTMx = 437108.8, UTMy = 3710629.3) in the central-eastern part of the project for the modeling analysis? In other words, do you expect this unit would result in worst-case impacts compared to other locations such as the northeastern corner?

Response: The location of the unit referenced was selected based on the predominant wind direction of meteorological data from the Mission Viejo station, which shows the predominant wind direction blowing from the west. As the closest residential receptor east of the project downwind is across the freeway, the source was located at the closest cabinet location west of the receptor.

5. We had a question regarding the benzene concentration for the module testing previously. In TN #: 260326 Table 4, the benzene concentration was reported as 9.0 ppm, while the file "Compass BESS – Model Inputs 1.pdf" shared with us previously lists the benzene component as 0.09%. Could you confirm which value is correct?

Response: We confirmed with Fire & Risk Alliance that the reference to the benzene concentration of 0.09% from the Compass BESS – Model Inputs 1.pdf is an editorial error. The correct concentration from the UL9540A module test is 9.0 ppm which was used in the HMA. We are requesting FRA to prepare an errata letter to confirm this correction.

6. In your updated emission worksheet, we noticed that the pollutant densities were calculated based on conditions of approximately 20 °C and 1 atm. However, under thermal runaway conditions with higher temperature and pressure, the gas densities could be higher. Previously we asked whether the pressure would be 98.46 psig, but I don't remember we received a formal answer on this. In addition, in the file

> "Compass BESS – Model Inputs 1.pdf" provided previously, the thermal runaway temperature was shown as 239 °C. However, the temperature currently used in your model is 1,160 °F.
>
> Given the sensitivity of emission calculations to both temperature and pressure, could you please provide a justification for using standard conditions instead of the thermal runaway conditions?

Response: The pressure reported in the cell level UL9540A test was 98.46 psig. The pollutant densities used were under standard temperature and pressure. When adjusting the density based on the temperature from the UL9540A of 524.3°C at the top of the cabinet and 98.46 psig, the relative densities increase at a maximum of 2.5 times what was modeled, although some pollutant densities decreased compared to standard temperature and pressure. Even assuming this higher density and the entire unit undergoing thermal runaway, project contributions at the MEIR (as shown in Attachment A) would still be well below the REL, AEGL, acute hazard index, and AAQS.

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Attachment A: Original Submitted May 23, 2025 and Revised AERMOD Model Results

Table 1. Max Emission Rates (lbs/day) for Project - Unit Level - Original Submitted May 23, 2025						
Max Rates	**Propane**	**Butane**	**Carbon Monoxide**	**Hexane**	**Benzene**	**Toluene**
Hourl Max, g/s	0.268	0.551	14.446	3.766	0.007950	0.009374
Hourly Max lbs/hr	2.13	4.37	114.66	29.89	0.0631	0.07440
Table 1. Max Emission Rates (lbs/day) for Project - Unit Level – Revised						
Max Rates	**Propane**	**Butane**	**Carbon Monoxide**	**Hexane**	**Benzene**	**Toluene**
Hourl Max, g/s	0.829	1.661	45.834	0.065	0.023436	0.027720
Hourly Max lbs/hr	6.58	13.18	363.77	0.51	0.1860	0.22000

Table 2. AERMOD Maximum Impact X/Q, (µg/m^3)/(g/s) Original Submitted May 23, 2025	**Table 2. AERMOD Maximum Impact X/Q, (µg/m^3)/(g/s) Revised**
Max 1-Hour	**Max 1-Hour**
86.76	88.67

Table 3. Project Contribution Concentrations (ug/m3) - Original Submitted May 23, 2025								
Pollutant	**CAS No.**	**Hr. Max (g/s)**	**X/Q (µg/m3)/(g/s)**	**Project Concentration (µg/m3)**	**REL (µg/m3)**	**AEGL (µg/m3)**	**Project Exceed REL or AEGL?**	**Acute Hazard Quotient**
		(from Table 1)	**(from Table 2)**					
Propane	74986	0.268	86.76	23.26	NA	9,920	No	NA
Butane	106978	0.551	86.76	47.78	NA	13,074	No	NA
Carbon Monoxide	630080	14.45	86.76	1,253.37	23,000	NA	No	0.05
Hexane	110543	3.77	86.76	326.78	NA	10,222	No	NA
Benzene	71432	0.007950	86.76	0.690	27	NA	No	0.03
Toluene	108883	0.009374	86.76	0.8133	5,000	NA	No	0.0002
							Hazard Index	**0.08**

Notes: A threshold of 1 was assumed for the acute hazard index.

Table 3. Project Contribution Concentrations (ug/m3) - Revised								
Pollutant	CAS No.	Hr. Max (g/s) (from Table 1)	X/Q (µg/m3)/(g/s) (from Table 2)	Project Concentration (µg/m3)	REL (µg/m3)	AEGL (µg/m3)	Project Exceed REL or AEGL?	Acute Hazard Quotient
Propane	74986	0.829	88.67	73.50	NA	9,920	No	NA
Butane	106978	1.661	88.67	147.25	NA	13,074	No	NA
Carbon Monoxide	630080	45.83	88.67	4,064.11	23,000	NA	No	0.18
Hexane	110543	0.06	88.67	5.74	NA	10,222	No	NA
Benzene	71432	0.023436	88.67	2.08	27	NA	No	0.08
Toluene	108883	0.027720	88.67	2.46	5,000	NA	No	0.0005
							Hazard Index	**0.25**

Notes: A threshold of 1 was assumed for the acute hazard index.

Table 4.AAQA for Compass BESS Project - Original Submitted May 23, 2025							
Impact Parameter	Applicable Standard	Project Area Maximum Background Concentration (Years 2021-2023)		Project Contribution (µg/m3)	Cumulative Concentration (µg/m3)	AAQS Threshold (µg/m3)	Exceed AAQS Threshold?
		ppmv	µg/m^3				
1-hour CO	State	3.3	3,780	1253.42	5,034	23,000	No
	Federal	3.3	3,780	1253.42	5,034	40,000	No
8-hour CO	State	2.7	3,093	654.41	3,748	10,000	No
	Federal	2.7	3,093	654.41	3,748	10,000	No

Table 4.AAQA for Compass BESS Project - Revised							
Impact Parameter	Applicable Standard	Project Area Maximum Background Concentration (Years 2021-2023)		Project Contribution (µg/m3)	Cumulative Concentration (µg/m3)	AAQS Threshold (µg/m3)	Exceed AAQS Threshold?
		ppmv	µg/m^3				
1-hour CO	State	3.3	3,780	4,063.98	7,844	23,000	No
	Federal	3.3	3,780	4,063.98	7,844	40,000	No

Table 4.AAQA for Compass BESS Project - Revised							
Impact Parameter	**Applicable Standard**	**Project Area Maximum Background Concentration (Years 2021-2023)**		**Project Contribution (µg/m3)**	**Cumulative Concentration (µg/m3)**	**AAQS Threshold (µg/m3)**	**Exceed AAQS Threshold?**
		ppmv	**µg/m^3**				
8-hour CO	State	2.7	3,093	2,107.20	5,200	10,000	No
	Federal	2.7	3,093	2,107.20	5,200	10,000	No