



**Memo to:**  
City of Morro Bay

**Copied to:**  
City of Morro Bay Fire Department  
Daniel McCrain, Fire Chief  
715 Harbor Street  
Morro Bay, CA 93442

**Memo No:** 10486697-HOU-M-01-A  
**From:** DNV Energy USA Inc  
**Date:** 19 June 2024

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**Re: Summary of Offsite Consequence Analysis for Vistra Morro Bay Battery Energy Storage System (BESS) Project**

## 1 EXECUTIVE SUMMARY

DNV Energy USA Inc. (“DNV”), an independent engineer, has reviewed the Offsite Consequence Analysis (OCA) for Vistra’s Morro Bay Battery Energy Storage System (BESS) Project developed by Ramboll submitted in March 2024 [1]. The OCA identifies the potential impacts to the public due to the release of airborne toxins during an unexpected fire event at Vistra’s proposed BESS Project in Morro Bay, California. The OCA specifically evaluates the potential emissions from a credible worst-case fire event and the impact on the surrounding areas based on local weather data. Two BESS layouts are included in the study: the building configuration, consisting of three buildings containing BESS (the proposed project), and the enclosures configuration, consisting of 174 individual outdoor rated BESS (the enclosure alternative). It was determined based on the analysis that in both layouts, a credible worst-case scenario would not present any significant health and safety risk to the public.

## 2 INTRODUCTION

Vistra is proposing a 600 MW / 2400 MWh BESS Project located at the Morro Bay Power Plant in Morro Bay, California. The Project is estimated to power 450,000 homes in the surrounding area when renewable resources are not available by interconnecting to the existing PG&E switchyard located east of the Project Site. The BESS would operate year-round to store and discharge electricity to support demand on the power grid, improve the reliability of California’s increasingly low-carbon grid, and facilitate the efficient use of renewable energy resources. Vistra has proposed two potential configurations for the BESS Site; one where the BESS would be contained within 3 dedicated use buildings (the proposed project), and another where the project would consist of 174 individual outdoor rated BESS (the enclosure alternative). The OCA has evaluated both potential configurations for comparison.

The BESS Site is surrounded by open space and recreation areas to the north and west (Morro Creek, Morro Rock Beach and Sand Dunes), public facilities to the east (Morro Bay Mutual Water Co), and commercial and recreational areas to the south (the Embarcadero, Coleman Park, and Morro Bay Oyster Company). The closest exposure to the BESS is an RV park approximately 132 m (433 ft) or 135 m (443 ft) from the closest BESS building or BESS enclosure in the proposed project or enclosure alternative layouts, respectively.

Hazards related to a credible worst-case fire event were evaluated using computational methods. Other hazards associated with BESS were not considered for this OCA.



### 3 METHODOLOGY AND ASSUMPTIONS

For the purposes of providing a worst-case scenario, the OCA assumes that a failure event occurs at the BESS Site causing a fire. It is also assumed that all active fire prevention methods have failed. In the proposed project, it was determined that a credible worst-case scenario would involve combustion of an entire block (48 racks) of batteries. In the enclosure alternative, it was determined that a credible worst-case scenario would involve combustion of one BESS enclosure (for comparison, one BESS enclosure has the equivalent of 46 battery racks). DNV finds these worst-case scenarios to adequately represent credible failure scenarios.

The OCA details a literature review discussing the likely toxins produced during a BESS fire. Based on the literature review, the selected toxins used for the OCA were hydrogen fluoride (HF), hydrogen chloride (HCl), hydrogen cyanide (HCN), and carbon monoxide (CO). DNV finds the type and quantity of the toxins used for analysis to be appropriate for the purposes of the study.

Industrial facilities, vehicles, and all fires have the potential to emit air toxins. Guidance documents and reference values have been developed to evaluate the impacts of potential exposure to these toxins. The two most commonly used guidelines are Acute Exposure Guideline Levels (AEGLs) and Emergency Response Planning Guidelines (ERPGs). AEGLs estimate the concentrations at which most people will begin to experience health effects if they are exposed to an air toxin for a specific length of time. ERPGs is the maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without experiencing or developing certain health effects. Both AEGLs and ERPGs have 3 levels, which are defined in Table 1 below. The OCA identifies the endpoint or furthest distance where serious injuries from short-term exposures would no longer occur. For the purposes of the OCA, the maximum allowable threshold for the air toxins modeled was determined to be Level 2. DNV finds this to be a standard modeling endpoint.

**Table 1 Definitions for AEGL and ERPG levels**

Level	AEGL Definitions	ERPG Definitions
1	AEGL-1 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.	ERPG-1 is the maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without experiencing more than mild, transient adverse health effects or without perceiving a clearly defined objectionable odor.
2	AEGL-2 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.	ERPG-2 is the maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action.
3	AEGL-3 is the airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.	ERPG-3 is the maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects.

The atmospheric stability, wind speed, temperature, and other meteorological conditions impact the consequence modeling as the gas cloud dispersion will be affected by the atmospheric conditions. This OCA considers meteorological conditions that are likely to result in reasonable worst-case impacts, which occur when ground-level concentrations are at their maximum. It also assumes that the winds are systematically blowing in the general direction of the nearest residence, which is deemed unlikely by the OCA based on the historical meteorology of the site. DNV finds the inputs used to be beneficial as a wide range of weather conditions are modelled allowing for the worst-case scenarios to be reported in the OCA.

The OCA additionally assumes that there is no evacuation of the nearest residents during the event and that residents are outside during the entire event.

## 4 RESULTS AND CONCLUSIONS

The OCA indicates that none of the modelled air toxins will exceed Level 2 AEGL or ERPG concentrations at the closest residence for both the proposed project and enclosure alternative. The results additionally indicate that the concentrations are lower at the closest residence for the enclosure alternative.

The OCA identified the endpoint or furthest distance where serious injuries from short-term exposures would no longer occur based on AEGL-2 and ERPG-2 levels. Table 2 below summarizes the predicted endpoint distances. Note, the closest exposure to the BESS is an RV park approximately 132 m (433 ft) or 135 m (443 ft) from the closest BESS building or BESS enclosure in the proposed project or enclosure alternative layouts, respectively.

For the proposed project, carbon monoxide was the only hazardous toxin that the model indicated that had a concentration accumulate in excess of the exposure guidelines. This means that based on the simulations, the other toxins did not exceed hazardous concentrations dictated by the AEGL and ERPG Level 2. The endpoint distance for carbon monoxide from a fire event in the proposed project was 131 m (430 ft) with an exposure duration of 8 hours. This means, that if an individual is outdoors with no safeguards within the 131 m radius for an 8-hour duration, they could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape. It is important to note that the OCA states that the closest RV is outside the radius of the carbon monoxide AEGL-2 endpoint.

Conversely, for the enclosure alternative, the endpoint distance for carbon monoxide from a fire event was 70 m (230 ft) with an exposure duration of 8 hours. This again means, that if an individual is outdoors with no safeguards within the 70 m radius for an 8-hour duration, they could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape. ERPG-2 levels were also identified for the enclosure alternative. These distances represent the maximum distance at which concentrations exceed the concentration limits that nearly all individuals could be exposed to for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair an individual's ability to take protective action. The maximum distance is reported as 19 m (62 ft) for HF, which according to the OCA would not reach the Project site boundary.



**Table 2 Predicted endpoint distances for the simulated toxins**

Species	HCN	HF	HCl	CO	HCN	HF	HCl	CO	HCN	HF	HCl	CO	HCN	HF	HCl	CO
Exposure Duration	60-min				30-min				10-min				8-hr			
	Exposure Guideline															
AEGL (ppm)	7.1	24	22	83	10	34	43	150	17	95	100	420	2.5	12	11	27
ERPG (ppm)	10	20	20	350												
Modeled Scenario	Predicted Maximum Toxic Endpoint Distance Above the Threshold (m)															
Enclosure - AEGL	7	17	6	16	7	16	5	10	6	8	4	7	16	37	7	70
Enclosure - ERPG	7	19	6	7												
Building - AEGL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	131
Building - ERPG	-	-	-	-												

Note: "-" means there is no concentration in excess of the identified guidelines.

Based on the assumptions used in the OCA, the BESS project poses no significant risk to the health or safety of the community during a credible event under worst-case conditions. DNV notes that the enclosure alternative has more favorable results that indicate a smaller potentially hazardous radius during a fire event. However, the greater hazard radius seen in the proposed project is for individuals who are outdoors with no safeguards for 8 hours. DNV finds it reasonable to assume that intervention will occur within that window.

With best regards,

DNV Energy USA Inc.

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June 19, 2024