Community Impacts From Emissions From Vistra Power Plant Lithium Battery Storage Facility Fire In Moss Landing, CA

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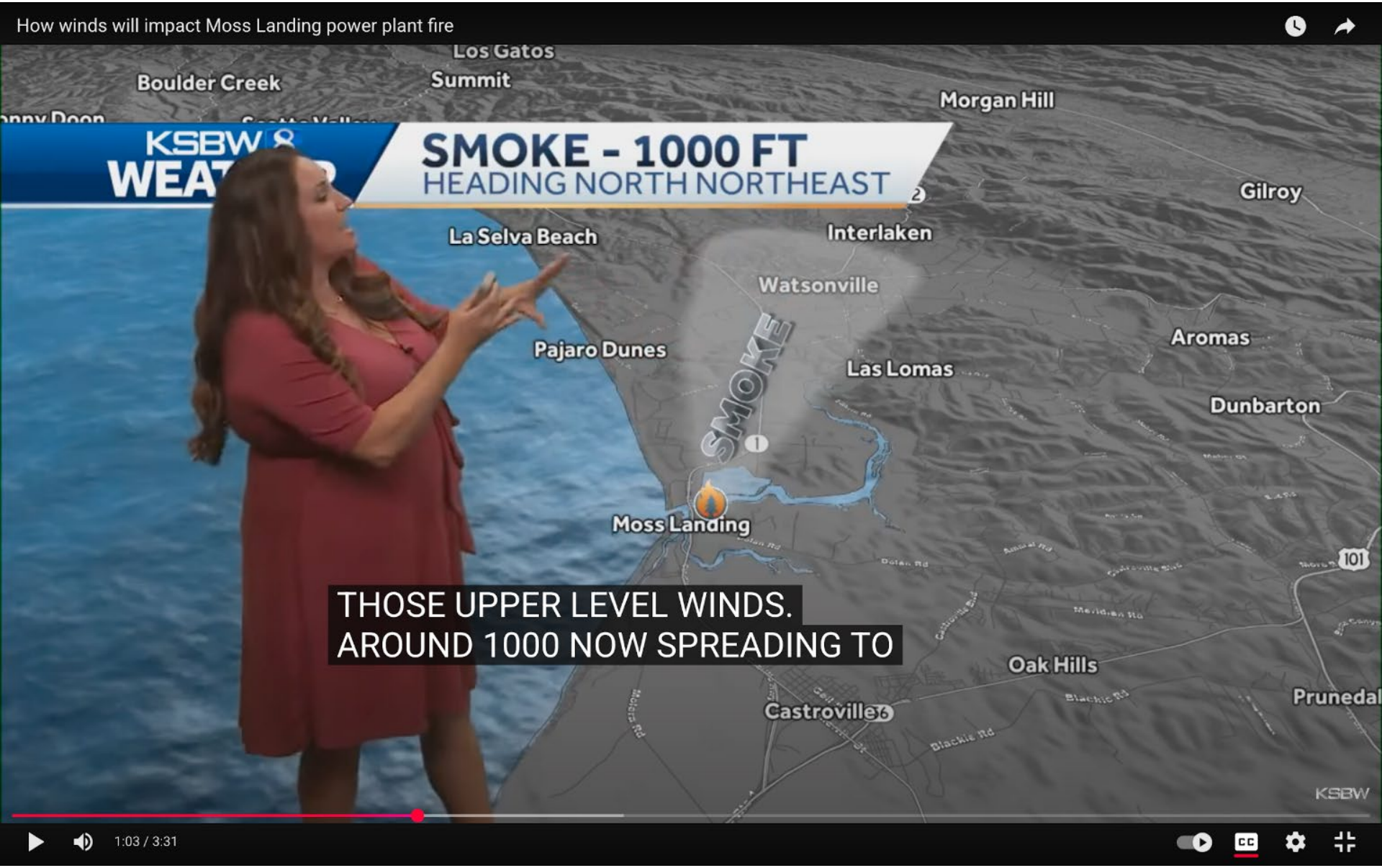
Live interview on Moss Landing battery plant fire with Monterey County Supervisor Glenn Church
LIVE
ARE YOU WHEN YOU LOOK AT THAT,
AT
MOSS LANDING POWER PLANT FIRE
BREAKING NEWS
KSBW
KSBW
0:02 / 9:19 • Intro


Live interview on Moss Landing battery plant fire with Monterey County Supervisor Glenn Church
LIVE
REBUILD?
DO WE DECIDE TO KEEP THIS
MOSS LANDING POWER PLANT FIRE
BREAKING NEWS
KSBW
KSBW
3:41 / 9:19 • Worst case scenario


How winds will impact Moss Landing power plant fire
Los Gatos
Boulder Creek
Summit
Morgan Hill
KSBW 8
WEA
SMOKE - 1000 FT
HEADING NORTH NORTHEAST
Gilroy
La Selva Beach
Interlaken
Watsonville
Aromas
Pajaro Dunes
SMOKE
Las Lomas
Dunbarton
Moss Landing
THOSE UPPER LEVEL WINDS.
AROUND 1000 NOW SPREADING TO
Oak Hills
Castroville
Pruneda
KSBW
1:03 / 3:31

A battery fire at the 300-MegaWatt Phase I energy storage facility at the Moss Landing Power Plant site(Moss 300) began on Thursday, January 16, 2025.

The site is an alternative energy storage facility operated by Vistra Energy Corporation. The facility contains Lithium-Ion Batteries and is one of the world's largest Battery Energy Storage System (BESS) sites.

Lithium-Ion Battery Threats and Hazards…

While Lithium-Ion Battery Energy Storage Systems are an added value to critical infrastructure and key resources, generally they also pose a new and emerging threat to public health and safety. Generally, lithium-ion batteries can:

- Overheat creating "thermal runaway"
- Fire and explosions
- Hazardous materials releases in the form of toxic plumes and toxic runoff due to fire suppression tactics.

Thermal Runaway…

Thermal runaway is one of the primary risks related to lithium-ion batteries. It is a phenomenon in which the lithium-ion cell enters an uncontrollable, self-heating state. In ideal conditions, the heat is able to dissipate from the cell. However, in thermal runaway, the lithium-ion cell generates heat at a rate several times higher than the rate at which heat dissipates from the cell.

A short circuit, physical damage, improper design, or assembly can cause heat and pressure to build up in the battery.

A thermal runaway often results in one or more of the following events:

- Heat generation,
- Gas and smoke formation,
- Cell breach/cell explosion,
- Fire or gas explosion.

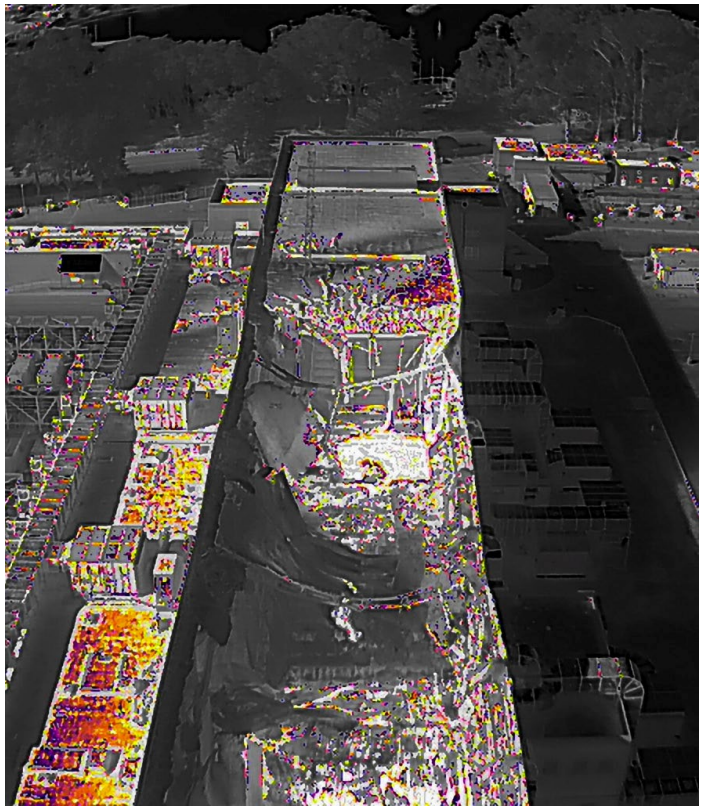
Cell Breach / Explosions:

If the pressure within the cell reaches a critical point, the cell can rupture, releasing flammable gases and in some examples; projectiles at high speeds.

These gases have the potential to combine with oxygen in the air and form an explosive mixture.

Cell Ignition / Fires…

When thermal runaway occurs, the cell is undergoing an unstable chemical. When oxygen mixes with the toxic flammable gases the battery cell may ignite, causing surrounding cells to do the same…



Site Areal Thermal Imaging on Day 3

Hazardous Materials - Toxic Gas/Smoke/Plumes:

Lithium-ion battery fires generate intense heat and considerable amounts of gas and smoke. The gasses that are released from battery energy storage systems are highly flammable and toxic.

Hazardous Martials and Smoke Plume Fallout = Toxic Runoff and debris

KION TV January 17th

Battery Fire Chemistry…

The type of gases, vapors, aerosols, and particulates released depends on the battery chemistry and environmental conditions involved but typically includes the production of…

- Gases such as: carbon monoxide, carbon dioxide, hydrogen, hydrogen sulfide, HF, HCl, HCN, methane, ethane, and other hydrocarbons.
- Metals such as Ni, Li, Mn, and Co
- HF reacts with salt water atmospheric fog (including salt vapor in air) to produce aerosolized HF, HCl and other Fluoride salts (CaF_2, NaF, etc.)

  …which can severely damage tissues and lungs.


COUNTY OF MONTEREY

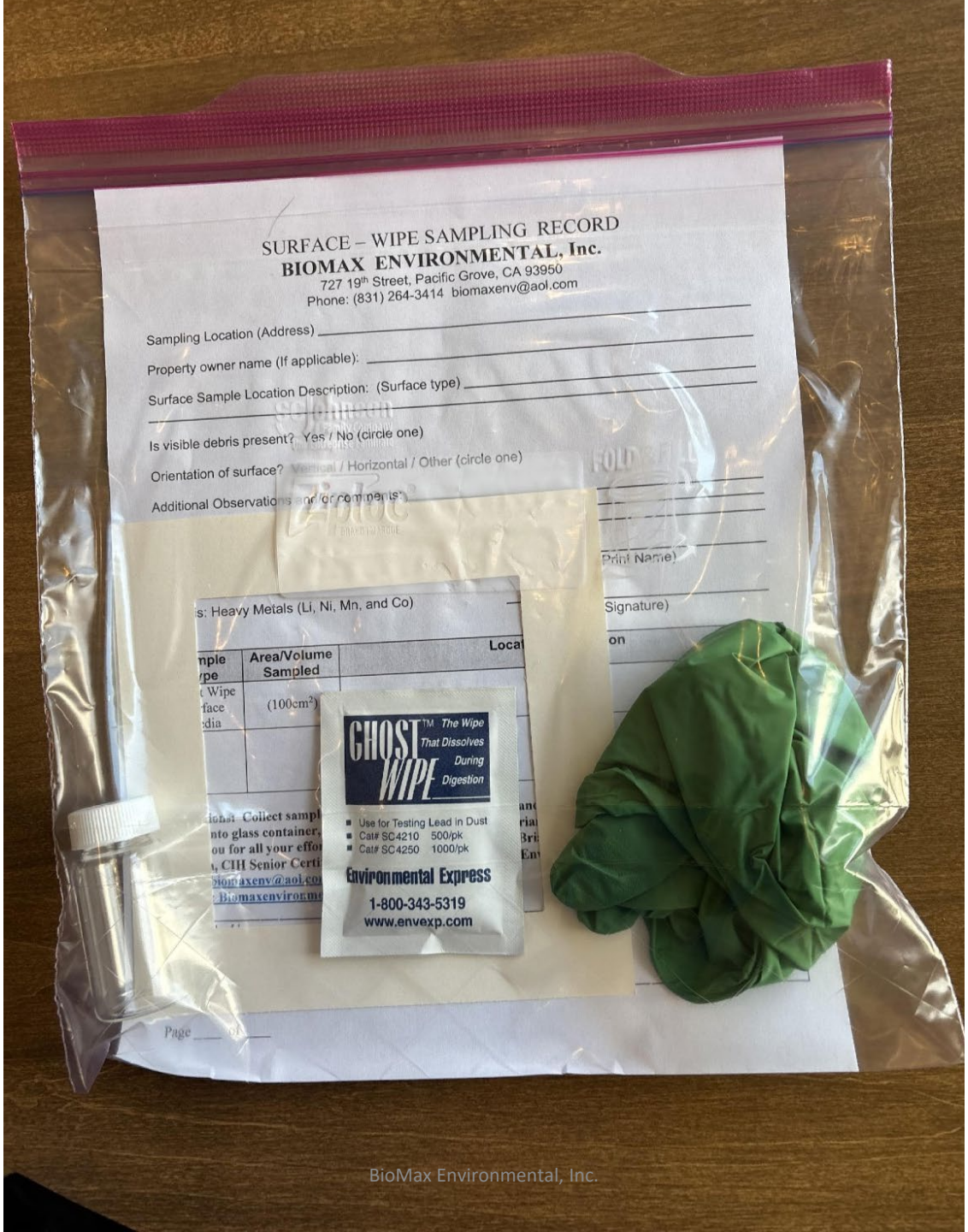

MIGHTY

- The three-story building's upper two floors collapsed because metal support beams melted or slumped.
- The building's interior was gutted by the chemical fire, leaving combustion fire residues and debris
- Unstable walls residue will have to be removed and as part of site decontamination.
- Widespread smoke plume fallout residues deposited throughout community
- Thousands nearby experience and report adverse health symptoms
- Many questions remain unanswered with respect to chemical exposures and long-term health effects


GET INVOLVED
neveragainmosslanding.org
NEVER AGAIN


VISTRA POLLUTED A NATIONAL MARINE SANCTUARY
B.E.S.S. BE
VISTRA POISONED US


BioMax


SURFACE – WIPE SAMPLING RECORD
BIOMAX ENVIRONMENTAL, Inc.
727 19th Street, Pacific Grove, CA 93950
Phone: (831) 264-3414 biomaxenv@aol.com
Sampling Location (Address)
Property owner name (If applicable):
Surface Sample Location Description: (Surface type)
Is visible debris present? Yes / No (circle one)
Orientation of surface? Vertical / Horizontal / Other (circle one)
Additional Observations and/or comments:
Print Name)
Signature)
s: Heavy Metals (Li, Ni, Mn, and Co)
Area/Volume Sampled
(100cm²)
GHOST WIPE™ The Wipe That Dissolves During Digestion
Use for Testing Lead in Dust
Cat# SC4210 500/pk
Cat# SC4250 1000/pk
Environmental Express
1-800-343-5319
www.envexp.com
Page ___ of ___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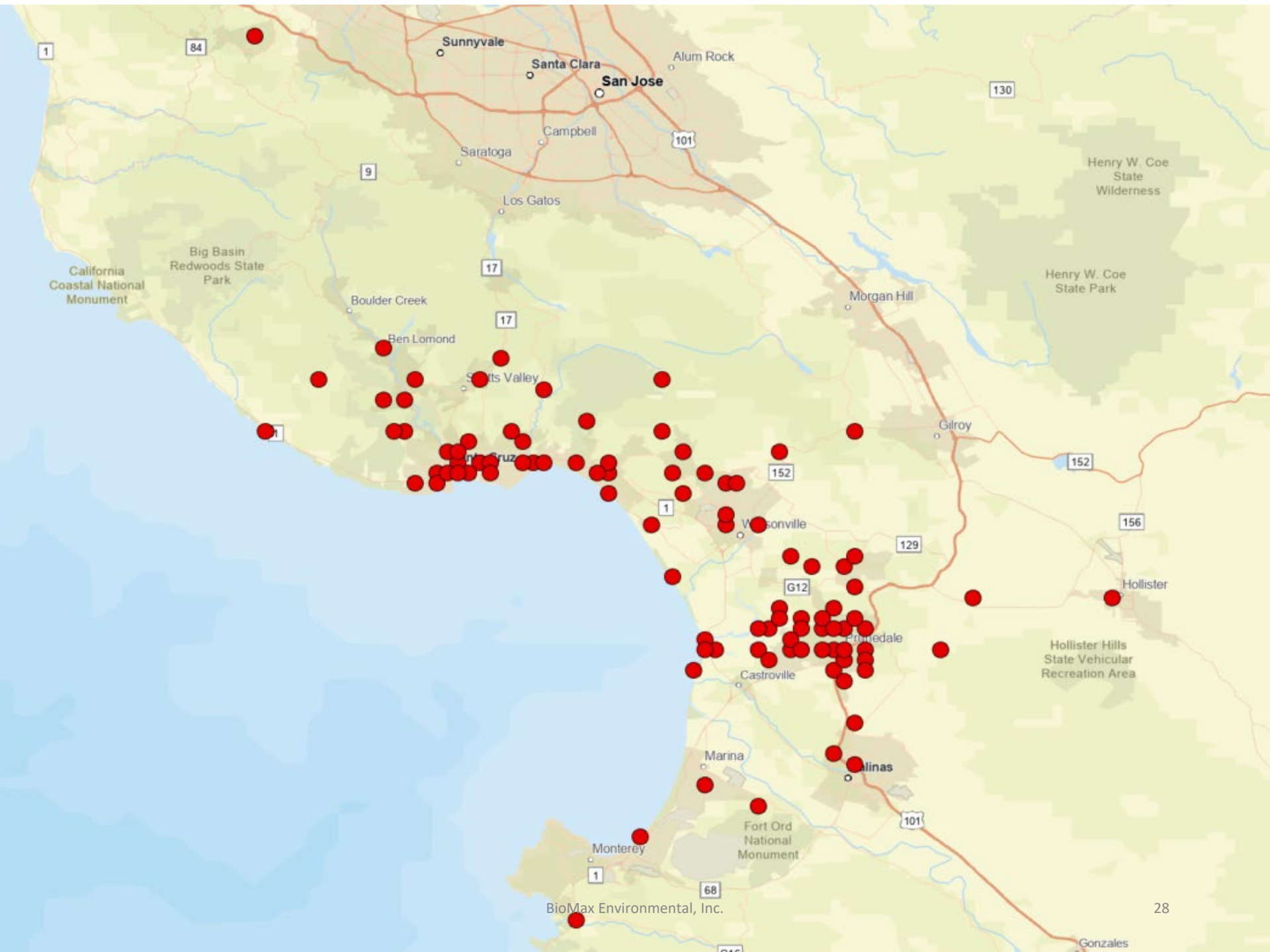
1-24-25


BioMax-3
1-24-25


Sunnyvale
Santa Clara
San Jose
Alum Rock
Campbell
Saratoga
Los Gatos
Henry W. Coe State Wilderness
Big Basin Redwoods State Park
California Coastal National Monument
Boulder Creek
Ben Lomond
Morgan Hill
Henry W. Coe State Park
Gilroy
Hollister
Hollister Hills State Vehicular Recreation Area
Castroville
Marina
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Fort Ord National Monument
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9
17
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G12
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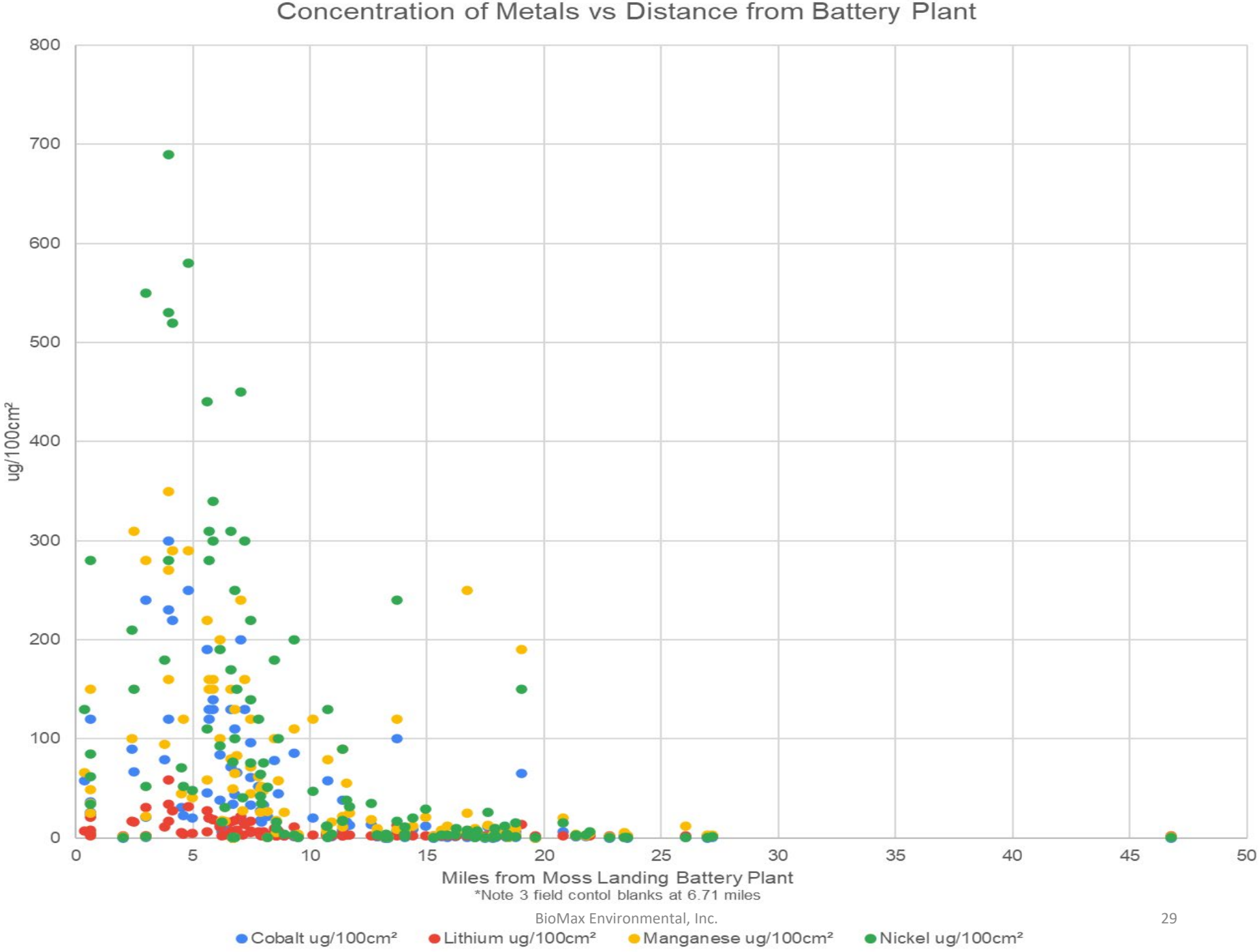
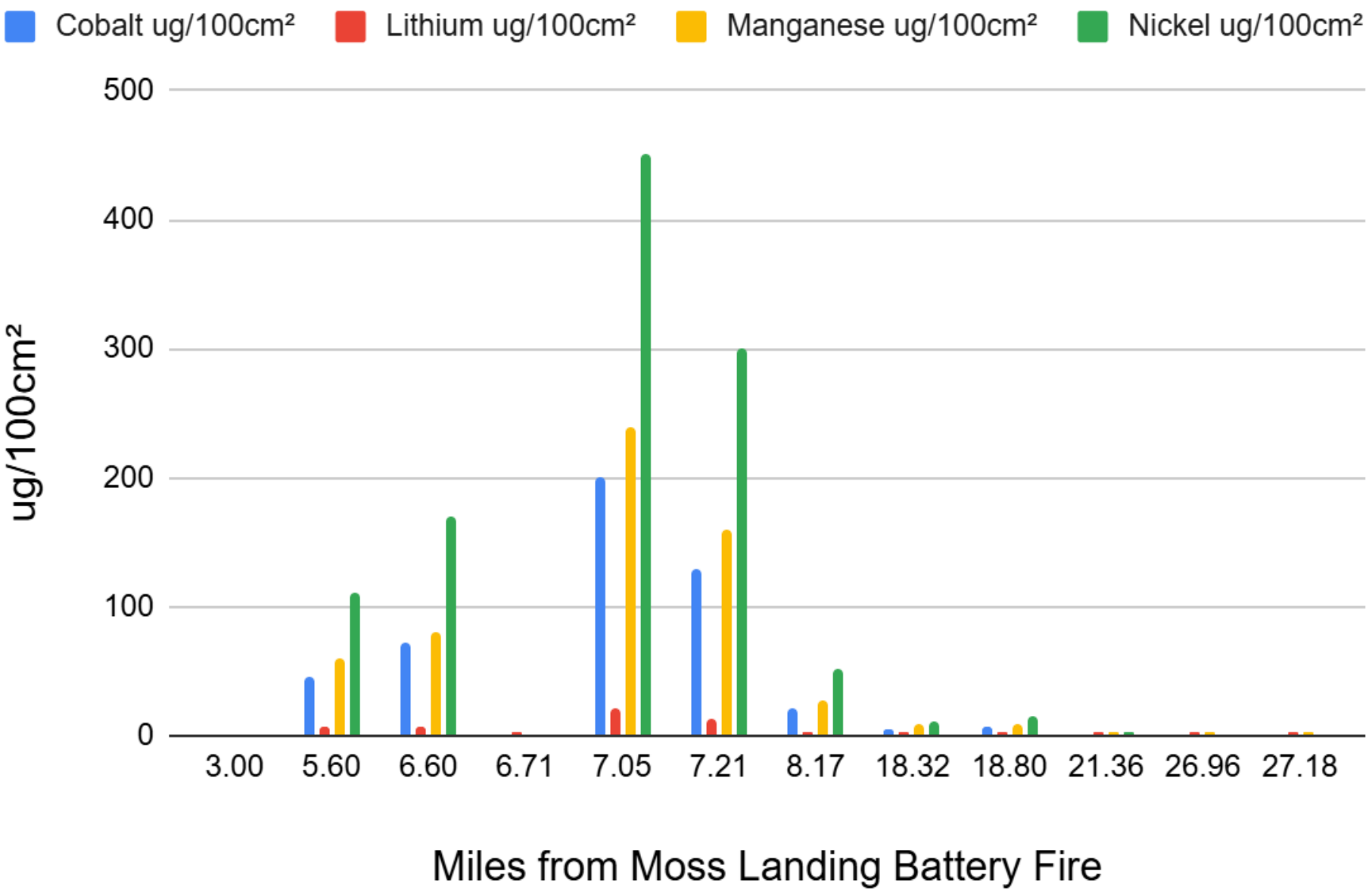
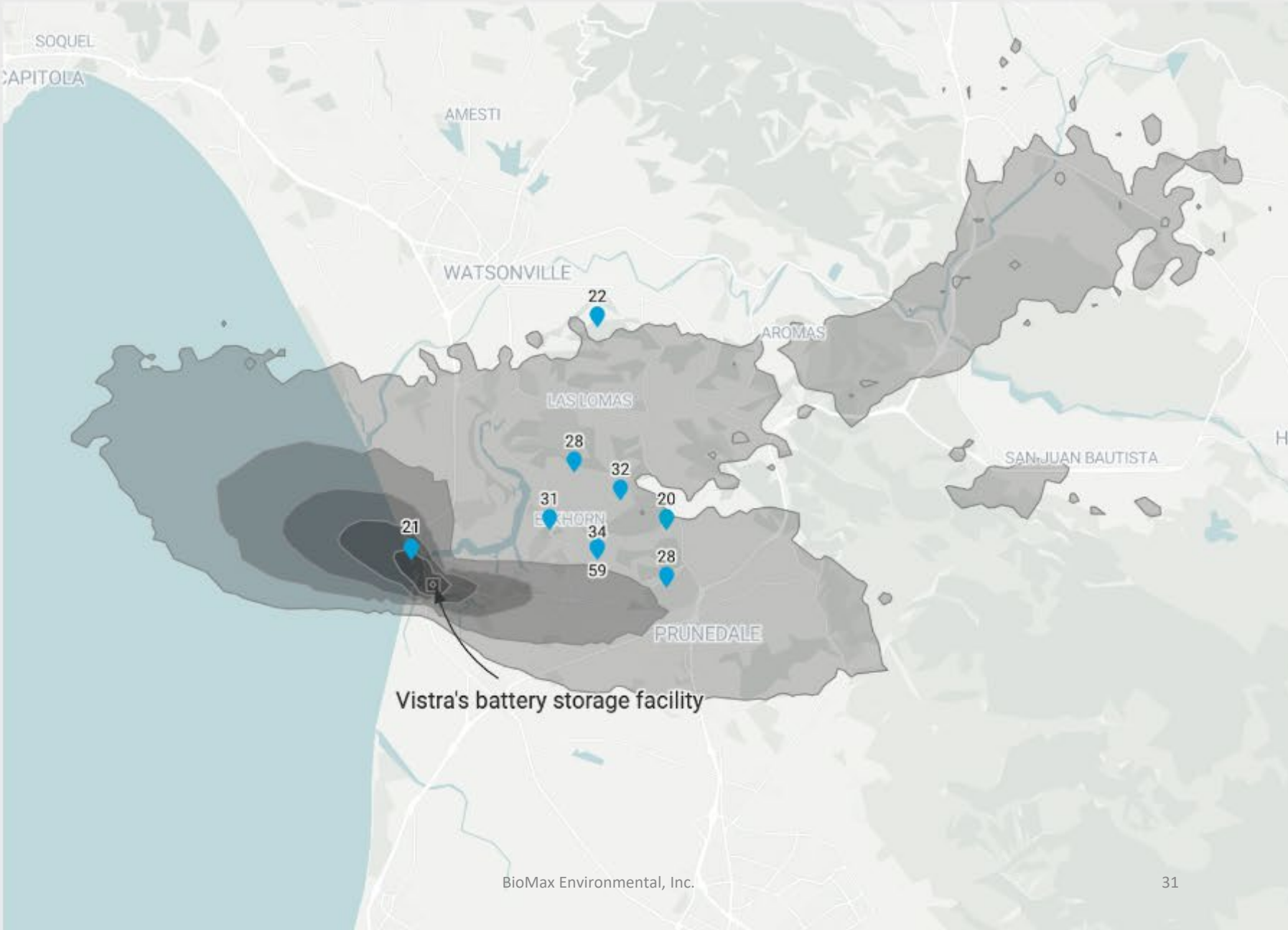

Concentration of Metals vs Distance from Battery Plant
ug/100cm²
800
700
600
500
400
300
200
100
0
0
5
10
15
20
25
30
35
40
45
50
Miles from Moss Landing Battery Plant
*Note 3 field contol blanks at 6.71 miles
Cobalt ug/100cm²
Lithium ug/100cm²
Manganese ug/100cm²
Nickel ug/100cm²


Cobalt ug/100cm²
Lithium ug/100cm²
Manganese ug/100cm²
Nickel ug/100cm²
500
400
300
200
100
0
ug/100cm²
3.00
5.60
6.60
6.71
7.05
7.21
8.17
18.32
18.80
21.36
26.96
27.18
Miles from Moss Landing Battery Fire

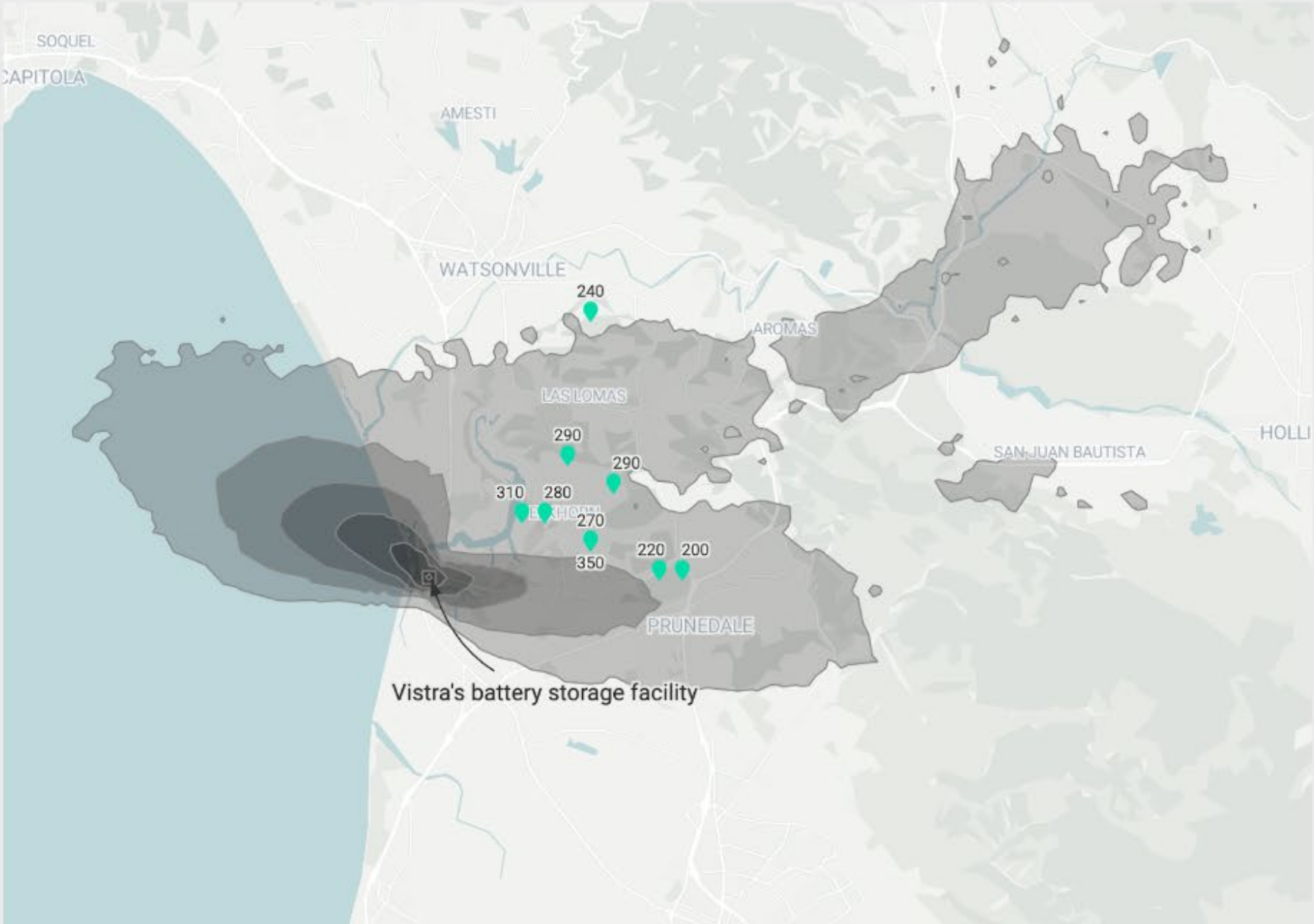
Click on the buttons below to switch between metals:

Nickel Cobalt Manganese Lithium



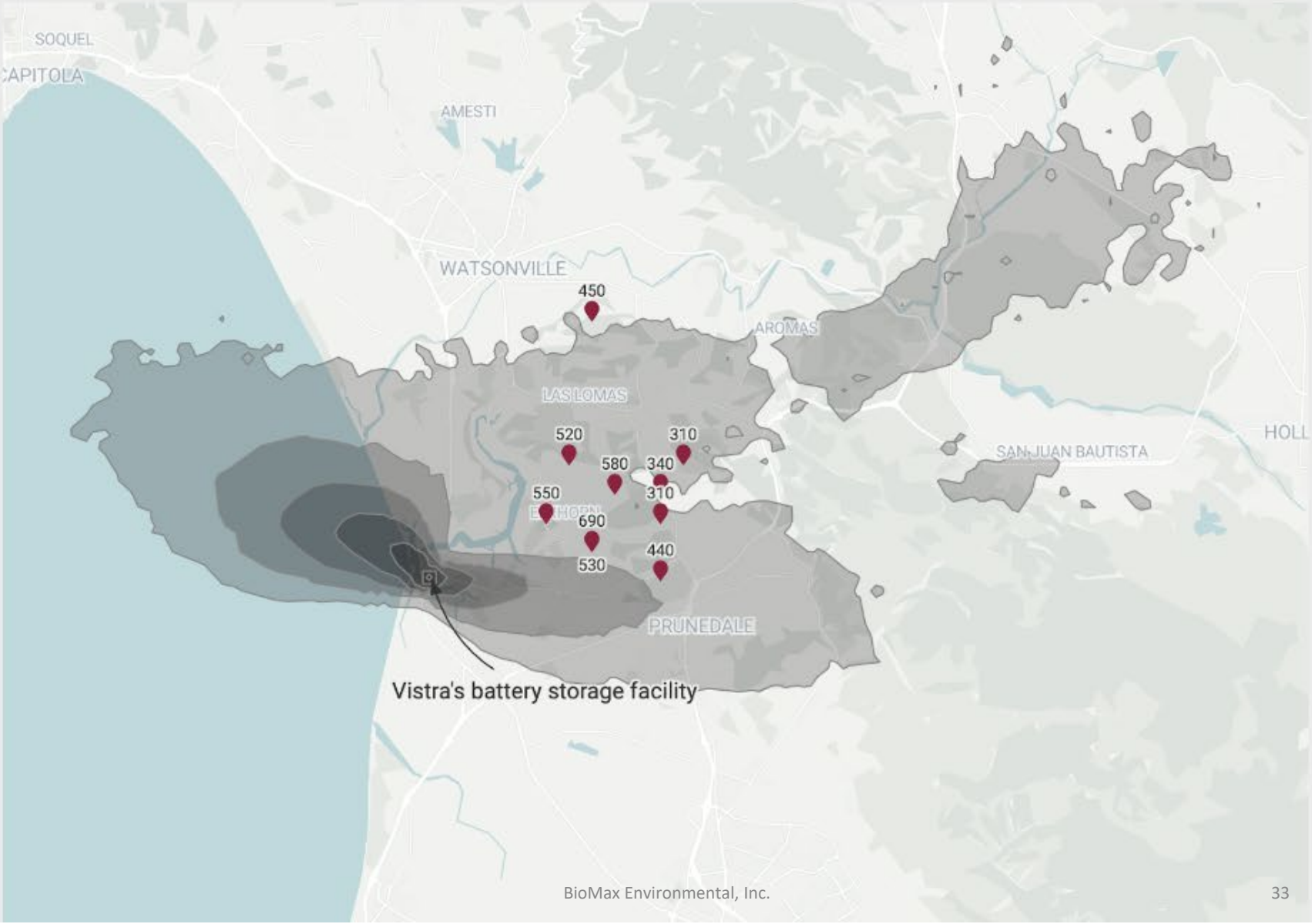
Click on the buttons below to switch between metals:

Nickel Cobalt Manganese Lithium



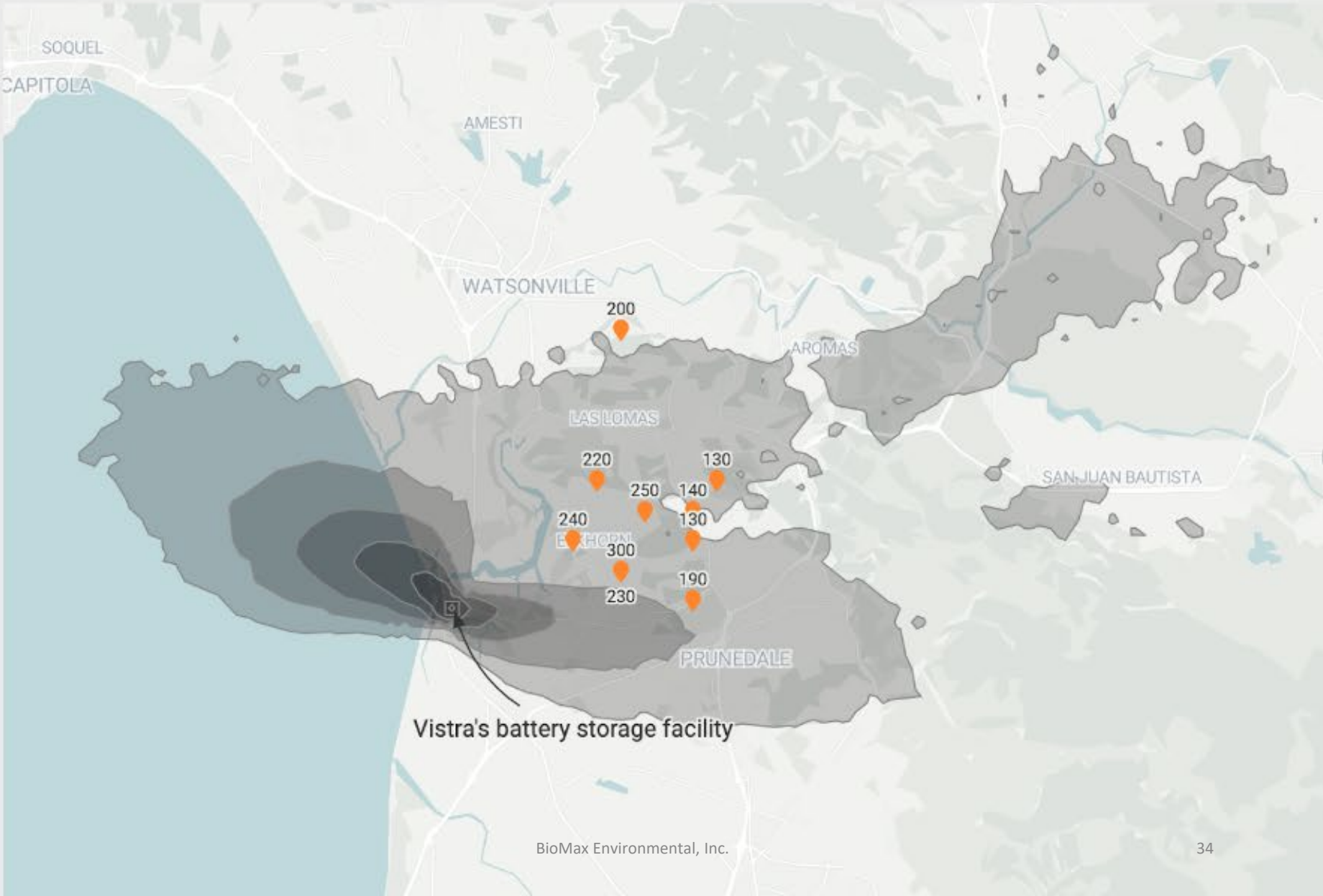
Click on the buttons below to switch between metals:

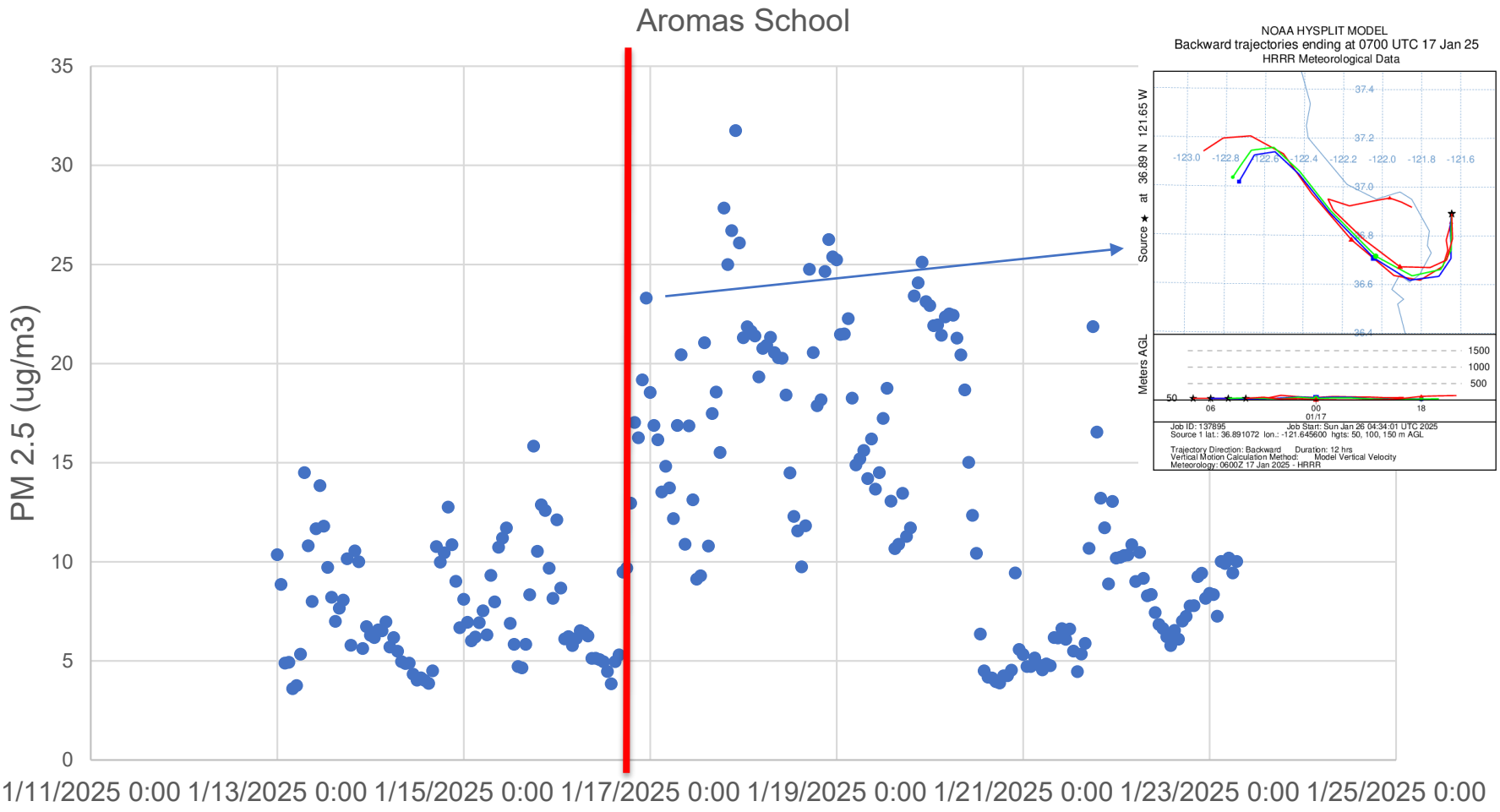
Nickel Cobalt Manganese Lithium

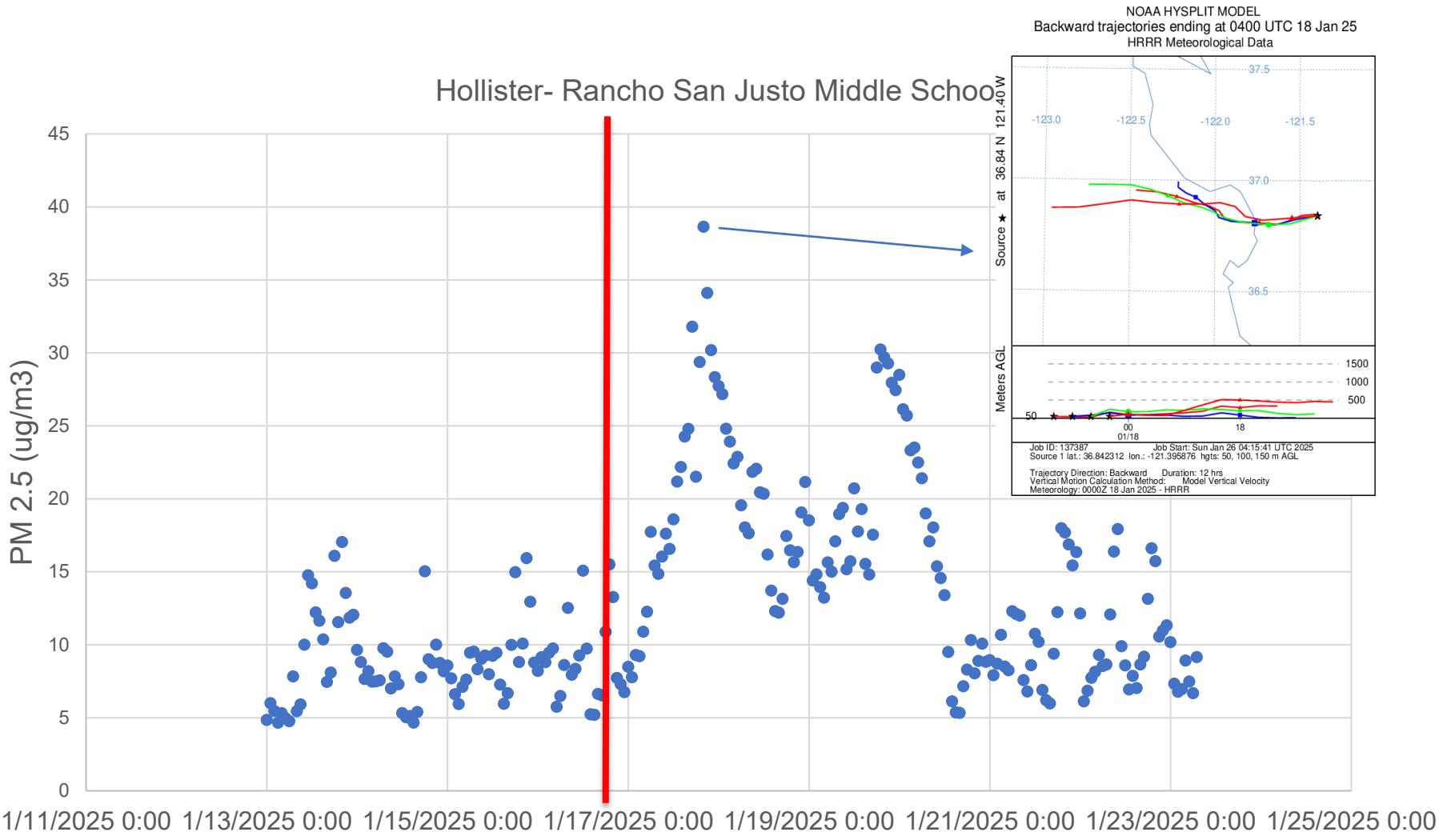


Click on the buttons below to switch between metals:

Nickel Cobalt Manganese Lithium




Aromas School
PM 2.5 (ug/m3)
0
5
10
15
20
25
30
35
1/11/2025 0:00
1/13/2025 0:00
1/15/2025 0:00
1/17/2025 0:00
1/19/2025 0:00
1/21/2025 0:00
1/23/2025 0:00
1/25/2025 0:00
NOAA HYSPLIT MODEL
Backward trajectories ending at 0700 UTC 17 Jan 25
HRRR Meteorological Data
Source ★ at 36.89 N 121.65 W
Meters AGL
1500
1000
500
50
06
00
18
01/17
Job ID: 137895
Job Start: Sun Jan 26 04:34:01 UTC 2025
Source 1 lat.: 36.891072 lon.: -121.645600 hgts: 50, 100, 150 m AGL
Trajectory Direction: Backward
Duration: 12 hrs
Vertical Motion Calculation Method:
Model Vertical Velocity
Meteorology: 0600Z 17 Jan 2025 - HRRR


Hollister- Rancho San Justo Middle Schoo
PM 2.5 (ug/m3)
45
40
35
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1/11/2025 0:00
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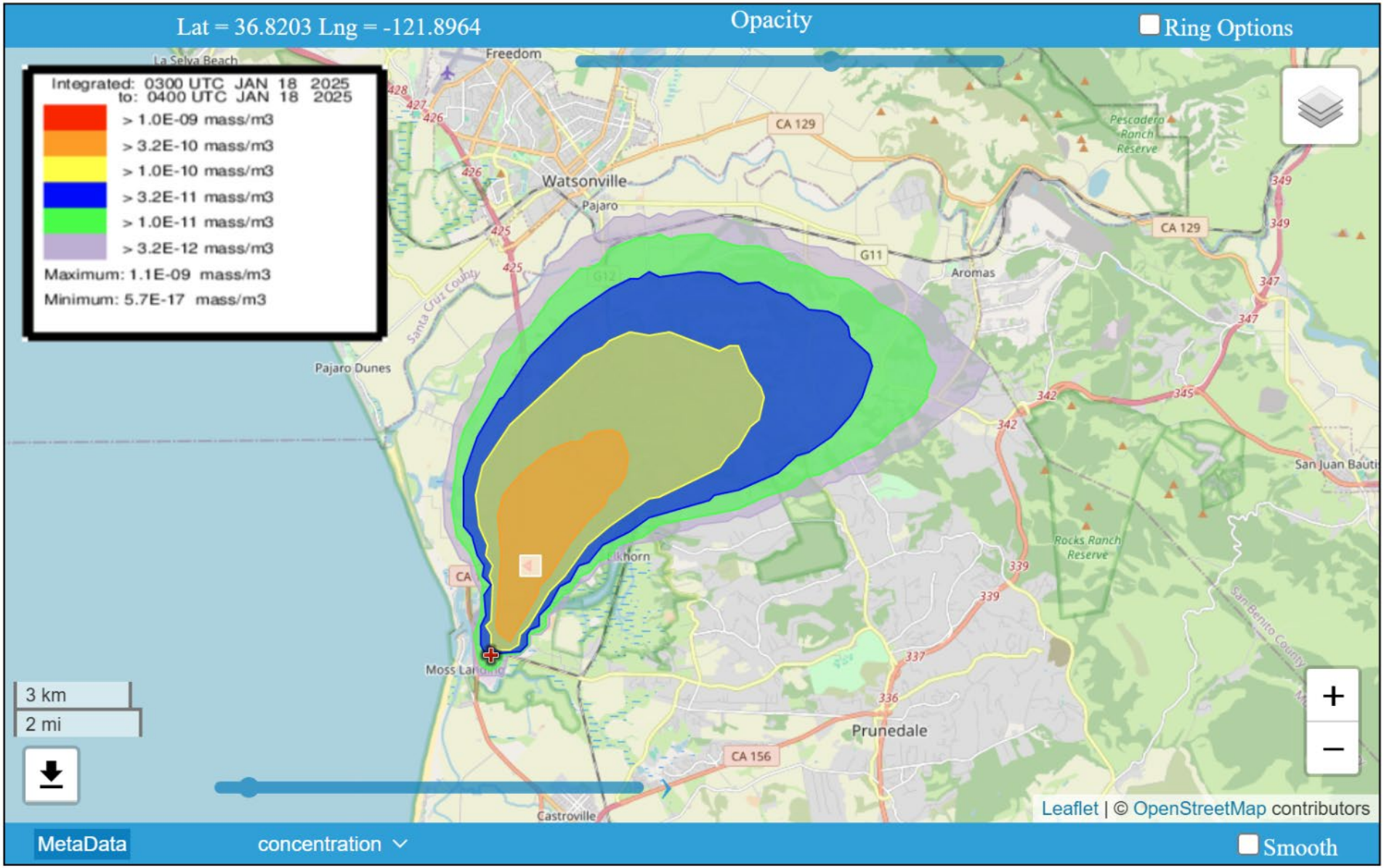
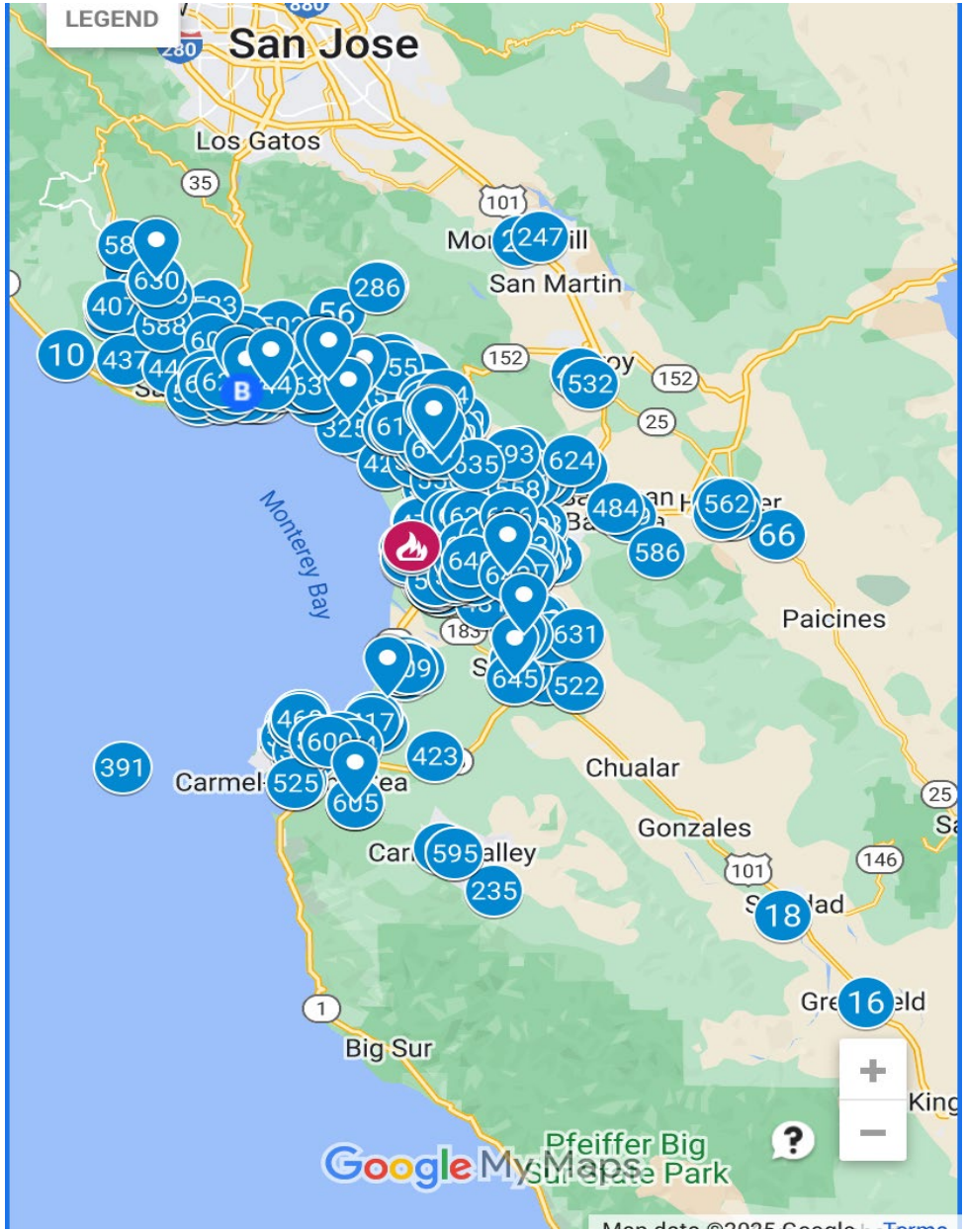
1/17/2025 0:00
1/19/2025 0:00
1/21/2025 0:00
1/23/2025 0:00
1/25/2025 0:00
NOAA HYSPLIT MODEL
Backward trajectories ending at 0400 UTC 18 Jan 25
HRRR Meteorological Data
Source ★ at 36.84 N 121.40 W
Meters AGL
37.5
37.0
36.5
-123.0
-122.5
-122.0
-121.5
1500
1000
500
50
00
18
01/18
Job ID: 137387
Job Start: Sun Jan 26 04:15:41 UTC 2025
Source 1 lat.: 36.842312 lon.: -121.395876 hgts: 50, 100, 150 m AGL
Trajectory Direction: Backward
Duration: 12 hrs
Vertical Motion Calculation Method:
Model Vertical Velocity
Meteorology: 0000Z 18 Jan 2025 - HRRR

- Only eight (8) sampling sites where samples were evaluated by DTSC and Monterey County using XRF and soil samples


Lat = 36.8203 Lng = -121.8964
Opacity
Ring Options
Integrated: 0300 UTC JAN 18 2025
to: 0400 UTC JAN 18 2025
> 1.0E-09 mass/m3
> 3.2E-10 mass/m3
> 1.0E-10 mass/m3
> 3.2E-11 mass/m3
> 1.0E-11 mass/m3
> 3.2E-12 mass/m3
Maximum: 1.1E-09 mass/m3
Minimum: 5.7E-17 mass/m3
Freedom
Watsonville
Pajaro
CA 129
G11
Aromas
Pescadero Ranch Reserve
Pajaro Dunes
Santa Cruz County
Elkhorn
Moss Landing
Prunedale
CA 156
Castroville
Rocks Ranch Reserve
San Benito County
San Juan Bauti
3 km
2 mi
Leaflet | © OpenStreetMap contributors
MetaData
concentration
Smooth

By the end of January, Over 647 NAML Facebook Members Reported minor to significant Symptoms

From Santa Cruz to Salinas, to Pacific Grove and Down Valley to Greenfield



SJSU SAN JOSÉ STATE UNIVERSITY

MEDIA ADVISORY

University Marketing and Communications | San José State University
One Washington Square
San José, CA 95192-0005

As part of a decade-long monitoring program of the Elkhorn Slough estuary, Dr. Ivano Aiello's research team analyzed the marsh soil properties, including the composition of major and trace elements.

The field surveys, conducted within a radius of approximately two miles from the power plant, measured a dramatic increase in marsh soil surface concentration (hundreds to thousand-fold) of the three heavy metals Nickel, Manganese and Cobalt.

These nanoparticles are used in cathode materials for lithium-ion batteries, commonly referred to as "NMC" (Nickel Manganese Cobalt), clearly connecting the occurrence of the heavy metals to airborne cathode material from the Vistra battery fire.

https://www.ksbw.com/article/heavy-metal-moss-landing-soil-battery-facility-fire/63575941

Interpretation of Community Results and Findings…

Proposed "clearance levels" have been prepared for the four metals in question (Ni, Li, Mn, and Co) based on established potential human exposure pathway modeling correlated with applicable regulatory standards and currently available guidance levels as noted. Regulatory standards and guidance considered…

- Preliminary Remediation Goals (PRGs) in soils
- Environmental Screening Levels (ESLs) in soils
- Permissible Exposure Levels (PELs) in air
- Occupational Exposure Limits (OELs) air and some surface
- EPA Regional Screening Levels (RSLs)
- EPA Health Based Screening Level (HBSLs)
- EPA Surface (HUD) Standards for lead dust

The Question/Problem… How to convert above standards and guidance limits to surface residue level standards (ug/100cm^2)

Comparative Example Calculations…. Nickel (Ni) offered by Rob Kleinerman, CIH

Toxicological modelling Assumes the following relevant to Occupational exposure levels…

- Average worker breaths 10 m^3 of air in 8-hour shift, and
- Average palm size of a human hand is about 100cm^2…

Surface contamination limits (expressed in µg/100 cm^2) = OEL X 10 m^3

Cal/OSHA PEL of 50 ug/m^3 of soluble nickel would be:
50 ug/m^3 X 10 m^3 = 500 ug/100cm^2

This method is used as a housekeeping standard in both the pharmaceutical and semiconductor[1] industries.

1 - As reported in the "*Semiconductor Industrial Hygiene Handbook – Monitoring, Ventilation, Equipment and Ergonomics.*" By Michael E. Williams and David G. Baldwin. Noyes Publications, 1995. Pages 242-243.

Comparative Example Calculations…. Nickel (Ni) offered by Rob Kleinerman, CIH

Toxicological modelling Assumes the following relevant to exposure limit levels for the general public[2]…

- Average person consumes 2 liters of water/day

$$\frac{\text{Surface contamination limits} =}{\text{Drinking Water Standard (in ug/liter) X 2 liters}}$$

California Maximum Contaminant Level (MCL) for nickel in drinking water of 100ug/liter. (100 ug/liter X 2 liters = 200 ug/100cm^2)

World Health Organization Guidelines for Drinking Water Quality for nickel of 70 ug/liter. (70 ug/liter X 2 liters = 140 ug /100cm^2)

2 – Which may include "sensitive" populations (i.e., children, elderly and immunocompromised individuals)

Proposed Community Standards Summary…

- Lithium (Li) 20 ug/100cm2 (ref. 1)
- Cobalt (Co) 80 ug/100cm2 (ref. 2)
- Manganese (Mn) 100 ug/cm2 (ref. 3)
- Nickel (Ni) 140 ug/100cm2 (ref. 4)

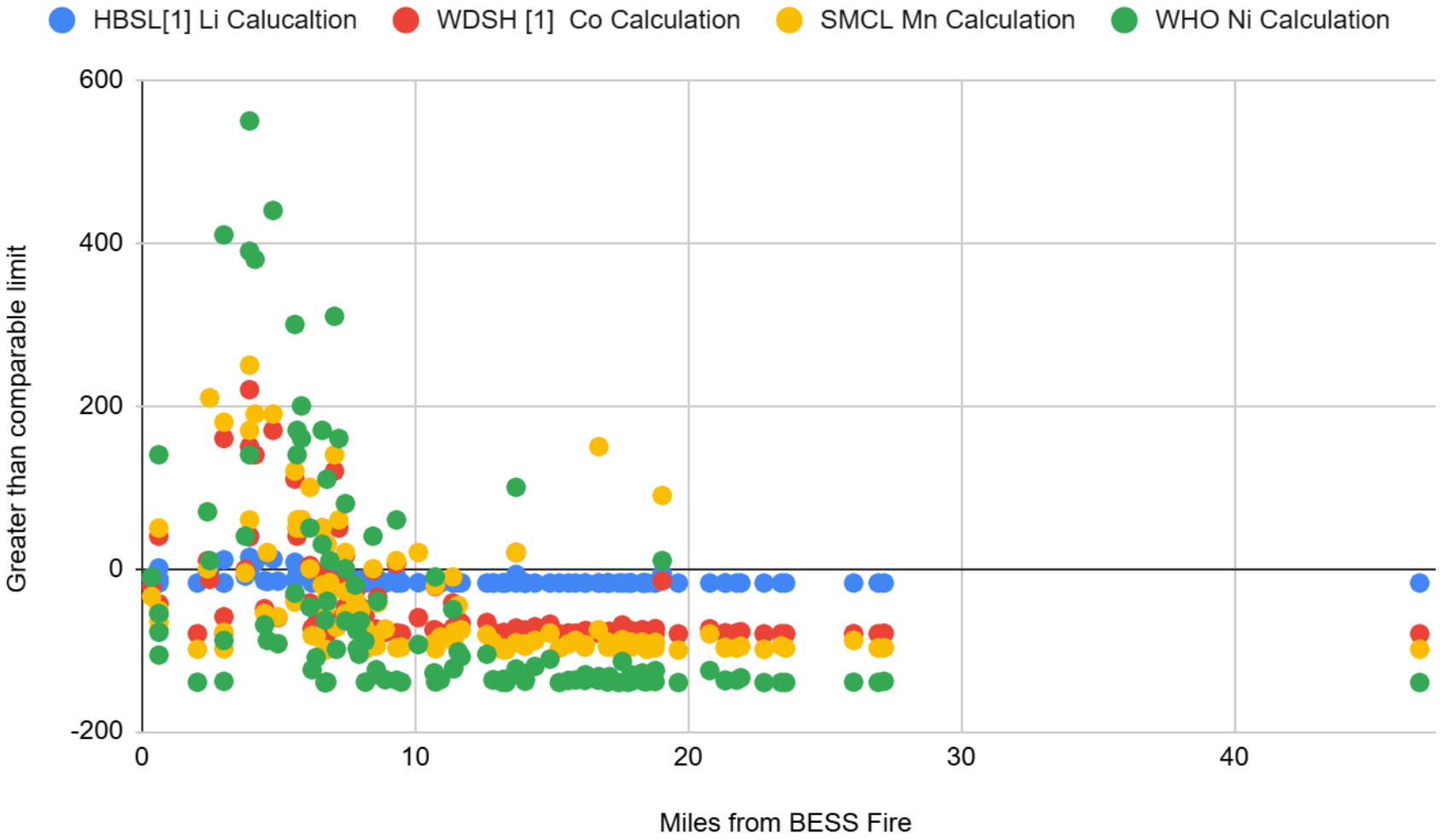
[1] Based on EPA's nonregulatory Health-Based Screening Level (HBSL) for drinking water of 10 micrograms per liter (µg/L).

[2] Based on Wisconsin's (WDHS) level for cobalt in drinking water of 40 ug/liter.

[3] Based on California's Secondary Maximum Contaminant Level (SMCL) for manganese in drinking water of 50 ug/liter.

[4] Based on World Health Organization's (WHO) Guidelines for Drinking Water Quality for nickel of 70 ug/liter.

Samples with Levels Greater than Comparable Standards



Vistra's Proposed Screening Levels… (Consultant CTEH)

- Lithium: 280 ug/100cm2
- Cobalt: (NA)
- Manganese: 2,260 ug/cm2
- Nickel: 1,880 ug/cm2

… CTEH proposed screening levels are some 12-23 times higher (less protective) than community's proposed clearance levels.

"The interpretation then becomes a toxicological question of risk acceptability and safety factor assumptions used for calculations and exposure modeling"

What is ”Acceptable”…???
Proposed Community vs. Vistra Levels…

Community “Clearance Level”:

- Lithium (Li) 20 ug/100cm^2
- Cobalt (Co) 80 ug/100cm^2
- Manganese (Mn) 100 ug/cm^2
- Nickel (Ni) 140 ug/100cm^2

Vistra (CTEH) “Screening Level”:

- Lithium: 280 ug/100cm^2
- Cobalt: (NA)
- Manganese: 2,260 ug/cm^2
- Nickel: 1,880 ug/cm^2

Regulatory Advisories and Statements…

- "No levels of HF exceeded OEHHA's acute Reference Exposure Level (REL) of 300 ppb (Monterey Bay Air Resources District – MBARD)
- "No measurements exceeded the moderate air quality level… and there were No exceedances of California human health standards" (US EPA Region 9)
- "Soil Testing indicates contamination below DTSC or EPA thresholds for worker exposure". (CTEH Vistra's consultant)
- "Data indicates there are not elevated metals associated with the fire in soil"… "Although initial surface screening of ash detected elevate levels of metals." (DTSC)
- CDPH's Conclusions…

  "…with exception of Co and Mn, metal concentrations are consistent with background levels"

  "none of the metal concentrations exceed health-based soil screening values"

  … "concentrations in agricultural soil samples do not pose a health risk to the public"

Incident Root Cause and Analysis…

The cause(s) of the incident points to failures of fire-suppression systems and facility design/spacing (i.e., batteries packed too close) as factors that allowed the thermal runaway to cascade and propagate.

All the available official sources (as of now) still state that the cause is under investigation.

Legal actions pending and responses are ongoing.

Conclusions and Take Aways…

Facts Revealed by the Incident…

- Collection and analysis of surface samples within the community indicates increased levels of Ni, Mn, Li, and Co within the smoke plume's fallout areas
- Community residents were unaware and uninformed regarding the hazards associated with the BESS operations conducted at the site as approved by the CPUC
- Local fire department were ill equipped and ill prepared to adequately respond to the magnitude of the fire incident
- The local Monterey County Health Department was ill prepared to respond and/or monitor the hazardous substance releases (air and particulate) associated with the incident
- Vistra's emergency response plan and site operations were inadequate to handle the magnitude of the incident and admitted that "older technologies" (from 2020) and procedures were in place and that newer control technologies are now available.

Call To Action…

- Let's learn from the causes of this incident and hazards that exist
- BESS facilities need to be better prepared to assure that this never happens again!
- Communities need to be part of the process in permitting and operations of these kinds of facilities
- Green technologies have "value"…. Let's assure they are implemented responsibly, safely, and without adverse collateral impacts to our communities and environments