Recommendation to Consider Granting Landlord Consent for Small-Scale Atmospheric Sea Salt Process Studies on the USS Hornet

June 4, 2024

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Aircraft Carrier Hornet Foundation

- Located at Alameda Point Pier #3 North
- AC Hornet Foundation has operated the USS Hornet Museum in Alameda since October 17, 1998
- Existing lease with City has expired, but its operating on a month-to-month basis as a new lease is negotiated
- The Approved Use of the Premises is defined in the Lease as, “Museum operated in decommissioned Aircraft carrier called the Hornet, and related uses, including parking”
- Administrative Use Permit regulates the approved uses (including events) for the Premises

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University of Washington's Marine Cloud Brightening Program (MCBP) & the USS Hornet

The University of Washington has partnered with **AC Hornet Foundation** to place the **Costal Atmospheric Aerosol Research and Engagement (CAARE) Facility** on the flight deck

- Temporary exhibit with both an educational & research component
- Researching a climate intervention strategy, known as marine cloud brightening
- Idea of cooling the Earth by increasing reflectivity of low clouds over ocean
- University's **Marine Cloud Brightening Program (MCBP)** scientists developed the **Cloud Aerosol Research Instrument** or **(CARI)**
- CARI is the experimental equipment (research component) being tested on the flight deck

- The near-term goal of the equipment testing is to measure the plume of the aerosolized salt-water produced at a small scale by the CARI.
- University of Washington will provide more detail shortly

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What is the “CARI” ?

- Cloud Aerosol Research Instrument, or CARI (the blue instrument)
- CARI takes pressurized air and salt water* as inputs
- CARI spray nozzles generate a plume of mist that travels down the flight deck
- Measurements are taken to assess particle size and position by sensors placed 10-200 meters from the CARI
- The droplets are 96.5% water and 3.5% sea salt, the same proportion as ocean water
- Current localized scale of testing to be used to improve models for possible future experiments at a larger scale (not proposed for the USS Hornet)

* "sea salt” utilized is a product purchased with chemical composition is per ASTM D1141-98, added to City water. No other chemicals are reported as being aerosolized by the CARI.

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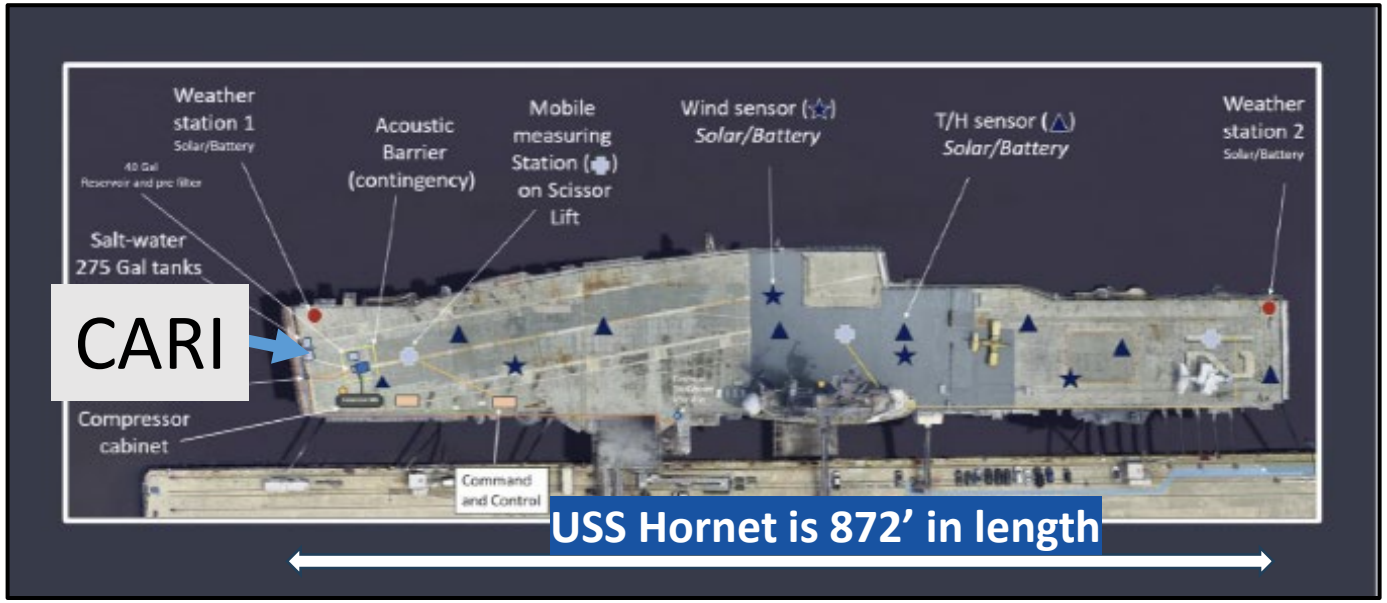
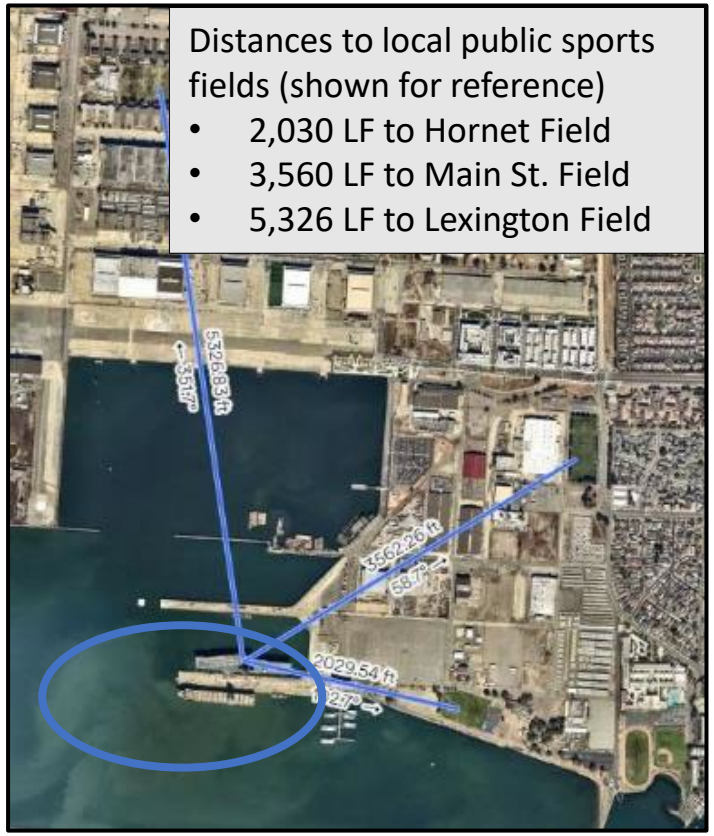
Layout of CARI on Flight Deck & Proposed Operation

- Proposal to operate 4 days a week for MCBP's testing purposes over a 20-week period
- Would like to continue operations, thereafter for educational, peer review & continuing research purposes
- Spray nozzles will be activated generally in the morning, prior to opening of the USS Hornet to the public
- Three (3) cycles of 3-10 mins. each, CARI operates in a light to moderate westerly wind





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Assessments by 3rd Party Experts

Staff engaged consultants to evaluate the experiment from several perspectives:

1. **Health and Human Safety (Terraphase – Exhibit 6):**
   - Found little to no risk in the community or to wildlife
   - Recommended placement of PurpleAir monitors to provide additional reassurance
   - Suggest conditional approval based on changes in particulate matter (PM) readings from monitors

2. **Compliance with Biological Opinion – minimizing impact on Least Terms (H.T. Harvey & Associates – Exhibit 7):**
   - Assessed noise of equipment, vibration, salt water & expected dispersal of aerosol emissions
   - Based on easterly direction of spray, minimal anticipated reach, did not anticipate violation of Biological Opinion

3. **Possible impact on Alameda's local climate from experiment, and explanation of geoengineering (Professor James Hurrell, Colorado State University – Supplemental Memo)**
   - No potential for small-scale CARI operation to impact local weather & climate
   - This type of research is a growing part of mainstream climate science
   - Data produced by CAARE facility is invaluable to researchers around the world

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Recommendation to Council

City Council to consider the following three (3) Options:

1. Approve the Use for testing of experimental equipment and aerosolized saltwater emissions, by authorizing the City Manager to grant Landlord Consent.
   - Consider providing "guardrails" to Landlord Consent
2. Choose not to approve the Use, and not authorize the City Manager to grant Landlord Consent.
3. Choose not to approve the Use but recommend an alternative.

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Conditions & Considerations ("Guardrails")

Options for consideration in further conditioning Landlord Consent

A) Deploy PurpleAir monitors & City approval of monitoring plan prior to operation of equipment

B) Written verification the operation of equipment complies with all local, state, and federal regulations

C) Confirmation from the Bay Area Air Quality Management District and Regional Water Quality Control Board that additional controls are not required

D) Limitations around operational use for CARI (weekdays, before 11 AM)

E) Consent limited to the current scale of equipment

F) Water only, aerosolized by CARI during times museum is open to public

G) Operation of CARI beyond initial 20-week period, requires written City Manager Authorization

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