NATURAL ENERGY LABORATORY OF HAWAII AUTHORITY

An Authority of the State of Hawaii attached to the Department of Business, Economic Development & Tourism

February 5, 2026

Memo: Results from the 2025 Bioassay Toxicity Testing Special Study

The NELHA Water Quality Laboratory contracted Eurofins Environment Testing Bio-Aquatics (formerly Bio-Aquatic Testing, Inc.) to conduct a special study evaluating the source of potential toxicity effects of seawater at HOST Park. This special project was designed to provide lethal and sub-lethal data utilizing marine shrimp and fish species. These methods include the effects of synergistic, antagonistic, and additive effects of all chemical, physical, and additive components which adversely affect the physiological and biochemical functions of the test organisms. The test concentration consisted of 100% sample water (*i.e.,* no dilutions) and a synthetic laboratory prepared control. The bioassay tests were:

1. Mysid shrimp (*Americamysis bahia*) 7-day, static renewal, chronic toxicity test for survival, growth, and fecundity. EPA Method 1007.0
2. Inland Silverside (*Menidia beryllina*) 7-day, static renewal, chronic toxicity test for larval survival and growth. EPA Method 1006.0.

Sampling locations were chosen to evaluate the source of the potential toxicity. Therefore, the locations were determined to include samples with no-contact of the pipeline system (*i.e.* open ocean), samples that had entered the pipeline distribution system (*i.e.* land-based sump stations and mid-point distribution location), and samples from three representative aquaculture facilities (*i.e.* fish, shrimp and bivalve farms) after all their pre-treatment processes. These strategic sampling locations should provide insight into where the potential seawater toxicity is developing. A total of eight seawater sample locations were submitted for each round of testing:

1. Offshore, directly above the SSW-28” ocean intake pipe, pumped from a depth of 80’
2. Offshore, directly above the SSW-55” ocean intake pipe, pumped from a depth of 80’
3. SSW-28” sump – northern pump station
4. SSW-55” sump – southern pump station
5. A mid-point location along the SSW pipeline distribution system (*i.e.* SSW-24” pump station)
6. A representative fish farm, collected from pre-treatment seawater inflow stream to larval tanks

73-4460 Queen Kaahumanu Hwy., #101, Kailua-Kona, Hawaii USA 96740-2637
Phone: (808) 327-9585 Fax: (808) 327-9586 Email: nelha@nelha.org Website: nelha.hawaii.gov

7. A representative shrimp farm, collected from pre-treatment seawater inflow stream to larval tanks. (Note – minor sampling location changes occurred between rounds depending on operations in hatchery vs maturation tanks)
8. A representative bivalve farm, collected from pre-treatment seawater inflow stream to larval tanks

Samples were collected by NELHA personnel and placed in a cooler, covered in ice, and shipped out to the testing laboratory in Texas. The first round of toxicity samples was collected on May 2, 2025; second round of toxicity samples was collected on August 22, 2025; and the third round of toxicity samples was collected on December 15, 2025.

All toxicity testing reports are available on the NELHA Lab Reports webpage. The following is a summary of the results:

Results of Round #1 - May 2, 2025

All eight samples passed both the survival and growth testing requirements using shrimp and fish test organisms, resulting in no chronic toxicity observed and a No Observable Effect Concentration (NOEC) of 100%.

Results of Round #2 - August 22, 2025

All eight samples passed both the survival and growth testing requirements using shrimp and fish test organisms, resulting in no chronic toxicity observed and a No Observable Effect Concentration (NOEC) of 100%.

Results of Round #3 – December 15, 2025

Seven of the eight samples passed both the survival and growth testing requirements using shrimp and fish test organisms, resulting in no chronic toxicity observed and a No Observable Effect Concentration (NOEC) of 100%. The 7 samples that passed were: SSW-28 Ocean Intake, SSW-28 Sump, SSW-55 Sump, SSW-Midpoint, fish farm, shrimp farm, and bivalve farm.

The sample collected from the SSW-55 Ocean Intake resulted in the chronic fish test passing the survival and growth test requirements, resulting in no toxicity observed and NOEC of 100%. However, the same SSW-55 Ocean Intake sample also resulted in the chronic shrimp test failing the survival test requirements. After the initial 24-hour test period, 100% mortality was observed, resulting in a failed test with the Lowest Observed Effect Concentration (LOEC) of 100%.

Discussion

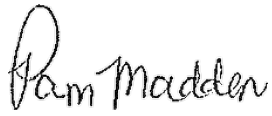
After reviewing the physical parameter data sheets, several inconsistencies regarding the salinity values of the SSW-55 Ocean Intake sample were noted. The sample was received with an initial salinity of 37.1ppt, which is 2ppt above the historical mean. At test initiation, the salinity value was recorded as 30.2ppt. At the 24-hour renewal period, when complete mortality was observed, the ending salinity value in the test vessel was recorded as 53.2ppt; and the renewal solution (if any shrimp were still alive) was recorded as 48.2ppt. This marine/estuarine mysid shrimp (*Americamysis bahia*) species is salinity sensitive and the recommended salinity range for static renewal tests is 20-30ppt (EPA, 2009). Therefore, it is plausible that the elevated salinity measurement of 53.2ppt that was recorded in the test vessel after 24 hours, contributed to the mortality observed in the chronic shrimp test. It is unknown how or why the salinity increased so drastically in both the ending test vessel cups (*i.e.* 53.2ppt) and in sample cubi-container from which the test renewals were prepared (*i.e.* 48.2ppt). During a test, it is typical for minimal salinity increase over time due to evaporation, even with the test vessels being covered. However, an increase from 30.2ppt to 53.2ppt over a 24-hour test period, far exceeds a normal fluctuation tolerance.

The SSW-55 Ocean Intake sample had no contact with the NELHA seawater pipeline infrastructure. It was collected offshore, from a boat, using a dedicated 2” diameter pump that has only ever pumped seawater from a location several miles offshore of Keahole Point. Conversely, the SSW-55 Sump sample consisted of seawater that flowed through the intake system offshore, travelled through the pipeline infrastructure onto land, and pumped into the land-based sump station before final distribution throughout the HOST Park pipeline system. Given that the land-based SSW-55 Sump station sample passed both the shrimp and fish chronic toxicity tests, it is reasonable that the observed erroneously high salinity values of the SSW-55 Ocean Intake sample contributed, if not fully caused, the mortality of this salinity sensitive shrimp species.

In follow-up inquiries with Eurofins testing laboratory, it is their position that the salinity values (ppt) were inadvertently recorded as conductivity values (mS/cm). If this unit transcription error did occur, the following “corrections” could be made:

1. The 24-hour ending value of 53.2 “mS/cm” would be corrected to a salinity of 38.8ppt
2. The renewal solution value of 48.2 “mS/cm” would be corrected to a salinity of 35.2ppt

Unfortunately, with this type of laboratory error, it is impossible to know if it was a unit transcription error and if the “corrected” salinity readings would be accurate or if contamination occurred in the sample resulting in the actual high salinity readings recorded on the bench sheet. With suspected laboratory error or contamination, the validity of the chronic shrimp toxicity test with the SSW-55 Ocean Intake sample is in question.



Pam Madden

NELHA Water Quality Laboratory Manager

U.S. EPA. 2009. Mysid (*Americamysis bahia*) Survival, Growth, and Fecundity Toxicity Tests Supplement to Training Video. EPA 833-C-09-00.