Tier 2 Fish Toxicity Study

Chemical Contaminants in Fish and Shellfish

and

Recommended Consumption Limits

for

Territory of American Samoa

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EXECUTIVE SUMMARY

This report presents results from a study for selected contaminants in fish and shellfish collected from the United States Territory of American Samoa, located in the tropical South Pacific. This study was conducted at the Tier 2-level in accordance with US EPA protocols, and follows previously completed Tier 1-level screening studies for the Territory. Data collected were used to recommend consumption limits for fish and shellfish that contain elevated concentrations of inorganic arsenic (As(i)), lead (Pb), mercury (Hg), and polychlorinated biphenyls (PCBs).

Overall, this study suggests that coastal reefs of American Samoa are generally clean of the contaminants studied, and that coastal reef biota do not accumulate significant levels of contaminants to limit consumption of seafoods or justify fish advisories.

The results of this work confirm and expand upon the previous findings for Pago Pago Inner Harbor, and indicate that As(i), Hg, and PCBs are present at high enough concentrations in the biota to justify a general fish advisory for the Inner Harbor. To a lesser extent Pb was found at elevated levels in Inner Harbor biota, but primarily in shellfish. Pb is not considered a significant determining factor for a fish advisory, but is considered in the overall toxicity assessment for the Inner Harbor.

It is recommended that people avoid all fish and shellfish from Pago Pago Inner Harbor due to As(i), Hg, and PCBs. For many of the species collected, contaminants were present in high enough concentrations to restrict fish and shellfish consumption to ≤8 meals per month. The current fish advisory for Pago Pago Harbor should be updated based on this study, and should be re-issued. The role of Risk Manager is incumbent on ASEPA, and this agency should assume primary responsibility for the advisory.

Mercury levels in fish and shellfish from Onesosopo were elevated and it is recommended that this location should be studied more thoroughly to determine extent and magnitude of contamination. It is known that Onesosopo Park is constructed on the site of a former uncontrolled municipal dump, and ASEPA water quality data and sediment data for this area indicate possible leachate contamination of the surrounding environment.

Arsenic levels were found to be elevated in most biota studied. Consistently elevated levels of arsenic among coastal locations suggest a natural background source, possibly the volcanic parent material of the island. Higher arsenic in Pago Pago Inner Harbor biota compared to biota of coastal locations may be a function of terrigenous sediment input and accumulation.

ACKNOWLEDGMENTS

The authors express their appreciation to the many dedicated and qualified individuals who assisted with this work. The late ASEPA Director, Muaavatele Togipa Tausaga, mobilized resources and maintained a clear vision of the overall importance of environmental research in American Samoa. Edna Buchan and her fine staff from the ASEPA Water Program provided field, laboratory, and logistical support. The irrepressible Louie "the fish" DeNolfo tirelessly pursued his finned namesakes for collections, and never ceased to entertain with his inimitable troubadour style. Sasauli Satele contributed her marine science expertise and her local knowledge of Tutuila natural history, and as Louie's wife, kept Louie on course, above and below the waterline. Peter Craig of the National Park Service was a staunch supporter, a persistent reminder, and provided beneficial comments. And *fa'afetai tele lava* to Carl Goldstein, American Samoa Program Manager, US EPA Region IX, San Francisco, for whom this work was a long time coming. His patience, though it reflects well on his character, could hardly have been withheld. Given all the other work he required of us during this project time frame it's a wonder we got this done when we did.

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1.0 INTRODUCTION

This report presents results from a study for selected contaminants in fish and shellfish collected from the United States Territory of American Samoa, located in the tropical South Pacific (Lat. 14^{o} 30' south, Long. 170^{o} 40' west). This study was conducted at the Tier 2-level in accordance with US EPA protocols, and follows previously completed Tier 1-level screening studies. Data collected were used to recommend consumption limits for fish and shellfish that contain elevated concentrations of inorganic arsenic (As(i)), lead (Pb), mercury (Hg), and polychlorinated biphenyls (PCBs). Specific recommendations are provided for consumption of fish and shellfish species analyzed, as shown in the tables. General recommendations for local seafood consumption in American Samoa are also provided. Recommendations are offered as part of the Risk Communication and Risk Management responsibilities incumbent on the American Samoa EPA.

Consumption rates of locally caught fish and shellfish can be considered moderate to low among the indigenous and general population of American Samoa. Subsistence fishing and subsistence livelihoods are virtually non-existent in the Territory. The commercial economy of the Territory is well developed compared with neighboring Small Island Developing States, and there are a wide variety of foods available to American Samoans that are common to developed countries. These foods are primarily imported from the United States, Australia, New Zealand, and Asia. Substantial funding allocations from the United States and a range of US-based social welfare programs enable the indigenous population to take part in the cash economy, which promotes the purchase of imported foodstuffs. Chicken, pork, and beef are the major protein sources in the typical American Samoa diet. There is a small local commercial fishing fleet that fishes off-shore and which supplies a small number of local outlets with pelagic fish and ground fish. Near-shore fishing is chiefly recreational, with a very small commercial reef fish fishery. Locally caught reef fish and shellfish make up a relatively minor portion of the catch in the local fish outlets, and are a relatively minor component of the typical American Samoa diet. These observations are supported by survey data from a previous study that characterized fish consumption in American Samoa (ATSDR 1995). When eaten, reef fish are typically cooked whole with skin and scales, and with or without viscera. Shellfish are typically cooked in the traditional umu (ground oven), with coconut milk (except lobster, which are baked whole).

Prior to this Tier 2-level study, several Tier 1-level screening studies were completed for American Samoa between 1990 and 1994. Screening-level studies indicated that elevated concentrations of some heavy metals and PCBs were present in fish tissue from Tutuila Island (AECOS 1991, US EPA 1992, EnviroSearch 1994). The EnviroSearch risk assessment indicated that consumption of fish and shellfish with elevated concentrations of As(i), Pb, Hg, and PCBs may pose a risk to human health in American Samoa. In contrast, the ATSDR study (1995) suggested that in general there were not significant health risks from metals from local seafood consumption. After completion of the Tier 1-level studies, Pago Pago Inner Harbor was placed under a fish consumption advisory. Following the Tier 1 work were recommendations to conduct a Tier 2-level study (US EPA 2000) to further define the nature and extent of contaminants in seafood from American Samoa. In brief, recommendations for the Tier 2-level study were:

1) Collect replicate composite samples of fish and shellfish previously found contaminated with elevated concentrations of inorganic arsenic, lead, mercury and the polychlorinated biphenyl Aroclor 1260;

2) Collect three size (age) classes for each target species of fish and shellfish;

3) Further assess the extent of lead contamination in American Samoa seafood;

4) Obtain data on mercury concentration in fish species from upper trophic levels;

5) Obtain data on inorganic arsenic in American Samoa seafood.

In response to recommendation 1, this study investigated total PCBs, for all fish and shellfish specimens that were collected from Pago Pago Inner Harbor and Pala Lagoon. Specimens were taken from several trophic levels to assess potential bio-accumulation. Mud clams represented filter feeders; mud crabs and mullet represented detritivores; filter-feeding mackerel represented planktivores; goatfish and octopus represented carnivorous benthic feeders; grouper and squirrelfish represented general carnivores, and; trevally represented piscivorous carnivores.

In response to recommendations 1 and 3, this study investigated Pb for all fish and shellfish specimens that were collected. Specimens were taken from several trophic levels to assess potential bio-accumulation. Mud clams represented filter feeders; mud crabs, spiny lobster and mullet represented detritivores; filter-feeding mackerel represented planktivores; lined surgeonfish represented herbivores; goatfish and octopus represented carnivorous benthic feeders; grouper and squirrelfish represented general carnivores, and; trevally represented piscivorous carnivores.

In response to recommendations 1 and 4, this study investigated total Hg for all fish and shellfish specimens that were collected. Specimens were taken from several trophic levels to assess potential bio-accumulation. Mud clams represented filter feeders; mud crabs, spiny lobster and mullet represented detritivores; filter-feeding mackerel represented planktivores; lined surgeonfish represented herbivores; goatfish and octopus represented carnivorous benthic feeders; grouper and squirrelfish represented general carnivores, and; trevally represented piscivorous carnivores.

In response to recommendations 1 and 5, this study investigated total arsenic (As(t)) and As(i) for fish and shellfish from several trophic levels to assess potential bio-accumulation. Arsenic was speciated to determine the ratio of inorganic to organic arsenic. Mud clams represented filter feeders; mud crabs, spiny lobster and mullet represented detritivores; filter-feeding mackerel represented planktivores; squirrelfish represented general carnivores, and; trevally represented piscivorous carnivores.

Recommendation 2 was not addressed for this study. The principal reasons are that age classes for coral reef fish are difficult to determine, and that the number of fish required for

replicate composites for each age class was considered prohibitively high. Age determination for coral reef fish usually requires examination of otoliths, since size is generally not a good indication of age in reef fish. Many reef fish grow to adult size (or near-adult size) while juveniles, and then live for long periods. It is also a phenomenon of coral reef ecology that diversity is high, but abundance is typically low. These reasons precluded additional intensive sampling required for age class analyses.

With the exception of some groups of specimens from Pago Pago Inner Harbor, 3 replicate composites each for muscle tissue and whole fish were collected for each group. Each composite typically contained 3 to 5 specimens, except for lobster from all locations, which contained a single specimen for each composite. See Table 1 for a summary of target fish and shellfish, and Table 2 for a summary of analyses.

This Tier 2 Fish Toxicity Study was prepared in accordance with *Guidance for Assessing Chemical Contaminant Data For Use in Fish Advisories (Volumes I-IV)*, Office of Water, United States Environmental Protection Agency, EPA 823-R-95-001, EPA 823-B-96-006, EPA 823-B-00-007, EPA 823-B-00-008 (1996-2000).

1.1 Objectives

The project objectives were to collect adequate data to determine whether the current fish and shellfish consumption advisory for Pago Pago Inner Harbor should be revised and re-issued, and to determine whether fish and shellfish advisories should be issued for other areas of the American Samoa archipelago. Data were collected to evaluate whether fish consumption advisories should be issued for fish and shellfish contaminated with As(i), total Hg, Pb, and PCBs, from several locations on Tutuila Island and one location on Ofu Island. To achieve the objectives the following tasks were completed:

- Sampling and analysis of target fish and shellfish identified in the EnviroSearch risk assessment (1994);
- Evaluation of mean contaminant concentrations in fish and shellfish from nine coastal locations;
- Evaluation of mean contaminant concentrations in fish and shellfish from Pago Pago Inner Harbor and Pala Lagoon;
- Determination of consumption limits for fish and shellfish contaminated with As(i), total Hg, Pb, and PCBs using US EPA fish consumption limit tables (US EPA 2000).
- Determination of consumption limits for fish and shellfish contaminated with Pb using US EPA Integrated Exposure and Uptake Biokinetic (IEUBK) model.

2.0 DATA COLLECTION

2.1 Collection of Fish and Shellfish

Fish and shellfish were collected from a total of eleven locations on two islands of American Samoa. Ten locations were on Tutuila Island and one location was on Ofu Island (see Figure 1). For Tutuila, eight open coastal locations and two sheltered locations were selected. Open coastal collection sites included Onesosopo, Faga'alu, Faga'itua, Lauli'i, Leone, Matu'u, Nu'uuli, and Poloa. Sheltered collection sites included Pago Pago Inner Harbor and Pala Lagoon. For Ofu, one open coastal location was selected in the National Park. Pago Pago Inner Harbor is currently under a fish advisory and was selected to verify previous data collected at this site. Pala Lagoon was selected because it is a shallow sea bay with limited flushing by ocean water. The Lagoon watershed is extensively developed and there is significant potential that terrigenous sediments that accumulate in the Lagoon can act as a sink and source for contaminants. The tier 1-level studies that included the Lagoon indicated that further investigations were warranted. Table 1 gives a summary of target fish and shellfish collected, and includes the number of composites and number of individual specimens per composite for each group.

For the nine open coastal locations, *Acanthurus lineatus* (lined surgeonfish), *Sargocentron spp.* (squirrelfish). and *Panulirus spp*. (spiny lobster) were the target organisms. For fish, 18-30 specimens were collected from each location. Three composites each were prepared for whole fish and muscle tissue. Each composite contained 3-5 individual fish. To the extent possible the fish in each composite were of similar size. For the lobster, 3 individuals of *Panulirus spp*. were collected from each study location, except for Onesosopo, where two *Panulirus spp.* and one *Parribacus sp*. (slipper lobster) were collected. For all coastal locations, lobsters were analyzed individually due to limited availability. See Table 1 and the data tables in the Appendix.

For Pago Pago Inner Harbor, 6 composites containing 3 to 5 fish per composite were collected for *Caranx papuensis* (brassy trevally), *Megalaspis cordyla* (filter feeding mackerel), and Mugilidae *spp*. (mullet). Three composites of *Asaphis violascens* (mud clam), 1 composite each for Serranidae *spp.* (grouper), *Trochus maculatus* (snail), and Mullidae *spp.* (goatfish), and a single *Octopus cyanea* (octopus) specimen, were collected from this site. To the extent possible the fish and shellfish in each composite were of similar size. See Table 1 and the data tables in the Appendix. Pago Pago Inner Harbor is arbitrarily defined as the harbor area that lies west of a line that extends from the Rainmaker Hotel (known locally as Goat Island Point) to the solid fill breakwater at the Village of Leloaloa.

For Pala Lagoon, 6 composites of 5 fish each were collected for whole fish and muscle tissue for Mugilidae *spp*. (mullet), 3 composites of 5 whole shellfish each were collected for *Asaphis violascens* (mud clam), and 3 composites of 3 whole shellfish each were collected for mud crab. The crab were not identified for this study due to a lack of available expertise for marine invertebrates, but it is assumed that all crab specimens belonged to the same family, and probable that all specimens belonged to the same species.

In the field, fish and shellfish were collected by hand, dip net, hook and line, and spear. Shellfish were immediately rinsed in native marine water and all debris were removed from the shell. Fish were measured to standard length at collection (except as noted in data tables in the Appendix). All fish and shellfish (except *Asaphis* and *Trochus*) were immediately double wrapped in heavy-duty aluminum foil at collection after measurements were taken. *Asaphis* and *Trochus* were held in clean seawater for 6 hours immediately after collection to facilitate depuration. For *Asaphis* and *Trochus*, handling procedures were identical to those for all other fish and shellfish, but followed the depuration period. Data labels were prepared for each individual specimen and labels and foil-wrapped specimen were placed in zip-seal type plastic bags. Bagged specimens were immediately placed on ice and transported to freezer storage within 6 hours after collection. Specimens were stored hard frozen at -20^{o} C in American Samoa until transport to the analytical laboratories.

For transport from Pago Pago to the analytical laboratories, hard frozen fish were packed on hard ice in heavy-duty polypropylene coolers and sent via over-night air cargo to Honolulu. American Samoa EPA contracted AECOS Laboratories (Kaneohe, Hawaii) to transship samples to mainland laboratories for analyses. AECOS received frozen specimens from ASEPA via over-night air cargo, then stored specimens frozen at -20^{o} C until transport to the sub-contracted laboratories. Chain of custody discipline was maintained for all specimens throughout the sampling, storage, and shipping period.

2.2 Analytical Methods for Fish and Shellfish Specimens

For analyses, AECOS sub-contracted Battelle Pacific Northwest Division (Sequim, Washington, USA) for arsenic speciation, and Columbia Analytical Services (Kelso, Washington, USA) for analysis of total Hg, Pb, and PCBs. AECOS sub-contracts were in accordance with analytical criteria established by ASEPA and US EPA, and were in accordance with the project scope of work.

Values for As(i) used for the risk assessment were blank corrected. Blank correction for As(i) was required due to the potential for arsenic contamination in reagents used for analyses. Sodium hydroxide (NaOH) used for digestion of tissue, and sodium borohydride ($NaBH_4$) used for reduction of arsenic compounds to arsene (AsH_3) prior to analyses, typically contain trace amounts of arsenic, although Battelle makes every effort to procure low arsenic reagents. Total As was analyzed for but was not included in the risk assessment. As(t) was used to calculate the proportion of inorganic As to organic As in tissue. Organic As is of generally low toxicity, and is sometimes considered non-toxic, and is not included in US EPA consumption limit tables. Blank correction for Hg, Pb, and PCBs, was not required because of the very low probability that these compounds occurred in reagents, and because detection limits for each of these analytes were far below the minimum contaminant levels given in the US EPA consumption limits tables. Total PCBs were calculated by summing all detected Aroclors. Analytical methods and detection limits are summarized below.

For all analyses, whole fish included the entire fish with scales and viscera, whole shellfish included all soft parts and body fluids without shell, and fish muscle tissue included dorsal muscle without skin.

Summary of analytical methods and detection limits

Analyte	Laboratory	Method	Detection Limit	Units
As(i)	Battelle	EPA 1632 A	0.0091	µg/g (wet-weight)
As(t)	Battelle	EPA 200.8	0.0025	µg/g (wet-weight)
Hg	Columbia	EPA 200.8	0.002-0.003	mg/kg (wet-weight)
Pb	Columbia	EPA 7471 A	0.002-0.004	mg/kg (wet-weight)
PCBs	Columbia	EPA 8082	5.0-6.3	µg/kg (wet-weight)

All handling and analyses were performed in accordance with AECOS, Battelle, and Columbia quality assurance programs. Quality assurance and quality control (QA/QC) included chain of custody, laboratory duplicates, matrix spikes, and laboratory control samples. For specific QA/QC questions or concerns contact:

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The complete data set for all specimens and composites is included in the Appendix. All laboratory data sheets, QA/QC documentation, and chain of custody records, are on file at ASEPA.

3.0 EVALUATION OF ANALYTICAL RESULTS

The approach used to evaluate analytical results for fish and shellfish tissue consisted of the following:

- Calculation of the arithmetic mean chemical concentration for each fish or shellfish group, from composites, by media type (whole fish or muscle tissue). Each composite represented a single analysis, and a single value. Analytes for which the laboratories reported "non-detect" were included in the arithmetic mean for each media as one-half of the method detection limit. The weighted arithmetic mean for each media was used where individuals per composite were not equal (see Table 1). This is a standard statistical practice for data sets of unequal sample sizes, and is used so that data are proportionately represented in further calculations.

- Comparison of the arithmetic mean chemical concentration in fish and shellfish tissue among the nine coastal sites. Pago Pago Inner Harbor and Pala Lagoon are discussed separately, as these are distinctly different habitat types from coastal reefs, and will not yield valid comparisons with coastal habitats.

- Determination of recommended fish consumption limits based on Consumption Limit Tables from guidance document (US EPA 2000).

- Comparison of the arithmetic mean chemical concentration in fish and shellfish tissue to US EPA health-based screening values (SVs), (US EPA 2000).

SVs help to identify sites where contaminant concentrations exceed human consumption levels of concern. SVs are calculated for contaminants with carcinogenic and non-carcinogenic effects. For a contaminant with both carcinogenic and non-carcinogenic effects, US EPA recommends that the lower (more stringent) of two SVs be used. The SVs used to screen the fish and shellfish tissue concentrations for this study are given below.

Summary of screening values for contaminants of concern[a]

	Recreational[b]		Subsistence[b]	
	Non-carcinogenic	Carcinogenic[c]	Non-carcinogenic	Carcinogenic[c]
As(i)	1.20	0.025	0.147	0.00327
Hg	0.40	NA	0.049	NA
Pb	NA	NA	NA	NA
PCBs	0.08	0.020	0.00983	0.00245

[a]mg/kg wet-weight

[b]Recreational SVs assume consumption rate of 17.5 g/day and body weight of 70 kg. Subsistence SVs assume consumption rate of 142 g/day and body weight of 70 kg.

[c]Cancer risk level is 10^{-5}, a level corresponding to one excess case of cancer per 100,000 individuals exposed over a 70 year lifetime.

NA = Hg is not a known carcinogen, and, SV not available for Pb

The interested reader is invited to compare SVs with mean concentrations of contaminants for each group of specimens and media type, per location, as shown in Tables 3-15. Some comparisons of SVs and study data are discussed in Section 8.0.

4.0 RESULTS

Tables 1-4 provide an indication of the overall study scope in summary form, and also summarize analytical results that were used for the risk assessment. Tables 5-15 give the mean contaminant concentrations (and range of values per composite) for each of the eleven locations selected for this study. Laboratory analytical results, and data on individual specimens, per composite, are given in the data summary tables for each study site in the Appendix.

Analytical results were used to determine consumption limits for target fish and shellfish, in accordance with US EPA Risk-Based Consumption Limits as presented in Tables 16-19 (US EPA 2000). Recommended consumption rates for target fish and shellfish for each study site are presented in Tables 20-30. Calculations for consumption rates are discussed in Section 6.0.

Overall, the data does not support a fish advisory for the nine coastal locations of Tutuila or for the Ofu site, although there is an occasional consumption rate that is less than "Unrestricted" for a specific contaminant within a particular specimen group for these locations. One possible exception to this is Onesosopo, where Hg levels restricted consumption to 1-5 meals per month for the carnivorous squirrelfish (*Sargocentron*) and the detritivorous lobster (*Panulirus*, *Parribacus*). For Pala Lagoon, where As(i) and PCBs restricted consumption to 0.5-8 meals per month in mullet and shellfish, data is insufficient to support a fish advisory, but it appears that further detailed investigations are warranted. The significance of Onesosopo and Pala Lagoon are discussed further in Sections 8.0 and 9.0.

Overall, the data supports a fish advisory for Pago Pago Inner Harbor. Table 28 shows that there is a relatively high occurrence of recommended consumption rates ≤ 8 meals/month for the majority of specimen groups analyzed, with As(i), Hg and PCBs the principal contaminants of concern. To a lesser extent, Pb levels resulted in some recommendations for limited consumption, although these were largely restricted to shellfish. Hence, Pb is not considered a risk driver for Pago Pago Inner Harbor; Pb toxicity assessment is discussed in Section 5.3. Specific recommendations and criteria for a fish advisory for Pago Pago Inner Harbor are discussed in Sections 8.0 and 9.0.

4.1 Inorganic Arsenic

Figures 2, 5 and 7 show comparisons of As(i) in fish and shellfish among the eleven study locations. In general, As(i) concentrations in *Panulirus spp*. (0.00849-0.04399 μg/g) were higher than levels measured in *Sargocentron spp*. (0-0.01719 μg/g). The highest As(i) concentrations were found in whole Mugilidae *spp*. (0.11139-0.14212 μg/g) and *Asaphis violas*cens (0.08542-0.22770 μg/g) from Pago Pago Inner Harbor and Pala Lagoon. As indicated in the summary table for arsenic, As(i) in the Mugilidae appears anomalously high, and further investigations for mullet may be warranted (see Appendix). Mugilidae *spp*. and *Asaphis violascens* were not collected at the nine coastal locations. As(i) in *Acanthurus lineatus* was not analyzed in this study. As(i) levels found in this study are consistent with previous studies that indicate As(i) is generally highest in marine shellfish (disregarding the Mugilidae As(i) anomaly until further data is collected).

4.2 Mercury

Figures 4, 5 and 7 show comparisons of Hg in fish and shellfish among the eleven study locations. In general, mercury concentrations in muscle tissue of *Sargocentron spp*. (0.001-0.465 mg/kg) were higher than levels measured in *Acanthurus lineatus* (0.001-0.100 mg/kg) and roughly similar to levels measured in *Panulirus spp*. (0.018-0.892 mg/kg). Several species of fish from Pago Pago Inner Harbor had elevated Hg levels in muscle tissue, including

Caranx papuensis (0.452 mg/kg), whole Mullidae *spp*. (0.400 mg/kg), and Serranidae *spp*. (0.670 mg/kg).

4.3 Lead

Figures 3, 5 and 7 show comparisons of Pb in fish and shellfish among the eleven study locations. For all sites, Pb levels were consistently higher in whole fish than in muscle tissue. Among coastal locations, concentrations in whole *Acanthurus lineatus* (0.040-0.161 mg/kg) were higher than whole *Sargocentron spp*. (0.018-0.050 mg/kg) and *Panulirus spp*. (0.001-0.009 mg/kg). Concentrations in these species were relatively low compared to whole Mugilidae *spp*. collected from Pago Pago Inner Harbor (3.12 mg/kg) and Pala Lagoon (0.462 mg/kg), and *Asaphis violascens* (11.3 mg/kg), *Trochus maculatus* (1.68 mg/kg) and *Octopus cyanea* (0.330 mg/kg) collected from Pago Pago Inner Harbor.

4.4 Polychlorinated Biphenyls

Figures 6 and 8 show comparisons of PCBs among fish and shellfish from the Pago Pago Inner Harbor and Pala Lagoon sites. Only Aroclor 1254 and/or Aroclor 1260 were detected (see Appendix). Whole fish consistently contained higher levels than muscle tissue. Whole Mullidae *spp*. (640 µg/kg) and whole Serranidae *spp*. (520 µg/kg) from Pago Pago Inner Harbor contained the highest concentrations of PCBs. Muscle tissue and whole fish from *Caranx papuensis* and *Megalaspis cordyla* from the Inner Harbor contained intermediate levels (101 µg/kg - 323 µg/kg). For Pala Lagoon, only whole Mugilidae *spp*. contained detectable concentrations of PCBs at 6 µg/kg.

5.0 TOXICITY ASSESSMENT

The primary source of information used for the Toxicity Assessment is US EPA (2000), and the Agency for Toxic Substances and Disease Registry (1999a, 1999b, 2000a, 2000b). Information was also summarized from the EnviroSearch Risk Assessment (1994).

5.1 Inorganic Arsenic

Arsenic is a naturally occurring compound in the Earth's crust, and is used in industrial applications such as wood preservation, automobile batteries, and as an alloy material in semi-conductor technology. Arsenic can be released and made available through both natural and anthropogenic sources. The major anthropogenic sources of arsenic are from metals smelting and burning of fossil fuels. Application of pesticides (FDA 1993) was formerly an important anthropogenic source of arsenic in the biosphere, but arsenic can no longer be used in agriculture in the United States. Inorganic arsenic is still used in over-the-counter general use pesticides such as ant and roach baits. This toxicity assessment is limited to inorganic arsenic, since organic arsenic compounds are generally must less toxic, and are sometimes considered non-toxic, compared with inorganic forms. Inorganic arsenic has been recognized as a poison since ancient times and high doses can cause death. The most characteristic effects from long-term exposure to inorganic arsenic are changes in the skin, which include a darkening of the skin and the presence of “corns” and “warts”. Drinking water that contains inorganic arsenic has been shown to increase the risk of contracting non-melanoma skin, bladder, liver, kidney and lung cancer.

The Integrated Risk Information System (IRIS) lists a reference dose (RfD) for inorganic arsenic of 3×10^{-4} mg/kg-d based on skin and possible vascular complications in individuals drinking arsenic-contaminated well water.

The oral cancer potency for inorganic arsenic is represented by a cancer slope factor (CSF) of 1.5 $(mg/kg\text{-}d)^{-1}$ based on the increased risk of skin, bladder, liver, kidney, and lung cancer through drinking water exposure.

5.2 Mercury

Mercury exists naturally in several forms as elemental mercury, inorganic salts, and organo-mercury compounds. It is distributed widely in the Earth's crust as mercuric sulfide (HgS), also known as the mineral cinnabar. Cinnabar is very stable and is considered non-toxic. Mercury has many uses in industry due to its unique properties of fluidity, high surface tension, and its ability to alloy with other metals. Mercury compounds are released into the environment from both anthropogenic and natural sources. Anthropogenic sources include emissions from refuse incineration, non-ferrous metal extraction and processing, combustion of fossil fuels, and the manufacture of industrial products such as batteries, barometers, and thermometers. Natural sources of mercury release include volcanoes, forest fires, de-gassing of the Earth's crust, and continental weathering. Mercury is widely distributed throughout the world as elemental gaseous Hg in the atmosphere (US EPA 1997). Atmospheric Hg is thought to be the source of most Hg in American Samoa, and there is an ASEPA study underway to characterize Hg contamination in the Territory. Once in the terrestrial and aquatic environments, biotic and abiotic processes can convert inorganic mercury into organic mercury compounds (primarily methylmercury). Most mercury in fish and shellfish is present as methylmercury (Bloom 1992). For this study, total Hg was analyzed for cost-effectiveness, with the assumption that $\geq$ 95% of Hg in tissue is present as methylmercury. The highest concentrations of mercury are found in organs and muscle. In general, the concentration of mercury in fish tissue increases with the size and age of the fish. There is variability in the accumulation of mercury in fish among species, but generally, the piscivorous (fish-eating) species accumulate higher levels of mercury than do non-piscivorous species. Fish and shellfish consumption is the main source of methylmercury exposure in the general population. Exposure to methylmercury through contaminated fish and other seafoods can pose a variety of health risks. Methylmercury is a powerful neurotoxin that is rapidly and nearly completely absorbed from the gastrointestinal tract. It readily crosses the placental and blood brain barriers in mammals. Infants can also be exposed to methylmercury through breast milk. Long-term low-dose prenatal exposure to methylmercury from maternal consumption of contaminated fish and other seafoods has been associated with poor performance on neurobehavioral tests in children.

US EPA has an interim RfD of 1×10^{-4} mg/kg-day for methylmercury based on data on neurological changes in 81 Iraqi children who had been exposed to mercury *in utero*. The RfD was reviewed by several US-based advisory boards including the Science Advisory Board and the National Academy of Sciences, and it was determined that the RfD is scientifically sound and is supported by human and animal studies.

Mercury and its various compounds are not known to be carcinogenic so cancer slope factors are not applicable and carcinogenic health endpoints for Hg were not assessed.

5.3 Lead

Lead is a naturally occurring element found in small amounts in the Earth's crust. In the metallic form it is insoluble in water, but may become soluble when combined with other elements to form lead salts. Lead has many industrial uses, the most important being the production of batteries, especially lead-acid batteries for motor vehicles. It is also used in solder and in the manufacture of some metal products and ceramic glazes. Both natural and anthropogenic processes are responsible for releases of lead to the environment. While combustion of leaded gasoline was formerly the major source of release to the environment, non-ferrous metal smelters, and battery and chemical manufacturing plants, are now the primary contributors to lead releases. According to US EPA's Groundwater and Drinking Water Section Factsheet, "Lead does not appear to bioconcentrate significantly in fish but does in some shellfish such as mussels. Evidence suggests that lead uptake in fish is localized in the mucous on the epidermis, the dermis, and scales, so that the availability in edible portions do not pose a human health danger". The fetus and young children are especially sensitive to the toxic effects of lead. Prenatal exposure to lead can result in premature births, low birth weight, and decreased mental ability in the infant. In young children, exposure to lead can result in learning difficulties and reduced growth. Exposure to high concentrations of lead can cause severe damage to the brain and kidneys in adults and children. US EPA recommends that risk to children from exposure to lead be assessed using US EPA Integrated Exposure Uptake Biokinetic (IEUBK) Model for lead, win32, model 1.0 (see http://www.epa.gov/superfund/programs/lead). The model determines total lead uptake (μg/day) in children zero to seven years of age exposed to lead in air, soil/dust, drinking water, and diet, and predicts the resultant blood lead levels. Additionally, the model predicts the percentage of children with blood lead levels greater than 10 μg/dL for any given blood lead concentration. The Centers for Disease Control and Prevention has determined that blood lead levels above 10 μg/dL should be considered as elevated.

For this study, the IEUBK model was used to construct a consumption limit table for fish and shellfish to determine whether consumption limits are necessary for fish and shellfish collected from American Samoa.

Lead and its various compounds are not known to be carcinogenic so cancer slope factors are not applicable and carcinogenic health endpoints for Pb were not assessed.

5.4 Polychlorinated Biphenyls

Polychlorinated biphenyls are a mixture of biphenyl compounds with varied chlorine substitution patterns. There are no known natural sources of PCBs in the environment. Mixtures of PCBs were marketed in the United States under the trade name Aroclor. Manufacture of PCBs was stopped in the United States in 1977. PCBs are slow to degrade in the environment, readily stored in fat tissues, and bio-accumulate through the food web. Exposure through consumption of fish may be especially important for some populations. Environmental mixtures of PCBs are different from the commercial mixtures due to

transformation and partitioning in the environment (US EPA 2000, ATSDR 2000b). There is evidence that a preferential accumulation of the more toxic compounds occur in higher organisms. Therefore, PCB mixtures found in fish tissues may be more toxic than the original mixtures. Aroclor mixtures, rather than the environmental mixtures, have been used in laboratory animals to assess toxicity. As discussed by US EPA, Aroclor analysis is not recommended, except for screening studies, because environmental PCB mixtures may not reflect the toxicity of the commercial mixtures. US EPA's Office of Water recommends that total PCBs be calculated as the sum of the concentrations of homologues or congeners. The Aroclor analysis can result in significant errors in determining total PCB concentrations because of the assumption that the distribution of PCB congeners in environmental samples is similar to the parent Aroclors. One study conducted by the Delaware Department of Natural Resources and Environmental Control found that the Aroclor analysis underestimated the total PCBs by 230%. Despite the limitations with the Aroclor analysis, US EPA's Office of Water states that risk assessment to determine whether tissue residues exceed potential levels of concern based on Aroclor equivalents, is acceptable. This recognizes that due to the lower costs for analyses, it may be the more cost effective method to use if large numbers of samples are analyzed. Total Aroclor analysis was used for this study, following the latter consideration of the Office of Water.

The USEPA has derived an RfD of 2×10^{-5} mg/kg-d for Aroclor 1254, based on eye and immunological effects in laboratory animals. This RfD was used for this study.

The oral cancer potency for PCBs is represented by a cancer slope factor (CSF) of 2 $(mg/kg\text{-}day)^{-1}$ for PCB food web exposure.

6.0 CALCULATION OF RISK-BASED CONSUMPTION LIMITS

Risk-based fish consumption limits for As(i), Hg and PCBs were obtained from US EPA guidance (2000). These limits determine the allowable number of fish-meals that can be consumed over a given time period (month). For cancer health endpoints, the meal intake limit depends upon the concentration of contaminant in the tissue, the size of the meal, and the "acceptable" lifetime risk level. For cancer health endpoints, the consumption limits for this study were prepared using default exposure assumptions presented in the US EPA guidance document, and are based on the excess cancer risk of 10^{-5}. The risk of 10^{-5} is recommended by US EPA Office of Water unless site-specific criteria are used to modify the risk level. For example, for subsistence fishers with no other protein source in their diet, a risk level of 10^{-6} could be considered. Or, say, for industrial workers, with exposure to other potentially carcinogenic substances, and alternative sources of protein available, a risk level of 10^{-4} might be appropriate. Where evidence suggests that contaminants are present as background, the lower risk level, 10^{-6}, might be selected. No site-specific criteria were identified for this study, so the recommended risk level of 10^{-5} for cancer health endpoints was used. For non-cancer health endpoints, a hazard quotient of 1 was used (US EPA 2000). The equations used to calculate consumption limits based on cancer and non-cancer health endpoints for As(i), Hg, and PCBs, as applicable, are given below.

Cancer endpoint equation:

$$CR_{lim} = \frac{(ARL)(BW)}{(CSF)(C_m)}$$

where:

CR_{lim} = Consumption Rate, maximum allowable limit (kg/day)

ARL = Acceptable Risk Level, maximum (unit-less)

BW = Body Weight (kg)

CSF = Cancer Slope Factor (usually the upper 95% confidence limit on the linear term in the multi-stage model used by USEPA, $[(mg/kg\text{-}d)^{-1}]$)

C_m = Concentration of contaminant, measured in a given species of fish (mg/kg)

Non-cancer endpoint equation:

$$CR_{lim} = \frac{(RfD)(BW)}{(C_m)}$$

where:

CR_{lim} = Consumption Rate, maximum allowable limit (kg/day)

RfD = Reference Dose (mg/kg-d)

BW = Body Weight (kg)

C_m = Concentration of contaminant, measured in a given species of fish (mg/kg)

Consumption limits equation:

$$\text{Meals per month} = (CR_{lim})(T_{ap})/(MS)$$

where:

CR_{lim} = Consumption Rate, maximum allowable limit (kg/day)

MS = Meal Size (kg fish/meal)

T_{ap} = Time averaging period (365.25 d/12mo=30.44 d/mo).

The fish consumption table for lead in children was constructed using the US EPA Integrated Exposure Uptake and Biokinetic (IEUBK) Model for Lead, win32, model 1.0. This model predicts blood lead levels in children 6 months to seven years of age resulting from exposure to lead in air, diet, dust/soil, and water. Blood lead levels above 10 μg/dL are associated with permanent decreases in the intelligence quotients in children. The IEUBK model was used to solve for lead concentrations in fish and shellfish tissue, given a specific consumption rate that resulted in 5 % of the population exceeding the blood lead level of concern. The model requires that the daily fish consumption rate be expressed as a percentage of total meat consumption. The average daily meat consumption rate of 98.05 grams for children zero to seven years of age was specified in the IEUBK technical guidance. A meal size for a child was assumed to be 3 ounces (85.5 grams). The percentage of meat consisting of locally caught fish is calculated by dividing the amount of fish consumed per day (meal size/30.44 days/month x meals/month) by the amount of meat consumed per day (98.05 grams) to yield a percentage. Default values were used to estimate exposure from air, dust/soil, and water.

Tables 16-19 show the risk-based consumption limits for As(i), Hg, Pb and PCBs, in whole fish and fillets based on an 8-ounce meal, except for the fish consumption limit table for lead which was based on a 3-ounce meal for a child. If the average contaminant concentration fell between two consumption limits, the more conservative consumption rate was selected. The definition of "unsafe" fish consumption is a consumption limit of less than one meal every two months, as represented by “none (<0.5)” in the tables. Tables 20-30 show the recommended consumption limits for fish and shellfish for each study location.

7.0 UNCERTAINTY ANALYSIS

Uncertainty cannot be avoided when estimating levels of safe exposure to environmental contaminants. Significant sources of uncertainty for this study include:

Estimation of chemical toxicity - Uncertainty exists in the RfDs and cancer potency factors for the chemical contaminants investigated here. There are often insufficient data to fully characterize the toxicity of a chemical. Toxicities for the chemical contaminants investigated for this work were based on the best available data at the time of project execution.

Multiple chemical exposures - This study did not evaluate multiple chemical exposures from fish consumption, *e.g.*, potential compounding effects of As(i) and PCBs. Additionally, except for lead, background sources of exposure were not considered. The potential net effect from this uncertainty is an underestimation of risk.

Estimation of body weight - An average adult body weight of 70 kg was used to calculate acceptable fish consumption rates for the American Samoa population. The average weight of an adult American Samoan may be greater. Greater body weight allows for higher consumption rates, as calculations show in Section 6.0. Reliable data on average adult American Samoan body weight was not available at the time of project execution. The potential net effect from this uncertainty is an overestimation of risk.

Analysis of PCBs by Aroclor analysis - The Aroclor analysis can result in significant errors in determining total PCB concentrations because of the assumption that the distribution of PCB congeners in environmental samples is similar to the parent Aroclors. Total PCBs were summed for this study as Aroclors. The potential net effect of this uncertainty is an underestimation of risk.

Low number of specimens for some fish and shellfish groups - Sample collection was limited to a single composite for some groups from Pago Pago Inner Harbor (see Table 1). For lobster from all study sites, a single specimen was used for each composite. Thus, there is less certainty that the concentrations of contaminants found in these fish and shellfish are representative of mean contaminants levels. It is not determinable whether this uncertainty results in an over- or underestimation of risk.

Different size and age classes of each species were not collected - Larger and older fish and shellfish will presumably have higher concentrations of some contaminants than younger and smaller specimens. Due to the life histories and growth patterns for reef fish and other reef species, and difficulties in collecting adequate numbers of some specimens, collections were based on obtaining adequate numbers of specimens for composite purposes. Larger and older fish and shellfish for each species may not be equally represented among composites. The potential net effect from this uncertainty is an underestimation of risk.

Species complexes used for some composites - Uptake rates and compartmental accumulation for contaminants may be different among species in the same genus or family because of physiological differences among individuals or species, although these differences may be small. Complexes of species were used in this study due to the limited abundance, and hence limited availability, of specimens from some groups, and because of lack of available expertise for taxonomic identifications. This practice was minimized to the extent possible. In terms of exposure for the American Samoa population, species complexes are probably representative of actual take by fishers. For example, squirrelfish are taken by local reef fishers as generally red, medium-sized, large-eyed fish, collectively called *Malau* in Samoan. *Malau* on American Samoa reefs are undoubtedly comprised of several genera and many species of the family Holocentridae. Other family groups, such as the Mugilidae (mullet), the Mullidae (goatfish), and the Serranidae (grouper), are similar to the *Malau* as regards local names and take by fishers. It is not determinable whether the uncertainty imposed by the use of species complexes results in an over- or underestimation of risk.

8.0 DISCUSSION

8.1 General

Overall, this study suggests that coastal reefs of American Samoa are generally clean of the contaminants studied here, and that coastal reef biota do not accumulate significant levels of these contaminants to limit consumption of seafoods or justify fish advisories. For the nine coastal locations, *Acanthurus lineatus* (lined surgeonfish) did not contain elevated levels of any of the contaminants studied, except for specimens from Faga'alu, where Hg levels in muscle tissue resulted in a consumption limit of 8 meals per month, or two 8-ounce meals per

week (Table 21). Similarly, *Sargocentron spp*. (squirrelfish) from the nine coastal sites did not contain contaminants at levels that would limit consumption or justify an advisory, except for Hg in *Sargocentron* from Onesosopo (Table 20). The pattern for *Panulirus sp*. among coastal sites is the same as that for *Sargocentron*, where only animals taken from Onesosopo had Hg at levels that resulted in consumption limits. The Hg anomaly in Onesosopo is discussed in Sections 8.3 and 9.0.

For *Panulirus* in general among coastal locations, As(i) appears to be elevated, but the data suggests this is likely due to natural phenomena. All but one coastal site had consumption rates ≤8 meals per month based on cancer risk from As(i). Consistent As(i) levels in *Panulirus* and in some of the other biota studied suggests that arsenic occurs at naturally high levels on the volcanic island of Tutuila.

For Pala Lagoon, whole Mugilidae (mullet) were found to have slightly elevated levels of Pb that resulted in a consumption limit of 6 meals per month, or less than two 8-ounce meals per week (Table 29). Recommendations for further studies in Pala Lagoon are discussed in Section 9.0.

The results of this work confirm and expand upon the previous findings for Pago Pago Inner Harbor, and indicate that As(i), Hg, and PCBs are present at high enough concentrations in the biota studied to justify a general fish advisory for the Inner Harbor. To a lesser extent as discussed above, Pb was found at elevated levels in Inner Harbor biota, but primarily in shellfish, so Pb is not considered a significant determining factor for a fish advisory, but is considered in the overall toxicity assessment for the Inner Harbor.

Pago Pago Outer Harbor was not specifically identified as part of this study, but was represented by the coastal sites of Onesosopo and Faga'alu (Figure 1, Tables 20 and 21). Except for the Hg anomaly at Onesosopo, and the high arsenic levels in *Panulirus* from both locations, these coastal sites appear consistent with the overall status of the other seven coastal locations. It is reasonable then to suggest that the Outer Harbor shares a similar status. The potential for species movement between the Inner Harbor and Outer Harbor was considered. Of the species studied for Pago Pago Inner Harbor, *Caranx papuensis* (brassy trevally) is the only species expected to have potential for occasional excursions or permanent migration to the Outer Harbor. Not enough is known of the life history of this fish to draw conclusions at this time.

No conclusions can be drawn from this work with regard to improving or deteriorating conditions for Pago Pago Inner Harbor, for the Outer Harbor, or for American Samoa coastal reefs in general. All previous fish toxicity work was tier 1-level and will not yield valid comparisons to this tier 2-level study. ASEPA has nearly completed a comprehensive Sediment Toxicity Study for the entire Pago Pago Harbor area, and this work indicates that sediment toxicity is generally low, even in the Inner Harbor. Also, Inner Harbor sediment data indicates that some contaminants of concern appear to have peak concentrations at some distance below the sediment surface, which suggests reduced inputs during past years. This suggests an overall optimistic outlook for the future of the Harbor. Information from the

Sediment Toxicity Study will be used as a baseline and as one component for future assessment of overall Harbor environmental quality.

8.2 Inorganic Arsenic

Among fish and shellfish collected from the nine coastal locations, the results are consistent with local and national studies that show marine shellfish have the highest concentrations of inorganic arsenic, followed by marine fish and freshwater fish. Levels of As(i) in *Panulirus spp.* from several coastal locations exceeded the recreational SV, and As(i) levels in *Panulirus* at all coastal sites exceeded the subsistence SV. The average values varied from a low of 0.00849 µg/g at Ofu National Park, to 0.04399 µg/g at Nu'uuli. Notably, almost 30% of the samples contained levels of As(i) that were reported below the detection limit. The reason for the variability in As(i) levels among the nine coastal locations is not known, but there were significant size differences among the lobster collected, and age classes were not included as part of the study design. Also, sample size for lobster was small due to limited availability. It is not known if there is a relationship between size and/or age and As(i) accumulation in *Panulirus*. In the 1994 EnviroSearch Risk Assessment, Poloa was used as a reference (control) site due to an assumed lack of development in that area. Results from this study, however, contradict that previous assumption. *Panulirus spp.* from Poloa had among the highest average concentrations of As(i) for any site. This suggests that levels measured at the nine coastal sites could be naturally occurring, or alternatively, that a local source of As(i) is present at Poloa. The latter seems unlikely because of the pattern of elevated As(i) in *Panulirus* and other species at all coastal sites.

For Pago Pago Inner Harbor, highest As(i) concentration was measured in *Asaphis violascens*. As(i) in whole Mugilidae *spp* and *Asaphis violascens* exceeded the recreational SV and subsistence SV.

Highest concentrations of As(i) in fish and shellfish from Pala Lagoon were measured in whole Mugilidae *spp*; As(i) in *Asaphis violascens*, mud crab, and Mugilidae *spp* exceeded the subsistence SV in the Lagoon.

8.3 Mercury

The most significant contaminant issue found in fish and shellfish collected from the nine coastal sites was mercury in fish and shellfish from Onesosopo. *Sargocentron spp.* and *Panulirus spp*. from this site also had generally higher mercury concentrations than fish and shellfish collected from the other eight coastal locations. Fish and shellfish collected in 1992 from Onesosopo did not contain elevated levels of mercury, which suggests that the contamination occurred since then. For coastal sites, it is interesting to note that the herbivorous *Acanthurus lineatus* was not significantly contaminated with mercury, but the carnivorous *Sargocentron* and the detrivore *Panulirus*, were. This supports prevailing notions of bio-accumulation patterns for organo-mercury compounds. For *Acanthurus lineatus*, the highest Hg concentration was measured in muscle tissue from Faga'alu. Mercury levels from *Acanthurus lineatus* from the remaining eight coastal sites were relatively low. *A. lineatus* from these sites did not exceed the recreational SV for Hg, and only whole fish from Faga'alu exceeded the subsistence SV. For *Sargocentron spp*. the highest Hg concentrations were detected at Onesosopo. Muscle tissue in *Sargocentron* and whole *Panulirus* from Onesosopo

exceeded the recreational SV. Mercury levels in *Sargocentron* from the remaining eight sites were fairly consistent. Mercury in muscle tissue from *Sargocentron* from all coastal sites except Faga'itua exceeded the subsistence SV.

For Pago Pago Inner Harbor, all specimens exceeded the subsistence SV for Hg, except for muscle tissue from the mullet (Mugilidae). Muscle tissue from *Caranx papuensis* exceeded the recreational SV, as did whole goatfish (Mullidae) and whole grouper (Serrandiae). A higher proportion of terrigenous sediments in the Inner Harbor compared to

None of the specimens from Pala Lagoon exceeded the recreational SV or subsistence SV for Hg.

8.4 Lead

For the nine coastal sites, Pb was generally higher in whole fish than in muscle tissue. This is consistent with the literature that indicates Pb in fish is localized in the skin, scales, and the epidermal mucous. Lead levels in specimens from all coastal locations were considered to be relatively low overall, and do not warrant fish advisories.

The presence of Pb at slightly elevated levels in *Asaphis*, *Trochus*, and whole mullet from Pago Pago Inner Harbor is of lesser concern than the other contaminants studied for this location, but should be considered as a factor for a general fish advisory for Pago Pago Inner Harbor (see Sections 8.1 and 9.0). For Pago Pago Inner Harbor, whole Mugilidae (mullet), whole *Asaphis* and whole *Trochus*, contained high enough levels of Pb to pose a risk to children who consume more than one serving per month, but consumption was generally unrestricted for other specimens studied. It should be noted that Pb was not found at significant levels in muscle tissue for Mugilidae. SVs are not available for Pb.

8.5 Polychlorinated Biphenyls

Almost all of the fish and shellfish species collected from Pago Pago Inner Harbor contained PCBs at levels that could pose significant risks for cancer and non-cancer effects if consumed more than once or twice a month. Aroclor 1254 and/or Aroclor 1260 were the detected contaminant (see Appendix). Whole fish contained higher levels than muscle tissue. Whole Mullidae *spp*. (goatfish) and whole Serranidae *spp*. (grouper) contained the highest concentrations of PCBs, while muscle tissue and whole fish from *Caranx papuensis* and *Megalaspis cordyla* contained intermediate levels. All fish and shellfish except muscle tissue from Mugilidae *spp*., whole *Asaphis violascens* and whole *Trochus maculatus* exceeded the recreational SV for PCB contamination. All fish and shellfish collected from Pago Pago Inner Harbor exceeded the subsistence SV for PCB contamination.

For Pala Lagoon, only whole Mugilidae *spp.* (mullet) contained detectable concentrations of PCBs.

9.0 RECOMMENDATIONS

Two recommendations were developed as a result of this work. First, the fish advisory for Pago Pago Inner Harbor should be updated and re-issued, and findings from this study should

be presented to the public. Specific action items recommended for the fish advisory are discussed below. Second, an environmental assessment of the Onesosopo area should be undertaken to ascertain the extent of Hg contamination in biota other than squirrelfish and lobster. The extent and magnitude of Hg contamination at this location should be assessed. The focus of the environmental assessment should be to determine if a fish advisory is appropriate for Onesosopo.

It is recommended that people avoid all fish and shellfish from Pago Pago Inner Harbor due to As(i), Hg, and PCBs. For many of the species collected, contaminants were present in high enough concentrations to restrict fish and shellfish consumption to ≤8 meals per month. The current fish advisory for Pago Pago Harbor should be updated based on this study, and should be re-issued. The role of Risk Manager is incumbent on ASEPA, and this agency should assume primary responsibility for the advisory. Specific recommended action items for a Pago Pago Inner Harbor fish advisory are:

- Prepare a press release to announce completion of this Tier 2 Toxicity Study

- Prepare a one page advisory for distribution that includes a description of potential health risks related to consumption of Inner Harbor seafoods

- Install fish advisory signs at all points along the Inner Harbor shoreline that are frequented by fishers; critical points include
  - COS Samoa Packing dock
  - Starkist Samoa dock
  - South West Marine dock
  - Pago Pago Park boat ramp
  - Small boat basin and pier
  - Pago Pago Market shoreline
  - Department of Port Administration main facility dock
  - Fuel dock
  - Rainmaker Hotel shoreline

- Request Department of Health to assume an enforcement role to stop commercial sale of fish and shellfish from the Inner Harbor

- Implement a public information campaign to include all available media, and presentations to schools, church groups, etc.

- Discuss findings of this study with Village Council of Satala, Pago Pago, Malaloa, and Fagatogo

- Present a seminar on the findings of this study to all appropriate government resource agencies

Mercury levels in fish and shellfish from Onesosopo were elevated and it is recommended that this location should be studied more thoroughly to determine extent and magnitude of contamination. It is known that Onesosopo Park is constructed on the site of a former uncontrolled municipal dump, and ASEPA water quality data and sediment data for this area indicate possible leachate contamination of the surrounding environment. The Onesosopo study design should include a thorough review of this study, the ASEPA Sediment Toxicity Study, and other water quality reports available at ASEPA.

10.0 REFERENCES

AECOS. 1991. A Preliminary Toxics Scan of Water, Sediment and Fish Tissues from Inner Pago Pago Harbor in American Samoa. Prepared for American Samoa EPA.

ATSDR. 1995. *Final Report, Technical Assistance to the American Samoa Government, Department of Health Services*. US Department of Health and Human Services. Public Health Service. Agency for Toxic Substances and Disease Registry. Atlanta, GA

ATSDR. 1999a. *Toxicological profile for lead*. US Department of Health and Human Services. Public Health Service. Agency for Toxic Substances and Disease Registry. Atlanta, GA

ATSDR. 1999b. *Toxicological profile for mercury*. US Department of Health and Human Services. Public Health Service. Agency for Toxic Substances and Disease Registry. Atlanta, GA

ATSDR. 2000a. *Toxicological profile for arsenic*. US Department of Health and Human Services. Public Health Service. Agency for Toxic Substances and Disease Registry. Atlanta, GA

ATSDR. 2000b. *Toxicological Profile for Polychlorinated Biphenyls.* US Department of Health and Human Services. Public Health Service. Agency for Toxic Substances and Disease Registry. Atlanta, GA

Bloom, N.S. 1992. On the Chemical Form of Mercury in Edible Fish and Marine Invertebrate Tissue. Canadian Journal of Fish and Aquatic Sciences. 49; 1010-1017.

Donahue, J.M. and C.O. Abernathy. 1999. *Exposure to Inorganic Arsenic (As) from Fish and Shellfish*. US EPA Office of Science and Technology. Washington, DC.

EnviroSearch. 1994. *Human Health Risk Assessment for the Consumption of Fish and Shellfish Contaminated with Heavy Metals and Organochlorine Compounds in American Samoa*. Prepared for American Samoa EPA.

US Food and Drug Administration. 1993. *Guidance Document for Arsenic in Shellfish*. 1-43.

US Environmental Protection Agency. 1991. Fish Contamination Data, American Samoa. Report prepared by Kim-Chi Hoang to Norm Lovelace, US EPA Region IX.

US Environmental Protection Agency. 1992. Pala Lagoon Fish Toxicity Study, American Samoa. Report prepared by Rita Biggs to Norm Lovelace, US EPA Region IX.

US Environmental Protection Agency. 1994. Technical Support Document: Parameter and Equations Used in the Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in

Children; Technical Review Workgroup for Lead, Office of Emergency and Remedial Response: Washington DC: EPA 540/r-94/040.

US Environmental Protection Agency. 1997. *Mercury Study Report to Congress*, EPA452/R-97-003, Office of Air Quality and Planning and Standards, Office of Research and Development. U.S. Government Printing Office, Washington, DC.

US Environmental Protection Agency. 2000. *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories. Volume 2. Risk Assessment and Fish Consumption Limits.* Third Edition. EPA 823-B-00-008. Office of Water. Washington DC.

Washington State Department of Ecology. 2002. *Inorganic Arsenic Levels in Puget Sound Fish and Shellfish from 303(d) Listed Waterbodies and Other Areas*. Publication No. 02-03-057. http://www.ecy.wa.gov/biblio/0203057.html.

TABLES

TABLES (continued)

Table 1. Summary of Target Fish and Shellfish[1]

Location	Genus species	Composite Number[2]	Individuals per Composite	Genus species	Composite Number[2]	Individuals per Composite	Genus species	Composite Number[2]	Individuals per Composite
Onesosopo	*Acanthurus lineatus*	C1MT	5	*Sargocentron spp.*	C1MT	3	*Panulirus sp.*	WSF1	1
		C2MT	5		C2MT	4		WSF2	1
		C3MT	5		C3MT	3			
		C4WF	5		C4WF	4	*Parribacus sp.*	WSF3	1
		C5WF	5		C5WF	4			
		C6WF	5		C6WF	3			
Faga'alu	*Acanthurus lineatus*	C1MT	5	*Sargocentron spp.*	C1MT	4	*Panulirus sp.*	WSF1	1
		C2MT	5		C2MT	3		WSF2	1
		C3MT	5		C3MT	4		WSF3	1
		C4WF	5		C4WF	4			
		C5WF	5		C5WF	4			
		C6WF	5		C6WF	4			
Faga'itua	*Acanthurus lineatus*	C1MT	5	*Sargocentron spp.*	C1MT	5	*Panulirus sp.*	WSF1	1
		C2MT	5		C2MT	5		WSF2	1
		C3MT	5		C3MT	5		WSF3	1
		C4WF	5		C4WF	5			
		C5WF	5		C5WF	5			
		C6WF	5		C6WF	5			
Lauli'i	*Acanthurus lineatus*	C1MT	5	*Sargocentron spp.*	C1MT	5	*Panulirus sp.*	WSF1	1
		C2MT	5		C2MT	5		WSF2	1
		C3MT	5		C3MT	5		WSF3	1
		C4WF	5		C4WF	5			
		C5WF	5		C5WF	5			
		C6WF	5		C6WF	5			

1. MT=muscle tissue (scales and skin removed); WF=whole fish (all parts); WSF=whole shellfish (soft parts and body fluids only, no shell).

2. Refers to ASEPA composite designation (see Appendix).

Table 1. Summary of Target Fish and Shellfish[1]

Location	Genus species	Composite Number[2]	Individuals per Composite	Genus species	Composite Number[2]	Individuals per Composite	Genus species	Composite Number[2]	Individuals per Composite
Leone	*Acanthurus lineatus*	C1MT	5	*Sargocentron spp.*	C1MT	5	*Panulirus sp.*	WSF1	1
		C2MT	5		C2MT	5		WSF2	1
		C3MT	5		C3MT	5		WSF3	1
		C4WF	5		C4WF	3			
		C5WF	5		C5WF	3			
		C6WF	5		C6WF	3			
Matu'u	*Acanthurus lineatus*	C1MT	5	*Sargocentron spp.*	C1MT	5	*Panulirus sp.*	WSF1	1
		C2MT	5		C2MT	5		WSF2	1
		C3MT	5		C3MT	5		WSF3	1
		C4WF	5		C4WF	4			
		C5WF	5		C5WF	4			
		C6WF	5		C6WF	4			
Nu'uuli	*Acanthurus lineatus*	C1MT	5	*Sargocentron spp.*	C1MT	3	*Panulirus sp.*	WSF1	1
		C2MT	5		C2MT	3		WSF2	1
		C3MT	5		C3MT	3		WSF3	1
		C4WF	5		C4WF	3			
		C5WF	5		C5WF	3			
		C6WF	5		C6WF	3			
Ofu National Park	*Acanthurus lineatus*	C1MT	4	*Sargocentron spp.*	C1MT	4	*Panulirus sp.*	WSF1	1
		C2MT	4		C2MT	4		WSF2	1
		C3MT	3		C3MT	3		WSF3	1
		C4WF	3		C4WF	3			
		C5WF	3		C5WF	3			
		C6WF	3		C6WF	3			

1. MT=muscle tissue (scales and skin removed); WF=whole fish (all parts); WSF=whole shellfish (soft parts and body fluids only, no shell).

2. Refers to ASEPA composite designation (see Appendix).

Table 1. Summary of Target Fish and Shellfish[1]

Location	Genus species	Composite Number[2]	Individuals per Composite	Genus species	Composite Number[2]	Individuals per Composite	Genus species	Composite Number[2]	Individuals per Composite
Pago Pago Inner harbor	*Caranx papuensis*	C1MT	3	*Megalaspis cordyla*	C1MT	5	*Mugilidae spp.*	C1MT	3
		C2MT	3		C2MT	5		C2MT	3
		C3MT	3		C3MT	5		C3MT	3
		C4WF	3		C4WF	5		C4WF	3
		C5WF	3		C5WF	5		C5WF	3
		C6WF	3		C6WF	5		C6WF	3
	Serranidae spp.	C1WF	5	*Mullidae spp.*	C1WF	5	*Asaphis violascens*	WSF1	3
								WSF2	3
	Trochus maculatus	WSF1	11	*Octopus cyanea*	WSF1	1		WSF3	5
Pala Lagoon	*Mugilidae spp.*	C1MT	5	*Asaphis violascens*	WSF1	5	Crab (not identified)	WSF1	3
		C2MT	5		WSF2	5		WSF2	3
		C3MT	5		WSF3	5		WSF3	3
		C4WF	5						
		C5WF	5						
		C6WF	5						
Poloa	*Acanthurus lineatus*	C1MT	5	*Sargocentron spp.*	C1MT	3	*Panulirus sp.*	WSF1	1
		C2MT	5		C2MT	3		WSF2	1
		C3MT	5		C3MT	3		WSF3	1
		C4WF	5		C4WF	4			
		C5WF	5		C5WF	4			
		C6WF	5		C6WF	4			

1. MT=muscle tissue (scales and skin removed); WF=whole fish (all parts); WSF=whole shellfish (soft parts and body fluids only, no shell).

2. Refers to ASEPA composite designation (see Appendix).

Table 2. Summary of Analyses

Location	Specimen	As(i)	As(t)	Hg	Pb	PCBs	Lipids	Solids
Faga'alu	*Acanthurus*	NA	NA	X	X	NA	X	X
	Sargocentron	X	X	X	X	NA	X	X
	Panulirus	X	X	X	X	NA	X	X
Faga'itua	*Acanthurus*	NA	NA	X	X	NA	X	X
	Sargocentron	X	X	X	X	NA	X	X
	Panulirus	X	X	X	X	NA	X	X
Lauli'i	*Acanthurus*	NA	NA	X	X	NA	X	X
	Sargocentron	X	X	X	X	NA	X	X
	Panulirus	X	X	X	X	NA	X	X
Leone	*Acanthurus*	NA	NA	X	X	NA	X	X
	Sargocentron	X	X	X	X	NA	X	X
	Panulirus	X	X	X	X	NA	X	X
Matu'u	*Acanthurus*	NA	NA	X	X	NA	X	X
	Sargocentron	X	X	X	X	NA	X	X
	Panulirus	X	X	X	X	NA	X	X
Nu'uuli	*Acanthurus*	NA	NA	X	X	NA	X	X
	Sargocentron	X	X	X	X	NA	X	X
	Panulirus	X	X	X	X	NA	X	X
Ofu National Park	*Acanthurus*	NA	NA	X	X	NA	X	X
	Sargocentron	X	X	X	X	NA	X	X
	Panulirus	X	X	X	X	NA	X	X
Onesosopo	*Acanthurus*	NA	NA	X	X	NA	X	X
	Sargocentron	X	X	X	X	NA	X	X
	Panulirus	X	X	X	X	NA	X	X
	Parribacus	X	X	X	X	NA	X	X

X = analyzed for
NA = not analyzed for

Table 2. Summary of Analyses

Location	Specimen	As(i)	As(t)	Hg	Pb	PCBs	Lipids	Solids
Pago Inner Harbor	*Caranx*	X	X	X	X	X	X	X
	Megalaspis	X	X	X	X	X	X	X
	Mugilidae	X	X	X	X	X	X	X
	Mullidae	NA	NA	X	X	X	X	X
	Serranidae	NA	NA	X	X	X	X	X
	Asaphis	X	X	X	X	X	X	X
	Trochus	NA	NA	X	X	X	X	X
	Octopus	NA	NA	X	X	X	X	X
Pala Lagoon	Mugilidae	X	X	X	X	X	X	X
	Asaphis	X	X	X	X	X	X	X
	Crab	X	X	X	X	X	X	X
Poloa	*Acanthurus*	NA	NA	X	X	NA	X	X
	Sargocentron	X	X	X	X	NA	X	X
	Panulirus	X	X	X	X	NA	X	X

X = analyzed for
NA = not analyzed for

Table 3. Summary of Mean Concentrations of Contaminants for Coastal Sites (from Tables 5-13)

		Onesosopo	Fagaalu	Fagaitua	Laulii	Leone	Matuu	Nuuuli	Ofu	Poloa
Acanthurus										
As(i) Muscle Tissue	(ug/g)	NA	NA	NA	NA	NA	NA	NA	NA	NA
As(i) Whole Fish	(ug/g)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pb Muscle Tissue	(mg/kg)	0.025	0.001	0.006	0.002	0.019	0.003	0.011	0.006	0.002
Pb Whole Fish	(mg/kg)	0.155	0.116	0.041	0.096	0.161	0.081	0.045	0.040	0.043
Hg Muscle Tissue	(mg/kg)	0.011	0.100	0.003	0.004	0.003	0.003	0.003	0.001	0.003
Hg Whole Fish	(mg/kg)	0.014	0.006	0.006	0.006	0.007	0.008	0.006	0.005	0.006
Sargocentron										
As(i) Muscle Tissue	(ug/g)	0.00124	0.00310	0.01719	0.00215	0.00032	0.00154	0.00130	0.00054	0.00256
As(i) Whole Fish	(ug/g)	0.00407	0.00103	0.00841	0.00115	0.00000	0.00185	0.00098	0.00546	0.00095
Pb Muscle Tissue	(mg/kg)	0.005	0.011	0.001	0.008	0.001	0.001	0.001	0.001	0.004
Pb Whole Fish	(mg/kg)	0.041	0.028	0.050	0.031	0.018	0.034	0.028	0.031	0.026
Hg Muscle Tissue	(mg/kg)	0.465	0.001	0.069	0.113	0.062	0.059	0.065	0.058	0.053
Hg Whole Fish	(mg/kg)	0.182	0.072	0.031	0.070	0.036	0.036	0.034	0.024	0.037
Panulirus										
As(i) Muscle Tissue	(ug/g)	NA	NA	NA	NA	NA	NA	NA	NA	NA
As(i) Whole Shellfish	(ug/g)	0.02929	0.01549	0.01383	0.00861	0.03199	0.01462	0.04399	0.00849	0.02729
Pb Muscle Tissue	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pb Whole Shellfish	(mg/kg)	0.008	0.009	0.001	0.003	0.003	0.001	0.002	0.002	0.002
Hg Muscle Tissue	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hg Whole Shellfish	(mg/kg)	0.892	0.050	0.023	0.046	0.018	0.038	0.034	0.019	0.047

NA = not analyzed for

Table 4. Summary of Mean Concentrations of Contaminants for Pago Pago Inner Harbor and Pala Lagoon (from Tables 14-15)

		Pago Pago Inner Harbor	Pala Lagoon
Caranx			
As(i) Muscle Tissue	(ug/g)	0.00242	NA
As(i) Whole Fish	(ug/g)	0.00043	NA
Pb Muscle Tissue	(mg/kg)	0.003	NA
Pb Whole Fish	(mg/kg)	0.013	NA
Hg Muscle Tissue	(mg/kg)	0.452	NA
Hg Whole Fish	(mg/kg)	0.156	NA
PCB Muscle Tissue	(ug/kg)	157	NA
PCB Whole Fish	(ug/kg)	181	NA
Megalaspis			
As(i) Muscle Tissue	(ug/g)	0.00063	NA
As(i) Whole Fish	(ug/g)	0.00000	NA
Pb Muscle Tissue	(mg/kg)	0.005	NA
Pb Whole Fish	(mg/kg)	0.036	NA
Hg Muscle Tissue	(mg/kg)	0.178	NA
Hg Whole Fish	(mg/kg)	0.104	NA
PCB Muscle Tissue	(ug/kg)	101	NA
PCB Whole Fish	(ug/kg)	323	NA

NA = not analyzed for

Table 4. Summary of Mean Concentrations of Contaminants for Pago Pago Inner Harbor and Pala Lagoon (from Tables 14-15)

		Pago Pago Inner Harbor	Pala Lagoon
Mugilidae			
As(i) Muscle Tissue	(ug/g)	0.00798	0.00448
As(i) Whole Fish	(ug/g)	0.11139	0.14212
Pb Muscle Tissue	(mg/kg)	0.049	0.033
Pb Whole Fish	(mg/kg)	3.12	0.462
Hg Muscle Tissue	(mg/kg)	0.015	0.005
Hg Whole Fish	(mg/kg)	0.080	0.008
PCB Muscle Tissue	(ug/kg)	18	3
PCB Whole Fish	(ug/kg)	87	6
Mullidae			
Pb Whole Fish	(mg/kg)	0.100	NA
Hg Whole Fish	(mg/kg)	0.400	NA
PCB Whole Fish	(ug/kg)	640	NA
Serranidae			
Pb Whole Fish	(mg/kg)	0.160	NA
Hg Whole Fish	(mg/kg)	0.670	NA
PCB Whole Fish	(ug/kg)	520	NA

NA = not analyzed for

Table 4. Summary of Mean Concentrations of Contaminants for Pago Pago Inner Harbor and Pala Lagoon (from Tables 14-15)

		Pago Pago Inner Harbor	Pala Lagoon
Asaphis			
As(i) Whole Shellfish	(ug/g)	0.22770	0.08542
Pb Whole Shellfish	(mg/kg)	11.3	0.157
Hg Whole Shellfish	(mg/kg)	0.078	0.028
PCB Whole Shellfish	(ug/kg)	3	3
Trochus			
Pb Whole Shellfish	(mg/kg)	1.68	NA
Hg Whole Shellfish	(mg/kg)	0.07	NA
PCB Whole Shellfish	(ug/kg)	3	NA
Octopus			
Pb Whole Shellfish	(mg/kg)	0.330	NA
Hg Whole Shellfish	(mg/kg)	0.200	NA
PCB Whole Shellfish	(ug/kg)	50	NA

NA = not analyzed for

Table 4. Summary of Mean Concentrations of Contaminants for Pago Pago Inner Harbor and Pala Lagoon (from Tables 14-15)

		Pago Pago Inner Harbor	Pala Lagoon
Crab			
As(i) Whole Shellfish	(ug/g)	NA	0.00723
Pb Whole Shellfish	(mg/kg)	NA	0.004
Hg Whole Shellfish	(mg/kg)	NA	0.007
PCB Whole Shellfish	(ug/kg)	NA	3

NA = not analyzed for

Table 5. Concentrations of Contaminants in Muscle Tissue and Whole Fish; Onesosopo

Genus species	Common name (English)	Common name (Samoan)	Media	Inorganic Arsenic (ug/g)	Lead (mg/kg)	Mercury (mg/kg)	PCB (ug/kg)
Acanthurus lineatus	Lined surgeonfish	Alogo	Muscle tissue	NA	0.025 (0.012 - 0.037)	0.011 (0.007 - 0.016)	NA
			Whole fish	NA	0.155 (0.124 - 0.182)	0.014 (0.011 - 0.019)	NA
Sargocentron spp.	Squirrelfish	Malau	Muscle tissue	0.00124 (0.00035 - 0.00209)	0.005 (0.003 - 0.006)	0.465 (0.251 - 0.619)	NA
			Whole fish	0.00407 (0.00299 - 0.00474)	0.041 (0.032 - 0.057)	0.182 (0.105 - 0.319)	NA
Panulirus spp.	Lobster	Ula	Whole fish	0.02929 (0.02709 - 0.03149)	0.008 (0.006 - 0.009)	0.892 (0.624 - 1.160)	NA
Parribacus sp.	Slipper lobster	Ula	Whole fish	0.00533 (single value)	0.007 (single value)	0.165 (single value)	NA

Values used for risk assessment are arithmetic average, or weighted average where individuals per composite are not equal (Table 1); all rounding is to higher value; range per composites in parentheses; reported value is based on one-half the detection limit.

NA=Not analyzed for

ND=Not detected at method detection limit (see Appendix)

Table 6. Concentrations of Contaminants in Muscle Tissue and Whole Fish; Faga'alu

Genus species	Common name (English)	Common name (Samoan)	Media	Inorganic Arsenic (ug/g)	Lead (mg/kg)	Mercury (mg/kg)	PCB (ug/kg)
Acanthurus lineatus	Lined surgeonfish	Alogo	Muscle tissue	NA	0.001 (ND)	0.100 (0.065 - 0.132)	NA
			Whole fish	NA	0.116 (0.080 - 0.166)	0.006 (0.005 - 0.007)	NA
Sargocentron spp.	Squirrelfish	Malau	Muscle tissue	0.00310 (0.00212 - 0.00452)	0.011 (0.008 - 0.015)	0.001 (ND - 0.002)	NA
			Whole fish	0.00103 (0 - 0.00308)	0.028 (0.022 - 0.032)	0.072 (0.051 - 0.085)	NA
Panulirus spp.	Lobster	Ula	Whole fish	0.01549 (0.00318 - 0.03029)	0.009 (0.003 - 0.013)	0.050 (0.031 - 0.077)	NA

Values used for risk assessment are arithmetic average, or weighted average where individuals per composite are not equal (Table 1); all rounding is to higher value; range per composites in parentheses; reported value is calculated based on one-half the detection limit.

NA=Not analyzed for

ND=Not detected at method detection limit (see Appendix)

Table 7. Concentrations of Contaminants in Muscle Tissue and Whole Fish; Faga'itua

Genus species	Common name (English)	Common name (Samoan)	Media	Inorganic Arsenic (ug/g)	Lead (mg/kg)	Mercury (mg/kg)	PCB (ug/kg)
Acanthurus lineatus	Lined surgeonfish	Alogo	Muscle tissue	NA	0.006 (0.006 - 0.006)	0.003 (0.002 - 0.003)	NA
			Whole fish	NA	0.041 (0.030 - 0.049)	0.006 (0.005 - 0.007)	NA
Sargocentron spp.	Squirrelfish	Malau	Muscle tissue	0.01719 (0 - 0.02579)	0.001 (ND)	0.069 (0.046 - 0.084)	NA
			Whole fish	0.00841 (0 - 0.01949)	0.050 (0.023 - 0.082)	0.031 (0.024 - 0.037)	NA
Panulirus spp.	Lobster	Ula	Whole fish	0.01383 (0.00077 - 0.03193)	0.001 (ND - 0.002)	0.023 (0.012 - 0.041)	NA

Values used for risk assessment are arithmetic average, or weighted average where individuals per composite are not equal (Table 1); all rounding is to higher value; range per composites in parentheses; reported value is calculated based on one-half the detection limit.

NA=Not analyzed for

ND=Not detected at method detection limit (see Appendix)

Table 8. Concentrations of Contaminants in Muscle Tissue and Whole Fish; Lauli'i

Genus species	Common name (English)	Common name (Samoan)	Media	Inorganic Arsenic (ug/g)	Lead (mg/kg)	Mercury (mg/kg)	PCB (ug/kg)
Acanthurus lineatus	Lined surgeonfish	Alogo	Muscle tissue	NA	0.002 (ND - 0.004)	0.004 (0.004 - 0.005)	NA
			Whole fish	NA	0.096 (0.083 - 0.106)	0.006 (0.006 - 0.007)	NA
Sargocentron spp.	Squirrelfish	Malau	Muscle tissue	0.00215 (0 - 0.00385)	0.008 (0.003 - 0.013)	0.113 (0.108 - 0.120)	NA
			Whole fish	0.00115 (0 - 0.00318)	0.031 (0.025 - 0.038)	0.070 (0.056 - 0.077)	NA
Panulirus spp.	Lobster	Ula	Whole fish	0.00861 (0.00436 - 0.01189)	0.003 (ND - 0.006)	0.046 (0.021 - 0.076)	NA

Values used for risk assessment are arithmetic average, or weighted average where individuals per composite are not equal (Table 1); all rounding is to higher value; range per composites in parentheses; reported value is based on one-half the detection limit.

NA=Not analyzed for

ND=Not detected at method detection limit (see Appendix)

Table 9. Concentrations of Contaminants in Muscle Tissue and Whole Fish; Leone

Genus species	Common name (English)	Common name (Samoan)	Media	Inorganic Arsenic (ug/g)	Lead (mg/kg)	Mercury (mg/kg)	PCB (ug/kg)
Acanthurus lineatus	Lined surgeonfish	Alogo	Muscle tissue	NA	0.019 (0.008 - 0.038)	0.003 (0.002 - 0.003)	NA
			Whole fish	NA	0.161 (0.095 - 0.231)	0.007 (0.004 - 0.008)	NA
Sargocentron spp.	Squirrelfish	Malau	Muscle tissue	0.00032 (0 - 0.00097)	0.001 (ND - ND)	0.062 (0.056 - 0.066)	NA
			Whole fish	0.00000 (0 - 0)	0.018 (0.018 - 0.019)	0.036 (0.030 - 0.046)	NA
Panulirus spp.	Lobster	Ula	Whole fish	0.03199 (0.02259 - 0.04189)	0.003 (0.003 - 0.003)	0.018 (0.013 - 0.021)	NA

Values used for risk assessment are arithmetic average, or weighted average where individuals per composite are not equal (Table 1); all rounding is to higher value; range per composites in parentheses; reported value is based on one-half the detection limit.

NA=Not analyzed for

ND=Not detected at method detection limit (see Appendix)

Table 10. Concentrations of Contaminants in Muscle Tissue and Whole Fish; Matu'u

Genus species	Common name (English)	Common name (Samoan)	Media	Inorganic Arsenic (ug/g)	Lead (mg/kg)	Mercury (mg/kg)	PCB (ug/kg)
Acanthurus lineatus	Lined surgeonfish	Alogo	Muscle tissue	NA	0.003 (ND - 0.007)	0.003 (0.003 - 0.003)	NA
			Whole fish	NA	0.081 (0.060 - 0.104)	0.008 (0.007 - 0.008)	NA
Sargocentron spp.	Squirrelfish	Malau	Muscle tissue	0.00154 (0.00110 - 0.00179)	0.001 (ND - 0.002)	0.059 (0.056 - 0.063)	NA
			Whole fish	0.00185 (0 - 0.00498)	0.034 (0.023 - 0.051)	0.036 (0.034 - 0.038)	NA
Panulirus spp.	Lobster	Ula	Whole fish	0.01462 (0.00969 - 0.01719)	0.001 (ND - ND)	0.038 (0.020 - 0.048)	NA

Values used for risk assessment are arithmetic average, or weighted average where individuals per composite are not equal (Table 1); all rounding is to higher value; range per composites in parentheses; reported value is based on one-half the detection limit.

NA=Not analyzed for

ND=Not detected at method detection limit (see Appendix)

Table 11. Concentrations of Contaminants in Muscle Tissue and Whole Fish; Nu'uuli

Genus species	Common name (English)	Common name (Samoan)	Media	Inorganic Arsenic (ug/g)	Lead (mg/kg)	Mercury (mg/kg)	PCB (ug/kg)
Acanthurus lineatus	Lined surgeonfish	Alogo	Muscle tissue	NA	0.011 (0.003 - 0.025)	0.003 (0.003 - 0.003)	NA
			Whole fish	NA	0.045 (0.041 - 0.051)	0.006 (0.004 - 0.008)	NA
Sargocentron spp.	Squirrelfish	Malau	Muscle tissue	0.00130 (0 - 0.00195)	0.001 (ND - ND)	0.065 (0.039 - 0.085)	NA
			Whole fish	0.00098 (0 - 0.00293)	0.028 (0.025 - 0.030)	0.034 (0.031 - 0.038)	NA
Panulirus spp.	Lobster	Ula	Whole fish	0.04399 (0.00689 - 0.08279)	0.002 (ND - 0.003)	0.034 (0.020 - 0.042)	NA

Values used for risk assessment are arithmetic average, or weighted average where individuals per composite are not equal (Table 1); all rounding is to higher value; range per composites in parentheses; reported value is based on one-half the detection limit.

NA=Not analyzed for

ND=Not detected at method detection limit (see Appendix)

Table 12. Concentrations of Contaminants in Muscle Tissue and Whole Fish; Ofu National Park

Genus species	Common name (English)	Common name (Samoan)	Media	Inorganic Arsenic (ug/g)	Lead (mg/kg)	Mercury (mg/kg)	PCB (ug/kg)
Acanthurus lineatus	Lined surgeonfish	Alogo	Muscle tissue	NA	0.006 (0.005 - 0.007)	0.001 (ND - 0.002)	NA
			Whole fish	NA	0.040 (0.033 - 0.048)	0.005 (0.004 - 0.007)	NA
Sargocentron spp.	Squirrelfish	Malau	Muscle tissue	0.00054 (0 - 0.00227)	0.001 (ND - 0.006)	0.058 (0.048 - 0.068)	NA
			Whole fish	0.00546 (0.00499 - 0.00599)	0.031 (0.017 - 0.053)	0.024 (0.018 - 0.031)	NA
Panulirus spp.	Lobster	Ula	Whole fish	0.00849 (0.00809 - 0.00889)	0.002 (ND - 0.004)	0.019 (ND - 0.054)	NA

Values used for risk assessment are arithmetic average, or weighted average where individuals per composite are not equal (Table 1); all rounding is to higher value; range per composites in parentheses; reported value is based on one-half the detection limit.

NA=Not analyzed for

ND=Not detected at method detection limit (see Appendix)

Table 13. Concentrations of Contaminants in Muscle Tissue and Whole Fish; Poloa

Genus species	Common name (English)	Common name (Samoan)	Media	Inorganic Arsenic (ug/g)	Lead (mg/kg)	Mercury (mg/kg)	PCB (ug/kg)
Acanthurus lineatus	Lined surgeonfish	Alogo	Muscle tissue	NA	0.002 (ND - 0.003)	0.003 (0.002 - 0.003)	NA
			Whole fish	NA	0.043 (0.039 - 0.049)	0.006 (0.004 - 0.008)	NA
Sargocentron spp.	Squirrelfish	Malau	Muscle tissue	0.00256 (0 - 0.00639)	0.004 (0.004 - 0.005)	0.053 (0.043 - 0.068)	NA
			Whole fish	0.00095 (0 - 0.00286)	0.026 (0.020 - 0.036)	0.037 (0.029 - 0.047)	NA
Panulirus spp.	Lobster	Ula	Whole fish	0.02729 (0.01459 - 0.04059)	0.002 (ND - 0.007)	0.047 (0.031 - 0.075)	NA

Values used for risk assessment are arithmetic average, or weighted average where individuals per composite are not equal (Table 1); all rounding is to higher value; range per composites in parentheses; reported value is based on one-half the detection limit.

NA=Not analyzed for

ND=Not detected at method detection limit (see Appendix)

Table 14. Concentrations of Contaminants in Muscle Tissue and Whole Fish; Pago Pago Inner harbor

Genus species	Common name (English)	Common name (Samoan)	Media	Inorganic Arsenic (ug/g)	Lead (mg/kg)	Mercury (mg/kg)	PCB (ug/kg)
Caranx papuensis	Brassy Trevally	Malaulie	Muscle tissue	0.00242 (0 - 0.00368)	0.003 (ND - 0.005)	0.452 (0.426 - 0.481)	157 (110 - 214)
			Whole fish	0.00043 (0 - 0.00090)	0.013 (0.006 - 0.020)	0.156 (0.044 - 0.276)	181 (82 - 300)
Megalaspis cordyla	Filter Feeding Mackerel	Ga	Muscle tissue	0.00063 (0 - 0.00170)	0.005 (0.003 - 0.007)	0.178 (0.158 - 0.208)	101 (94 - 104)
			Whole fish	0.00000 (0 - 0)	0.036 (0.031 - 0.040)	0.104 (0.098 - 0.109)	323 (280 - 370)
Mugilidae spp.	Mullet	Anae	Muscle tissue	0.00798 (0.00221 - 0.01639)	0.049 (0.026 - 0.073)	0.015 (0.008 - 0.020)	18 (10 - 32)
			Whole fish	0.11139 (0.09459 - 0.12979)	3.12 (2.37 - 3.96)	0.080 (0.040 - 0.150)	87 (52 - 130)
Mullidae spp.	Goatfish	Ulaoa	Whole fish	NA	0.100 (single value)	0.400 (single value)	640 (single value)
Serranidae spp.	Grouper	Gatala	Whole fish	NA	0.160 (single value)	0.670 (single value)	520 (single value)

Values used for risk assessment are arithmetic average, or weighted average where individuals per composite are not equal (Table 1); all rounding is to higher value; range per composites in parentheses; reported value is based on one-half the detection limit.

NA=Not analyzed for

ND=Not detected at method detection limit (see Appendix)

Table 14. Concentrations of Contaminants in Muscle Tissue and Whole Fish; Pago Pago Inner harbor

Genus species	Common name (English)	Common name (Samoan)	Media	Inorganic Arsenic (ug/g)	Lead (mg/kg)	Mercury (mg/kg)	PCB (ug/kg)
Asaphis violascens	Mud Clam	Pipi	Whole fish	0.22770 (0.21179 - 0.24379)	11.3 (10.5 - 11.5)	0.078 (0.070 - 0.090)	3 (ND - ND)
Trochus maculatus	Snail	Alili	Whole fish	NA	1.68 (single value)	0.070 (single value)	3 (ND, single value)
Octopus cyanea	Octopus	Fe'e	Whole fish	NA	0.330 (single value)	0.200 (single value)	50 (single value)

Values used for risk assessment are arithmetic average, or weighted average where individuals per composite are not equal (Table 1); all rounding is to higher value; range per composites in parentheses; reported value is based on one-half the detection limit.

NA=Not analyzed for

ND=Not detected at method detection limit (see Appendix)

Table 15. Concentrations of Contaminants in Muscle Tissue and Whole Fish; Pala Lagoon

Genus species	Common name (English)	Common name (Samoan)	Media	Inorganic Arsenic (ug/g)	Lead (mg/kg)	Mercury (mg/kg)	PCB (ug/kg)
Mugilidae spp.	Mullet	Anae	Muscle tissue	0.00448 (0.00274 - 0.00639)	0.033 (0.017 - 0.061)	0.005 (0.004 - 0.005)	3 (ND - ND)
			Whole fish	0.14212 (0.10879 - 0.18179)	0.462 (0.349 - 0.543)	0.008 (0.007 - 0.009)	6 (ND - 9.8)
Asaphis violascens	Mud Clam	Pipi	Whole fish	0.08542 (0.07109 - 0.10179)	0.157 (0.141 - 0.167)	0.028 (0.027 - 0.029)	3 (ND - ND)
Crab (unidentified)	Crab	Pa'a	Whole fish	0.00723 (0.00442 - 0.01259)	0.004 (0.003 - 0.006)	0.007 (0.004 - 0.011)	3 (ND - ND)

Values used for risk assessment are arithmetic average, or weighted average where individuals per composite are not equal (Table 1); all rounding is to higher value; range per composites in parentheses; reported value is based on one-half the detection limit.

NA=Not analyzed for

ND=Not detected at method detection limit (see Appendix)

Table 16. Monthly Fish Consumption Limits for Carcinogenic and Non-carcinogenic Health Endpoints - Arsenic (inorganic)

Risk Based Consumption Limit[a]	Non-Cancer Health Endpoints[b]	Cancer Health Endpoints[c]
Fish Meals/Month	Fish Tissue Concentrations (ppm, wet weight)	Fish Tissue Concentrations (ppm, wet weight)
Unrestricted(>16)	0-0.088	0-0.002
16	>0.088-0.18	>0.002-0.0039
12	>0.18-0.23	>0.0039-0.0052
8	>0.23-0.35	>0.0052-0.0078
7	0.4	0.0089
6	0.47	0.0104
5	0.56	0.0125
4	0.7	0.016
3	0.94	0.021
2	1.4	0.031
1	2.8	0.063
0.5	5.6	0.13
none[d] (<0.5)	>5.6	>0.13

[a]Assumed meal size is 8 oz. For meals greater than 8 meals/month, ranges of chemical concentrations are conservative, e.g., 12 meal per month levels represent the concentrations associated with 12 to 15.9 meals. Consumption limits are based on an adult body weight of 70 kg and an RfD of 3×10^{-4} mg/kg-d and cancer slope factor of 1.5 $(mg/kg\text{-}d)^{-1}$

[b]Chronic, systemic effects

[c]Cancer values represent tissue concentrations at a 1 in 100,000 risk level

[d]None; no consumption recommended

Source: USEPA (see references)

Table 17. Monthly Fish Consumption Limits for Non-carcinogenic Health Endpoints - Methylmercury

Risk Based Consumption Limit[a]	Non-Cancer Health Endpoints[b]
Fish Meals/Month	Fish Tissue Concentrations (ppm, wet weight)
Unrestricted(>16)	>0-0.029
16	>0.029-0.059
12	>0.059-0.078
8	>0.078-0.12
7	0.134
6	0.156
5	0.19
4	0.23
3	0.31
2	0.47
1	0.94
0.5	1.9
none[c] (<0.5)	>1.9

[a]Assumed meal size is 8 oz. For meals greater than 8 meals/month, ranges of chemical concentrations are conservative, e.g., 12 meal per month levels represent the concentrations associated with 12 to 15.9 meals. Consumption limits are based on an adult body weight of 70 kg and an RfD of 1×10^{-4} mg/kg-d.

[b]Chronic, systemic effects

[c]None; no consumption recommended

Source: USEPA (see references)

Table 18. Monthly Fish Consumption Limits for Non-carcinogenic Health Endpoints - Lead

Risk Based Consumption Limit[a]	Non-Cancer Health Endpoints[b]
Fish Meals/Month	Fish Tissue Concentrations (ppm, wet weight)
Unrestricted	0-0.1035
16	>0.1035-0.198
12	>0.198-261
8	>0.261-0.387
7	0.445
6	0.515
5	0.615
4	0.77
3	1.02
2	1.53
1	3.05
0.5	6.2
none[c] (<0.5)	>6.2

[a]Fish consumption limits calculated using EPA IEUBK model. Meal size for the child is 3 oz. For meals greather than 8 meals/month, the ranges of chemical concentrations are conservative, e.g., 12 meal per month levels represent the concentrations associated with 12 to 15.9 meals.

[b]Chronic, systemic effects

[c]None; no consumption recommended

Source: USEPA (see references)

Table 19. Monthly Fish Consumption Limits for Carcinogenic and Non-carcinogenic Health Endpoints - PCBs

Risk Based Consumption Limit[a]	Non-Cancer Health Endpoints[b]	Cancer Health Endpoints[c]
Fish Meals/Month	Fish Tissue Concentrations (ppm, wet weight)	Fish Tissue Concentrations (ppm, wet weight)
Unrestricted(>16)	0-0.0059	0-0.0015
16	>0.0059-0.012	>0.0015-0029
12	>0.012-0.016	>0.0029-0.0039
8	>0.016-0.023	>0.0039-0.0059
7	0.027	0.0067
6	0.031	0.0078
5	0.037	0.009
4	0.047	0.012
3	0.063	0.016
2	0.094	0.023
1	0.19	0.047
0.5	0.38	0.094
none[d] (<0.5)	>0.38	>0.094

[a]Assumed meal size is 8 oz. For meals greater than 8 meals/month, ranges of chemical concentrations are conservative, e.g., 12 meal per month levels represent the concentrations associated with 12 to 15.9 meals. Consumption limits are based on an adult body weight of 70 kg and an RfD of 2×10^{-5} mg/kg-d and cancer slope factor of 2 $(mg/kg\text{-}d)^{-1}$

[b]Chronic, systemic effects

[c]Cancer values represent tissue concentrations at a 1 in 100,000 risk level

[d]None; no consumption recommended

Source: USEPA (see references)

Table 20. Consumption Rates for Fish and Shellfish; Onesosopo

Genus species	Media	Analyte	Concentration (mg/kg)	Consumption Rate (meals/month)	
				Non-cancer Risk	Cancer Risk
Acanthurus lineatus	Muscle	Lead	0.025	Unrestricted	NA
	Whole	Lead	0.155	16	NA
	Muscle	Mercury	0.011	Unrestricted	NA
	Whole	Mercury	0.014	Unrestricted	NA
Sargocentron spp.	Muscle	Arsenic	0.00124	Unrestricted	Unrestricted
	Whole	Arsenic	0.00407	Unrestricted	12
	Muscle	Lead	0.005	Unrestricted	NA
	Whole	Lead	0.041	Unrestricted	NA
	Muscle	Mercury	0.465	2	NA
	Whole	Mercury	0.182	5	NA
Panulirus spp.	Whole	Arsenic	0.02929	Unrestricted	2
	Whole	Lead	0.008	Unrestricted	NA
	Whole	Mercury	0.892	1	NA
Parribacus sp.	Whole	Arsenic	0.00533	Unrestricted	12
	Whole	Lead	0.007	Unrestricted	NA
	Whole	Mercury	0.165	5	NA

NA=not applicable

Table 21. Consumption Rates for Fish and Shellfish; Faga'alu

Genus Species	Media	Analyte	Concentration (mg/kg)	Consumption Rate (meals/month) Non-cancer Risk	Cancer Risk
Acanthurus lineatus	Muscle	Lead	0.001	Unrestricted	NA
	Whole	Lead	0.116	16	NA
	Muscle	Mercury	0.100	8	NA
	Whole	Mercury	0.006	Unrestricted	NA
Sargocentron spp.	Muscle	Arsenic	0.00310	Unrestricted	16
	Whole	Arsenic	0.00103	Unrestricted	Unrestricted
	Muscle	Lead	0.011	Unrestricted	NA
	Whole	Lead	0.028	Unrestricted	NA
	Muscle	Mercury	0.001	Unrestricted	NA
	Whole	Mercury	0.072	12	NA
Panulirus spp.	Whole	Arsenic	0.01549	Unrestricted	4
	Whole	Lead	0.009	Unrestricted	NA
	Whole	Mercury	0.050	16	NA

NA=not applicable

Table 22. Consumption Rates for Fish and Shellfish; Faga'itua

Genus Species	Media	Analyte	Concentration (mg/kg)	Consumption Rate (meals/month)	
				Non-cancer Risk	Cancer Risk
Acanthurus lineatus	Muscle	Lead	0.006	Unrestricted	NA
	Whole	Lead	0.041	Unrestricted	NA
	Muscle	Mercury	0.003	Unrestricted	NA
	Whole	Mercury	0.006	Unrestricted	NA
Sargocentron spp.	Muscle	Arsenic	0.01719	Unrestricted	3
	Whole	Arsenic	0.00841	Unrestricted	7
	Muscle	Lead	0.001	Unrestricted	NA
	Whole	Lead	0.050	Unrestricted	NA
	Muscle	Mercury	0.069	12	NA
	Whole	Mercury	0.031	16	NA
Panulirus spp.	Whole	Arsenic	0.01383	Unrestricted	4
	Whole	Lead	0.001	Unrestricted	NA
	Whole	Mercury	0.023	Unrestricted	NA

NA=not applicable

Table 23. Consumption Rates for Fish and Shellfish; Lauli'i

Genus Species	Media	Analyte	Concentration (mg/kg)	Consumption Rate (meals/month) Non-cancer Risk	Cancer Risk
Acanthurus lineatus	Muscle	Lead	0.002	Unrestricted	NA
	Whole	Lead	0.096	Unrestricted	NA
	Muscle	Mercury	0.004	Unrestricted	NA
	Whole	Mercury	0.006	Unrestricted	NA
Sargocentron spp.	Muscle	Arsenic	0.00215	Unrestricted	16
	Whole	Arsenic	0.00115	Unrestricted	Unrestricted
	Muscle	Lead	0.008	Unrestricted	NA
	Whole	Lead	0.031	Unrestricted	NA
	Muscle	Mercury	0.113	8	NA
	Whole	Mercury	0.070	12	NA
Panulirus spp.	Whole	Arsenic	0.00861	Unrestricted	7
	Whole	Lead	0.003	Unrestricted	NA
	Whole	Mercury	0.046	16	NA

NA=not applicable

Table 24. Consumption Rates for Fish and Shellfish; Leone

Genus Species	Media	Analyte	Concentration (mg/kg)	Consumption Rate (meals/month)	
				Non-cancer Risk	Cancer Risk
Acanthurus lineatus	Muscle	Lead	0.019	Unrestricted	NA
	Whole	Lead	0.161	16	NA
	Muscle	Mercury	0.003	Unrestricted	NA
	Whole	Mercury	0.007	Unrestricted	NA
Sargocentron spp.	Muscle	Arsenic	0.00032	Unrestricted	Unrestricted
	Whole	Arsenic	0	Unrestricted	Unrestricted
	Muscle	Lead	0.001	Unrestricted	NA
	Whole	Lead	0.018	Unrestricted	NA
	Muscle	Mercury	0.062	12	NA
	Whole	Mercury	0.036	16	NA
Panulirus spp.	Whole	Arsenic	0.03199	Unrestricted	1
	Whole	Lead	0.003	Unrestricted	NA
	Whole	Mercury	0.018	Unrestricted	NA

NA=not applicable

Table 25. Consumption Rates for Fish and Shellfish; Matu'u

Genus Species	Media	Analyte	Concentration (mg/kg)	Consumption Rate (meals/month) Non-cancer Risk	Cancer Risk
Acanthurus lineatus	Muscle	Lead	0.003	Unrestricted	NA
	Whole	Lead	0.081	Unrestricted	NA
	Muscle	Mercury	0.003	Unrestricted	NA
	Whole	Mercury	0.008	Unrestricted	NA
Sargocentron spp.	Muscle	Arsenic	0.00154	Unrestricted	Unrestricted
	Whole	Arsenic	0.00185	Unrestricted	Unrestricted
	Muscle	Lead	0.001	Unrestricted	NA
	Whole	Lead	0.034	Unrestricted	NA
	Muscle	Mercury	0.059	16	NA
	Whole	Mercury	0.036	16	NA
Panulirus spp.	Whole	Arsenic	0.01462	Unrestricted	4
	Whole	Lead	0.001	Unrestricted	NA
	Whole	Mercury	0.038	16	NA

NA=not applicable

Table 26. Consumption Rates for Fish and Shellfish; Nu'uuli

Genus Species	Media	Analyte	Concentration (mg/kg)	Consumption Rate (meals/month) Non-cancer Risk	Cancer Risk
Acanthurus lineatus	Muscle	Lead	0.011	Unrestricted	NA
	Whole	Lead	0.045	Unrestricted	NA
	Muscle	Mercury	0.003	Unrestricted	NA
	Whole	Mercury	0.006	Unrestricted	NA
Sargocentron spp.	Muscle	Arsenic	0.00130	Unrestricted	Unrestricted
	Whole	Arsenic	0.00098	Unrestricted	Unrestricted
	Muscle	Lead	0.001	Unrestricted	NA
	Whole	Lead	0.028	Unrestricted	NA
	Muscle	Mercury	0.065	12	NA
	Whole	Mercury	0.034	16	NA
Panulirus spp.	Whole	Arsenic	0.04399	Unrestricted	1
	Whole	Lead	0.002	Unrestricted	NA
	Whole	Mercury	0.034	16	NA

NA=not applicable

Table 27. Consumption Rates Fish and Shellfish; Ofu National Park

Genus Species	Media	Analyte	Concentration (mg/kg)	Consumption Rate (meals/month)	
				Non-cancer Risk	Cancer Risk
Acanthurus lineatus	Muscle	Lead	0.006	Unrestricted	NA
	Whole	Lead	0.040	Unrestricted	NA
	Muscle	Mercury	0.001	Unrestricted	NA
	Whole	Mercury	0.005	Unrestricted	NA
Sargocentron spp.	Muscle	Arsenic	0.00054	Unrestricted	Unrestricted
	Whole	Arsenic	0.00546	Unrestricted	8
	Muscle	Lead	0.001	Unrestricted	NA
	Whole	Lead	0.031	Unrestricted	NA
	Muscle	Mercury	0.058	12	NA
	Whole	Mercury	0.024	16	NA
Panulirus spp.	Whole	Arsenic	0.00849	Unrestricted	7
	Whole	Lead	0.002	Unrestricted	NA
	Whole	Mercury	0.019	16	NA

NA=not applicable

Table 28. Consumption Rates for Fish and Shellfish; Pago Pago Inner Harbor

Genus Species	Media	Analyte	Concentration (mg/kg)	Consumption Rate (meals/month) Non-cancer Risk	Cancer Risk
Caranx papuensis	Muscle	Arsenic	0.00242	Unrestricted	16
	Whole	Arsenic	0.00043	Unrestricted	Unrestricted
	Muscle	Lead	0.003	Unrestricted	NA
	Whole	Lead	0.013	Unrestricted	NA
	Muscle	Mercury	0.452	2	NA
	Whole	Mercury	0.156	6	NA
	Muscle	PCB	0.157	1	None
	Whole	PCB	0.181	1	None
Megalaspis cordyla	Muscle	Arsenic	0.00063	Unrestricted	Unrestricted
	Whole	Arsenic	0	Unrestricted	Unrestricted
	Muscle	Lead	0.005	Unrestricted	NA
	Whole	Lead	0.036	Unrestricted	NA
	Muscle	Mercury	0.178	5	NA
	Whole	Mercury	0.104	8	NA
	Muscle	PCB	0.101	1	None
	Whole	PCB	0.323	0.5	None
Mugilidae *spp*	Muscle	Arsenic	0.00798	Unrestricted	7
	Whole	Arsenic	0.11139	16	0.5
	Muscle	Lead	0.049	Unrestricted	NA
	Whole	Lead	3.12	1	NA
	Muscle	Mercury	0.015	Unrestricted	NA
	Whole	Mercury	0.080	8	NA
	Muscle	PCB	0.018	8	2
	Whole	PCB	0.087	2	0.5
Mullidae *spp.*	Whole	Lead	0.100	Unrestricted	NA
	Whole	Mercury	0.400	2	NA
	Whole	PCB	0.640	None	None
Serranidae *spp.*	Whole	Lead	0.160	16	NA
	Whole	Mercury	0.670	1	NA
	Whole	PCB	0.520	None	None
Asaphis violascens	Whole	Arsenic	0.22770	12	None
	Whole	Lead	11.3	None	NA
	Whole	Mercury	0.078	12	NA
	Whole	PCB	0.003	Unrestricted	12
Trochus maculatus	Whole	Lead	1.68	1	NA
	Whole	Mercury	0.070	12	NA
	Whole	PCB	0.003	Unrestricted	12
Octopus cyanea	Whole	Lead	0.330	8	NA
	Whole	Mercury	0.200	4	NA
	Whole	PCB	0.050	3	0.5

NA=not applicable

Table 29. Consumption Rates for Fish and Shellfish; Pala Lagoon

Genus	Media	Analyte	Concentration (mg/kg)	Consumption Rate (meals/month) Non-cancer Risk	Cancer Risk
Mugilidae *spp.*	Muscle	Arsenic	0.00448	Unrestricted	12
	Whole	Arsenic	0.14212	16	None
	Muscle	Lead	0.033	Unrestricted	NA
	Whole	Lead	0.462	6	NA
	Muscle	Mercury	0.005	Unrestricted	NA
	Whole	Mercury	0.008	Unrestricted	NA
	Muscle	PCB	0.003	Unrestricted	12
	Whole	PCB	0.006	16	7
Asaphis violascens.	Whole	Arsenic	0.08542	Unrestricted	0.5
	Whole	Lead	0.157	16	NA
	Whole	Mercury	0.028	Unrestricted	NA
	Whole	PCB	0.003	Unrestricted	12
Crab	Whole	Arsenic	0.00723	Unrestricted	8
	Whole	Lead	0.004	Unrestricted	NA
	Whole	Mercury	0.007	16	NA
	Whole	PCB	0.003	Unrestricted	12

NA=not applicable

Table 30. Consumption Rates for Fish and Shellfish; Poloa

Genus	Media	Analyte	Concentration (mg/kg)	Consumption Rate (meals/month) Non-cancer Risk	Cancer Risk
Acanthurus lineatus	Muscle	Lead	0.002	Unrestricted	NA
	Whole	Lead	0.043	Unrestricted	NA
	Muscle	Mercury	0.003	Unrestricted	NA
	Whole	Mercury	0.006	Unrestricted	NA
Sargocentron spp.	Muscle	Arsenic	0.00256	Unrestricted	Unrestricted
	Whole	Arsenic	0.00095	Unrestricted	Unrestricted
	Muscle	Lead	0.004	Unrestricted	NA
	Whole	Lead	0.026	Unrestricted	NA
	Muscle	Mercury	0.053	12	NA
	Whole	Mercury	0.037	16	NA
Panulirus spp.	Whole	Arsenic	0.02729	Unrestricted	2
	Whole	Lead	0.002	Unrestricted	NA
	Whole	Mercury	0.047	16	NA

NA=not applicable

FIGURES

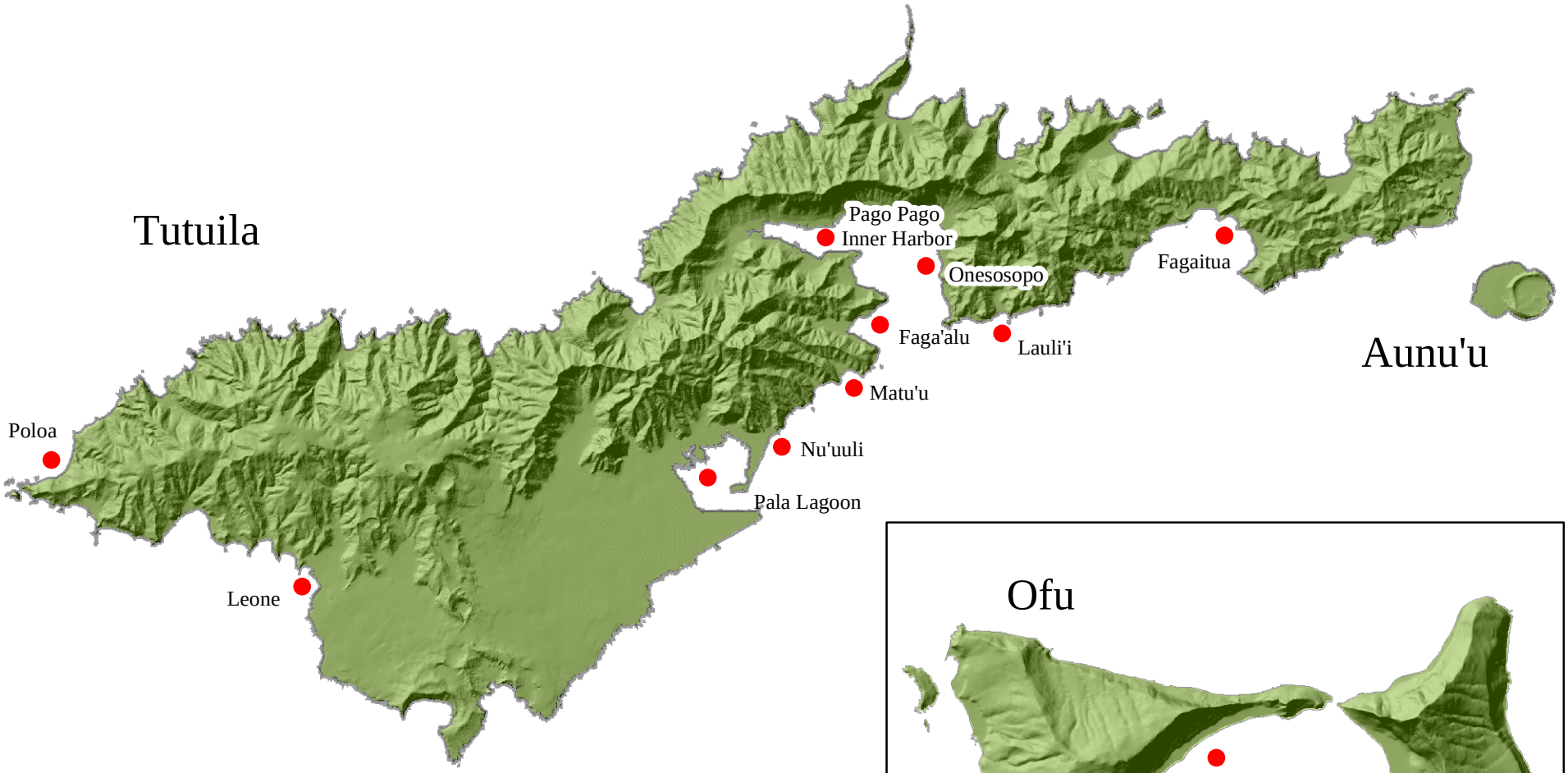


Figure 1
Fish and Shellfish Collection Sites

Figure 2. As(i) in *Sargocentron* and *Panulirus* ; Comparison among coastal sites

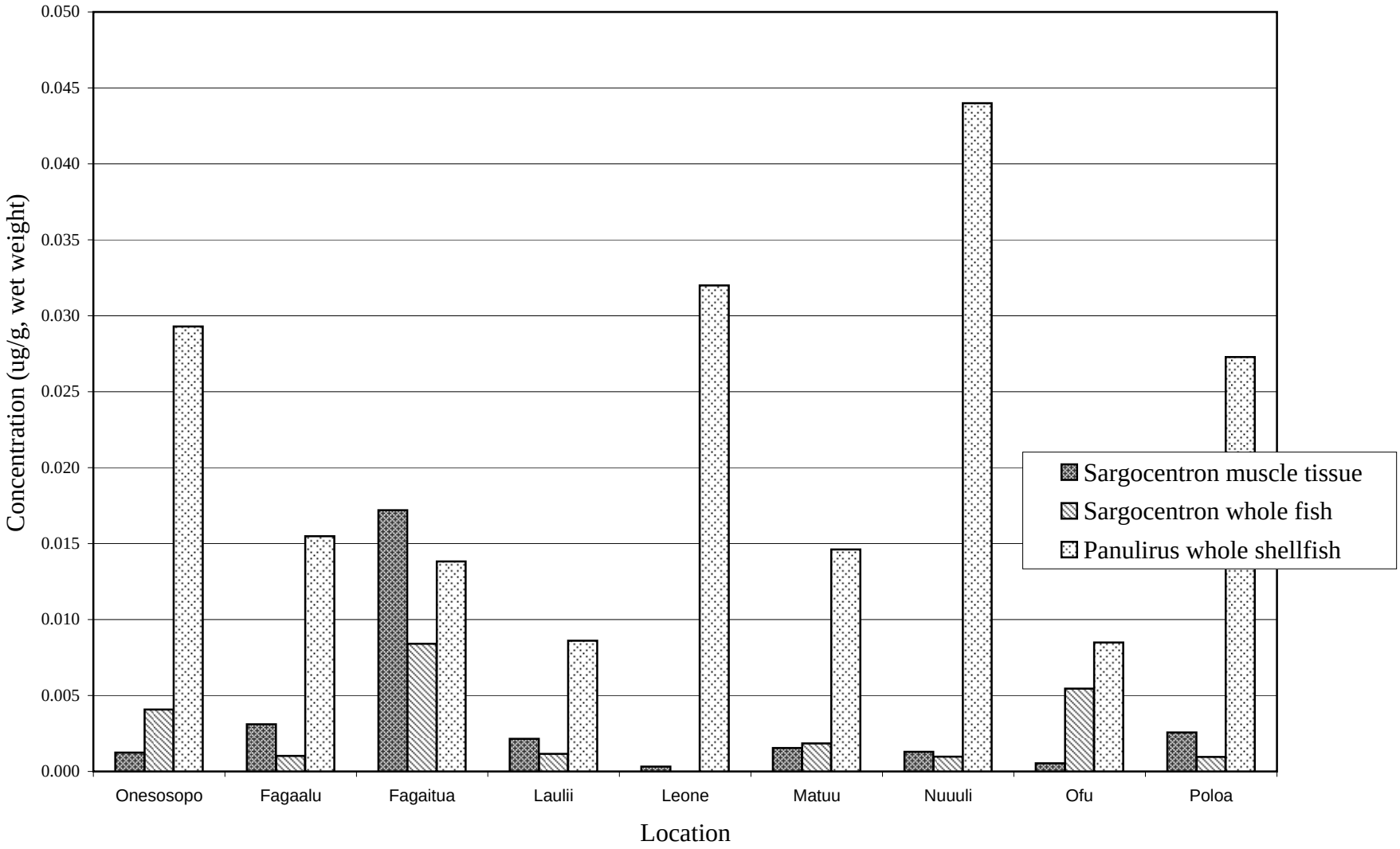


Figure 3. Pb in *Acanthurus* , *Sargocentron* and *Panulirus* ; Comparison among coastal sites

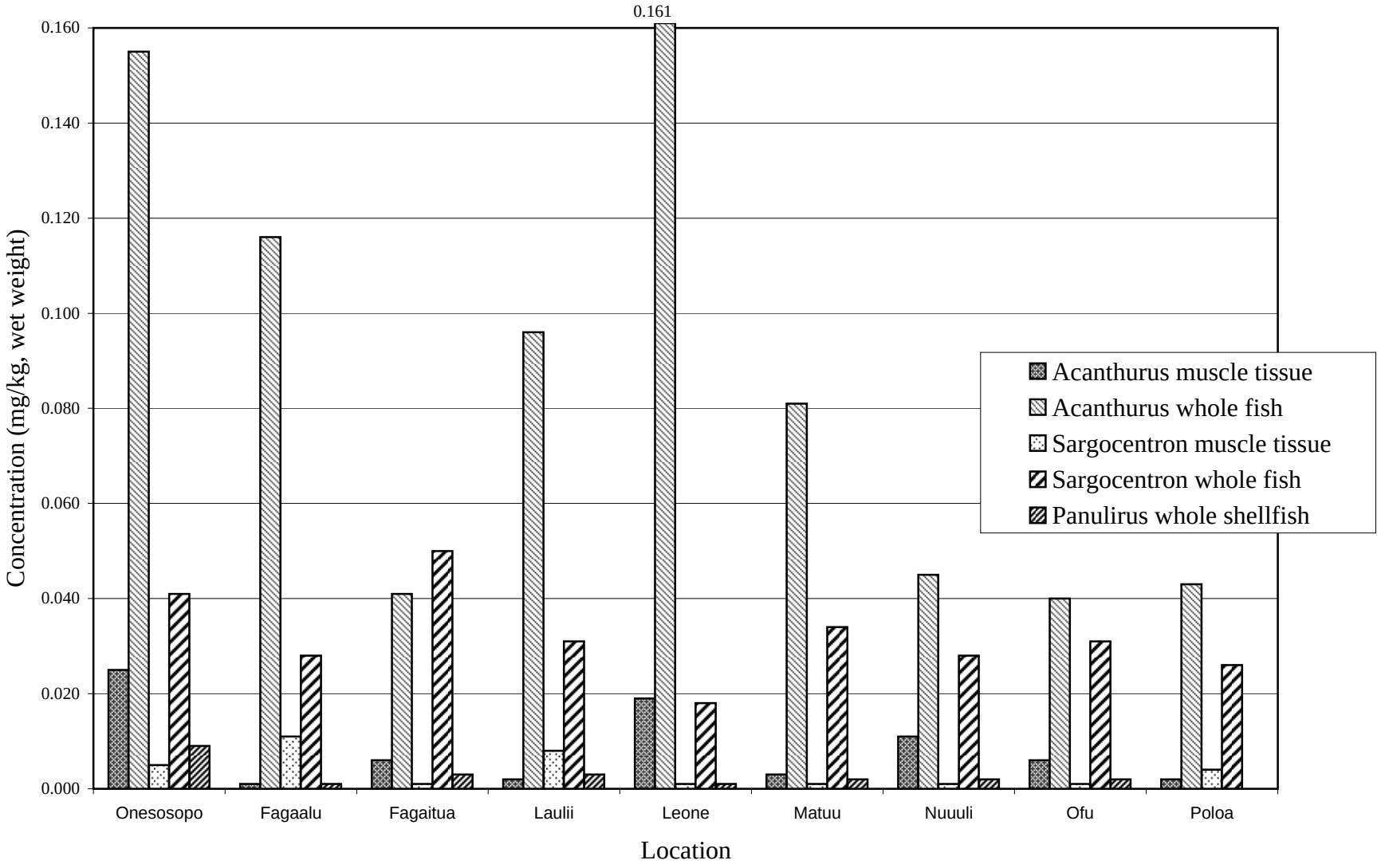


Figure 4. Hg in *Acanthurus* , *Sargocentron* and *Panulirus* ; Comparison among coastal sites

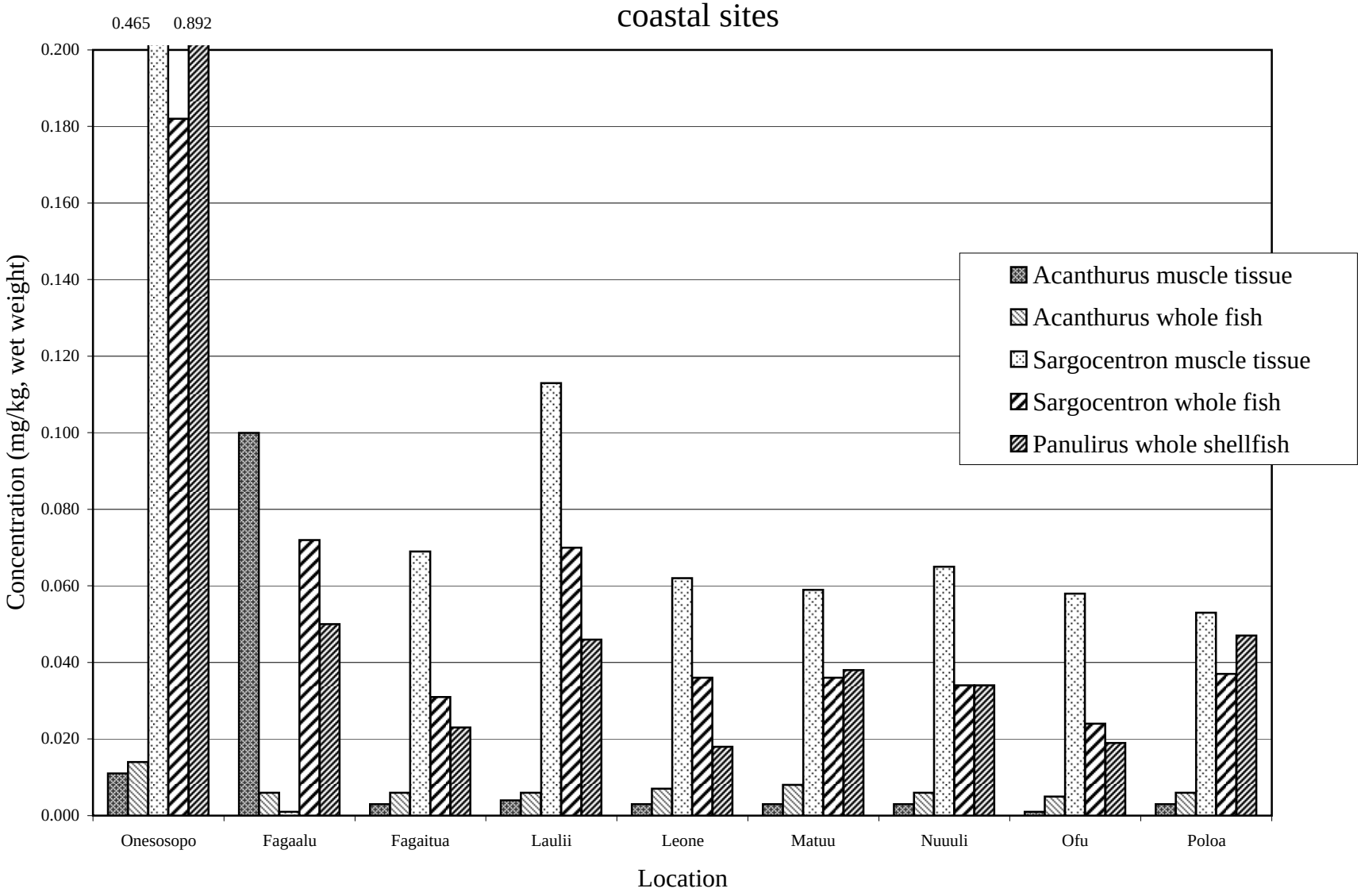


Figure 5. As(i), Pb, Hg in Pago Pago Inner Harbor; Comparison among Specimens

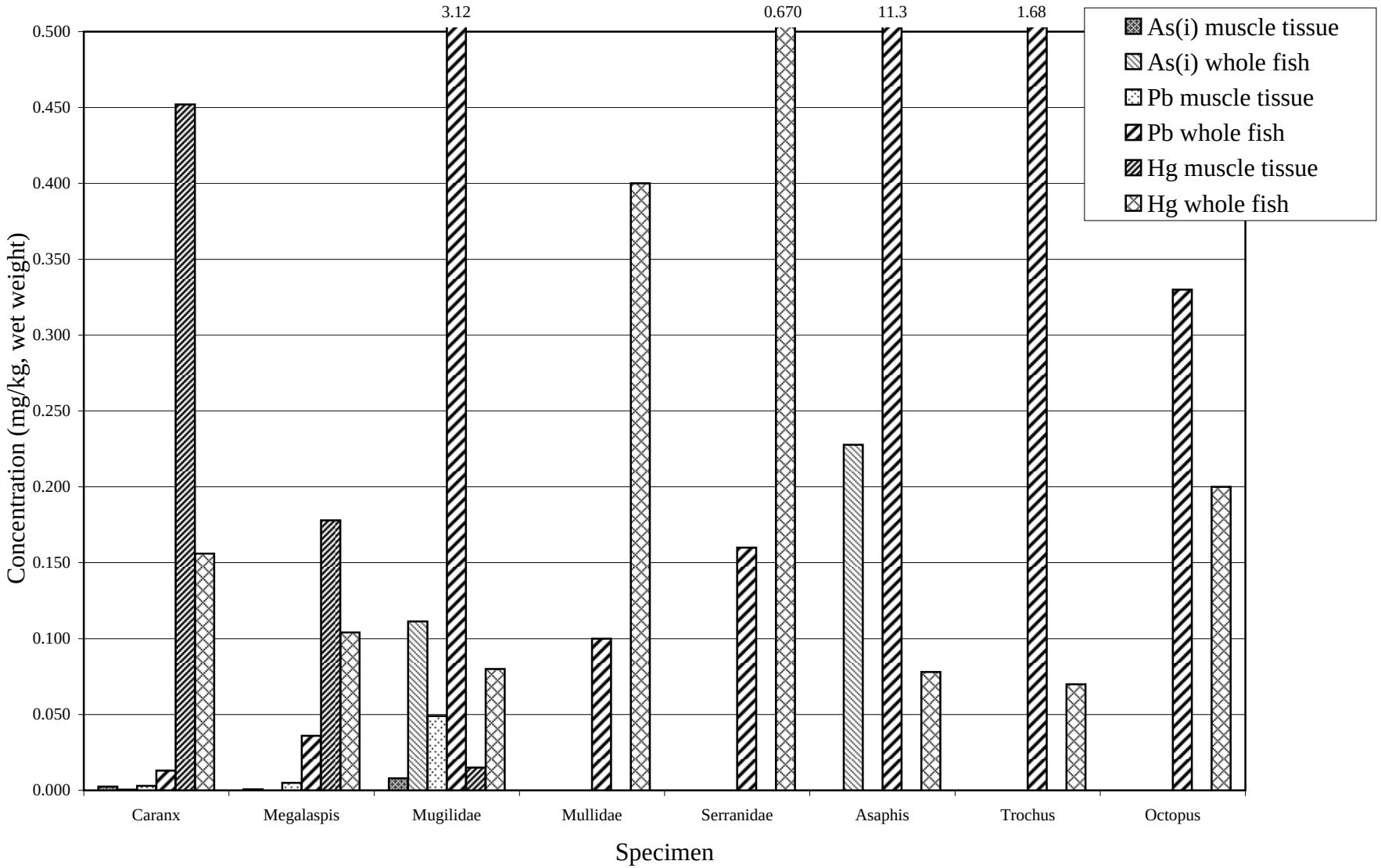


Figure 6. Polychlorinated Biphenyls in Pago Pago Inner Harbor; Comparison among Specimens

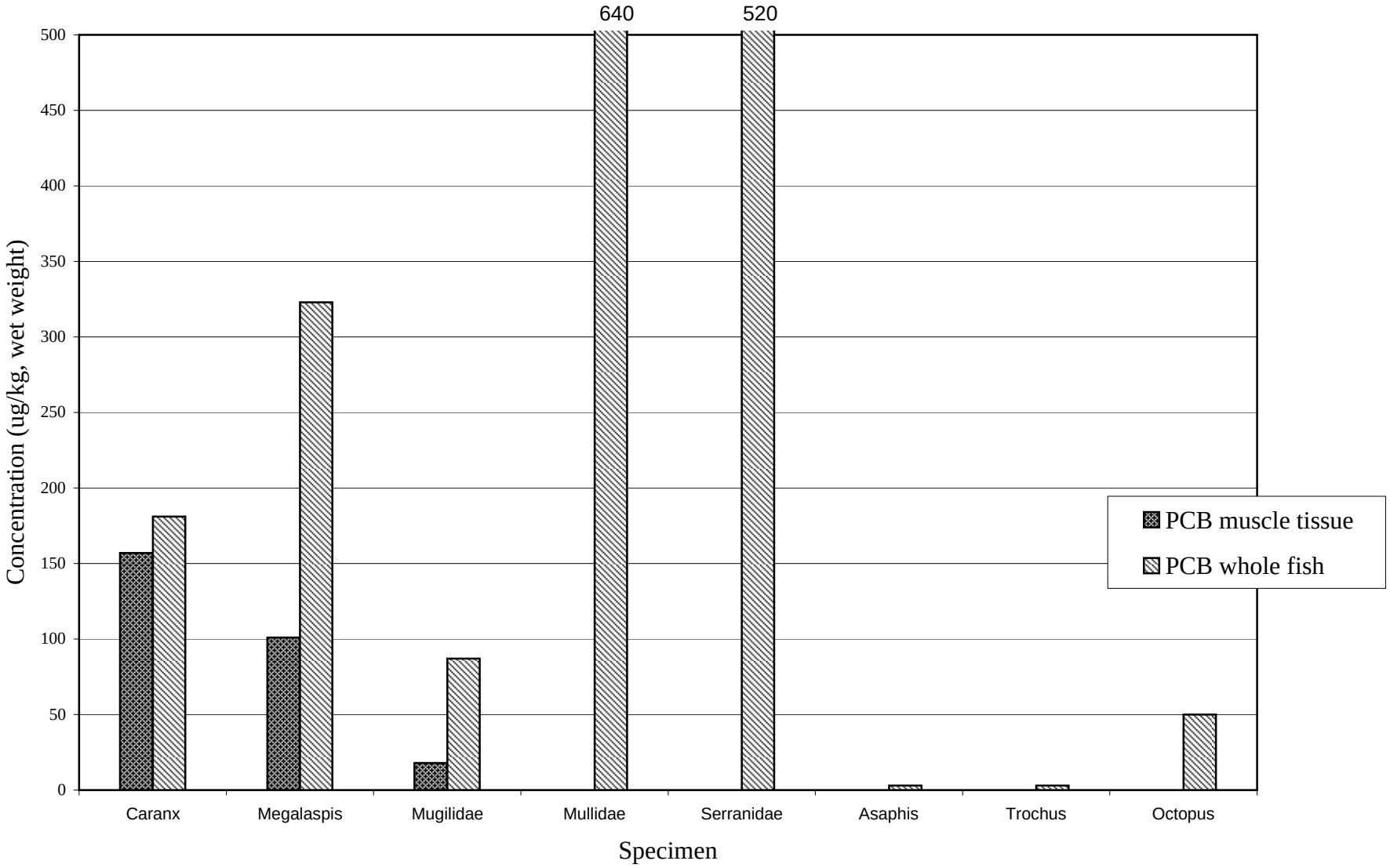


Figure 7. As(i), Pb, Hg in Pala Lagoon; Comparison among Specimens

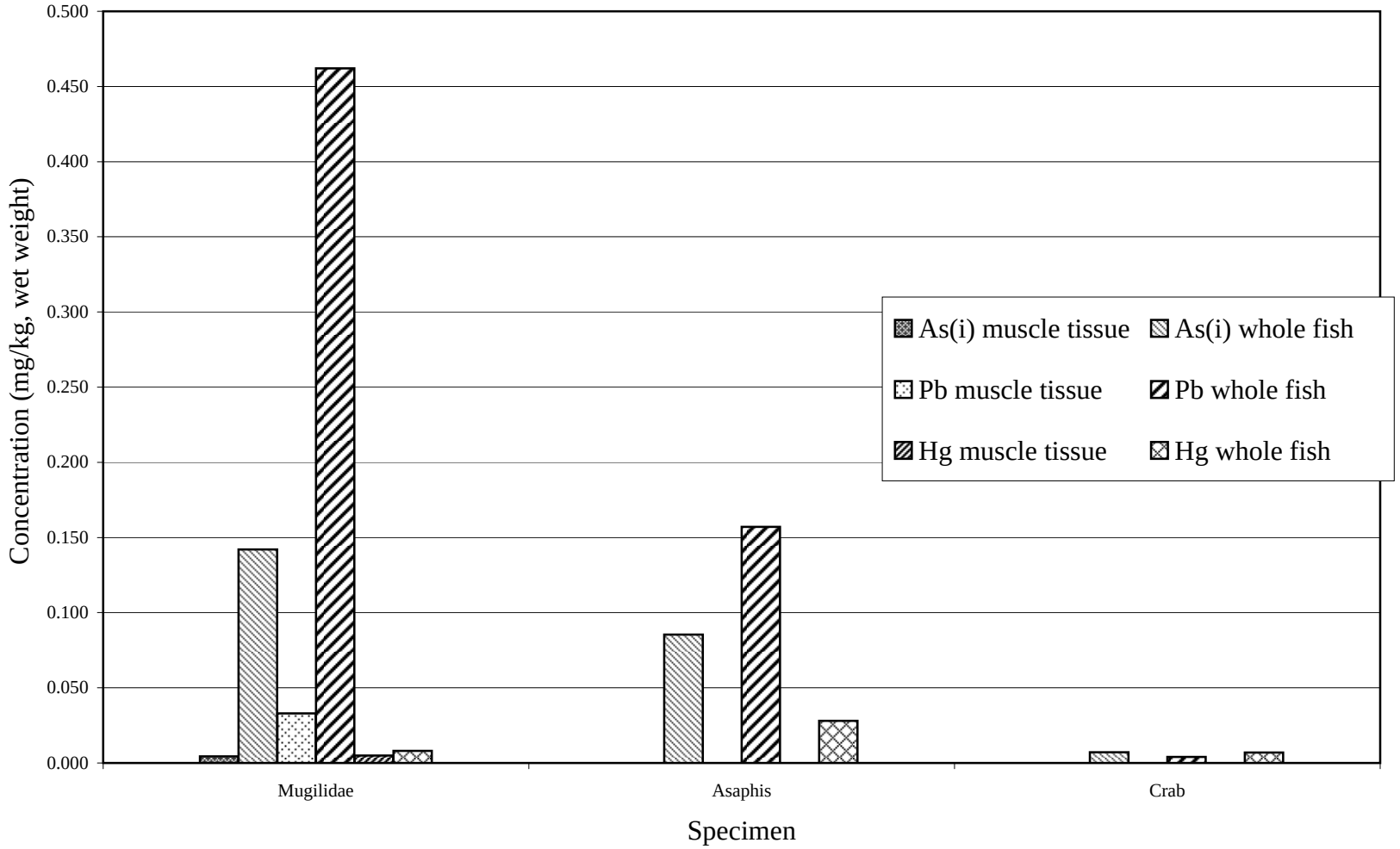
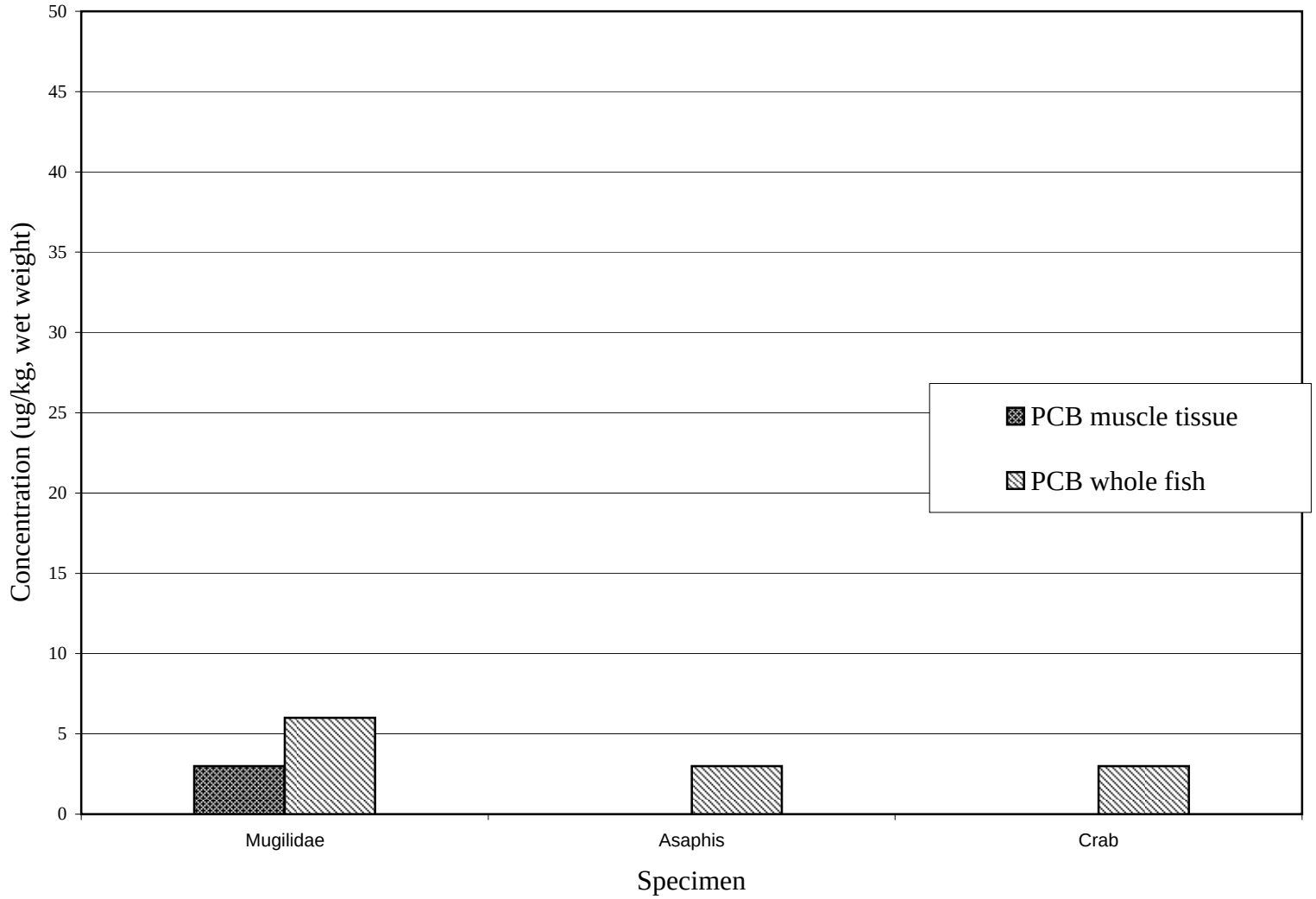


Figure 8. Polychlorinated Biphenyls in Pala Lagoon; Comparison among Specimens



APPENDIX - DATA SET

- Tier 2 Data Summary; Faga’alu
- Tier 2 Data Summary; Faga’itua
- Tier 2 Data Summary; Lauli’i
- Tier 2 Data Summary; Leone
- Tier 2 Data Summary; Matu’u
- Tier 2 Data Summary; Nu’uuli
- Tier 2 Data Summary; Ofu National Park
- Tier 2 Data Summary; Onesosopo
- Tier 2 Data Summary; Pago Pago Inner Harbor
- Tier 2 Data Summary; Pala Lagoon
- Tier 2 Data Summary; Poloa
- Arsenic Analysis Summary (all sites)

American Samoa Environmental Protection Agency
Tier 2 Fish Toxicity Study

Sampling Location: **Faga'alu**

filename: fagaalu tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
FAALO5240101	C1MT	168	16.0	Acanthurus lineatus	K2202880-013	ND[4]	0.132	NA	NA	NA	NA	4.4	26.2
FAALO5240102	C1MT	129	15.0	Acanthurus lineatus									
FAALO5240103	C1MT	222	18.0	Acanthurus lineatus									
FAALO5240104	C1MT	217	18.0	Acanthurus lineatus									
FAALO5240105	C1MT	189	18.0	Acanthurus lineatus									
FAALO5240106	C2MT	188	17.5	Acanthurus lineatus	K2202880-014	ND[4]	0.065	NA	NA	NA	NA	4.2	29.1
FAALO5240107	C2MT	155	17.5	Acanthurus lineatus									
FAALO5240108	C2MT	153	16.0	Acanthurus lineatus									
FAALO5240109	C2MT	193	17.5	Acanthurus lineatus									
FAALO5240110	C2MT	167	17.0	Acanthurus lineatus									
FAALO5240111	C3MT	211	18.0	Acanthurus lineatus	K2202880-015	ND[4]	0.103	NA	NA	NA	NA	3.9	29.6
FAALO5240112	C3MT	154	16.0	Acanthurus lineatus									
FAALO5240113	C3MT	169	17.5	Acanthurus lineatus									
FAALO5240114	C3MT	196	17.5	Acanthurus lineatus									
FAALO5240115	C3MT	180	16.5	Acanthurus lineatus									
FAALO5240116	C4WF	183	16.0	Acanthurus lineatus	K2202880-016	0.080	0.005	NA	NA	NA	NA	7.4	32.4
FAALO5240117	C4WF	198	17.0	Acanthurus lineatus									
FAALO5240118	C4WF	150	15.5	Acanthurus lineatus									
FAALO5240119	C4WF	169	16.5	Acanthurus lineatus									
FAALO5240120	C4WF	185	16.5	Acanthurus lineatus									
FAALO5240121	C5WF	192	17.0	Acanthurus lineatus	K2202880-017	0.166	0.007	NA	NA	NA	NA	4.4	28.5
FAALO5240122	C5WF	190	16.5	Acanthurus lineatus									
FAALO5240123	C5WF	217	17.0	Acanthurus lineatus									
FAALO5240124	C5WF	169	16.5	Acanthurus lineatus									
FAALO5240125	C5WF	224	18.0	Acanthurus lineatus									

American Samoa Environmental Protection Agency

Sampling Location: **Faga'alu**

Tier 2 Fish Toxicity Study

filename: fagaalu tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
FAALO5240126	C6WF	168	16.0	Acanthurus lineatus	K2202880-018	0.101	0.005	NA	NA	NA	NA	6.1	32.3
FAALO5240127	C6WF	138	14.5	Acanthurus lineatus									
FAALO5240128	C6WF	207	16.5	Acanthurus lineatus									
FAALO5240129	C6WF	171	16.0	Acanthurus lineatus									
FAALO5240130	C6WF	153	17.0	Acanthurus lineatus									
FAMAL5240101	C1MT	212	20.0	Sargocentron sp	K2203698-037	0.008	0.002	0.00452 [7]	0.270	1.674	NA	1.0	23.4
FAMAL5240102	C1MT	102	16.0	Sargocentron sp									
FAMAL5240103	C1MT	121	16.0	Sargocentron sp									
FAMAL5240104	C1MT	88	15.0	Sargocentron sp									
FAMAL5240106	C2MT	126	16.0	Sargocentron sp	K2203698-038	0.015	ND[4]	0.00212 [7]	0.235	0.902	NA	0.5	22.2
FAMAL5240107	C2MT	98	15.5	Sargocentron sp									
FAMAL5240108	C2MT	121	16.0	Sargocentron sp									
FAMAL5240109	C3MT	166	18.0	Sargocentron sp	K2203698-039	0.011	ND[4]	0.00241 [7]	0.257	0.938	NA	1.7	24.7
FAMAL5240110	C3MT	96	15.5	Sargocentron sp									
FAMAL5240111	C3MT	137	17.0	Sargocentron sp									
FAMAL5240112	C3MT	106	15.5	Sargocentron sp									
FAMAL5240113	C4WF	156	17.0	Sargocentron sp	K2203698-040	0.032	0.085	ND[8]	7.96	0.000	NA	11.0	40.0
FAMAL5240114	C4WF	108	15.0	Sargocentron sp									
FAMAL5240115	C4WF	92	15.0	Sargocentron sp									
FAMAL5240116	C4WF	129	17.0	Sargocentron sp									
FAMAL5240117	C5WF	177	18.0	Sargocentron sp	K2203698-041	0.022	0.051	ND[8]	5.77	0.000	NA	10.0	40.0
FAMAL5240118	C5WF	98	14.0	Sargocentron sp									
FAMAL5240119	C5WF	103	15.0	Sargocentron sp									
FAMAL5240120	C5WF	153	17.0	Sargocentron sp									

American Samoa Environmental Protection Agency
Tier 2 Fish Toxicity Study

Sampling Location: **Faga'alu**

filename: fagaalu tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
FAMAL5240121	C6WF	80	15.0	Sargocentron sp	K2203698-042	0.030	0.081	0.00308 [7]	6.32	0.049	NA	8.0	40.9
FAMAL5240122	C6WF	102	14.0	Sargocentron sp									
FAMAL5240123	C6WF	132	16.0	Sargocentron sp									
FAMAL5240124	C6WF	105	15.5	Sargocentron sp									
FAULA5240101	C1WSF	519	10.0	Panulirus sp	K2203513-001	0.003	0.041	0.00318 [7]	46.3	0.007	NA	0.88	21.3
FAULA5240102	C2WSF	453	9.5	Panulirus sp	K2203513-002	0.010	0.077	0.01299	49.1	0.026	NA	1.5	26.3
FAULA5240103	C3WSF	446	9.5	Panulirus sp	K2203513-003	0.013	0.031	0.03029	35.6	0.085	NA	1.0	29.0

Notes:

1. CAS = Columbia Analytical Services, Kelso, WA, USA
2. Pb, Hg, PCBs, lipids, solids; analyses per wet weight by CAS
3. As(i) (inorganic As), As(t) (total As); analyses per wet weight by Battelle Marine Science Laboratories, Sequim, WA, USA
4. ND = not detected at method detection limit
5. NA = not analyzed for

6. Detection Limits:
   - Pb = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - Hg = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - As(i) = 0.0091 ug/g (established by Battelle Marine Science Laboratories, see Battelle/Peshut notes in file)
   - As(t) = 0.0025 ug/g (per method)
   - PCBs = 5.0-6.3 ug/kg (per method)
   - Lipids = 0.25 % (per method)
   - Solids = <1-4 relative % difference among duplicates (freeze-dry method)

7. Value reported is below the detection limit; see Battelle/Peshut notes in file
8. ND = not detected based on blank correction; see Battelle/Peshut notes in file
9. Carapace length for Panulirus, Parribacus

American Samoa Environmental Protection Agency

Sampling Location: **Faga'itua**

Tier 2 Fish Toxicity Study

filename: fagaitua tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
TUAALO5280101	C1MT	228	17.5	Acanthurus lineatus	K2202879-019	0.006	0.003	NA	NA	NA	NA	3.0	25.6
TUAALO5280102	C1MT	182	17.0	Acanthurus lineatus									
TUAALO5280103	C1MT	219	18.5	Acanthurus lineatus									
TUAALO5280104	C1MT	251	19.0	Acanthurus lineatus									
TUAALO5280105	C1MT	193	17.5	Acanthurus lineatus									
TUAALO5280106	C2MT	176	17.5	Acanthurus lineatus	K2202879-020	0.006	0.002	NA	NA	NA	NA	2.5	25.0
TUAALO5280107	C2MT	179	16.5	Acanthurus lineatus									
TUAALO5280108	C2MT	166	16.0	Acanthurus lineatus									
TUAALO5280109	C2MT	229	18.5	Acanthurus lineatus									
TUAALO5280110	C2MT	177	17.0	Acanthurus lineatus									
TUAALO5280111	C3MT	137	15.5	Acanthurus lineatus	K2202879-021	0.006	0.003	NA	NA	NA	NA	2.3	23.6
TUAALO5280112	C3MT	178	17.0	Acanthurus lineatus									
TUAALO5280113	C3MT	154	17.0	Acanthurus lineatus									
TUAALO5280114	C3MT	179	16.0	Acanthurus lineatus									
TUAALO5280115	C3MT	191	17.5	Acanthurus lineatus									
TUAALO5280116	C4WF	160	16.0	Acanthurus lineatus	K2202879-022	0.049	0.005	NA	NA	NA	NA	4.5	32.5
TUAALO5280117	C4WF	177	16.5	Acanthurus lineatus									
TUAALO5280118	C4WF	189	16.5	Acanthurus lineatus									
TUAALO5280119	C4WF	185	16.0	Acanthurus lineatus									
TUAALO5280120	C4WF	180	16.5	Acanthurus lineatus									
TUAALO5280121	C5WF	178	17.0	Acanthurus lineatus	K2202879-023	0.030	0.007	NA	NA	NA	NA	5.4	26.8
TUAALO5280122	C5WF	150	16.0	Acanthurus lineatus									
TUAALO5280123	C5WF	232	18.0	Acanthurus lineatus									
TUAALO5280124	C5WF	232	18.0	Acanthurus lineatus									
TUAALO5280125	C5WF	207	17.0	Acanthurus lineatus									
TUAALO5280126	C6WF	195	17.0	Acanthurus lineatus	K2202879-024	0.044	0.005	NA	NA	NA	NA	6.1	30.5

American Samoa Environmental Protection Agency
Tier 2 Fish Toxicity Study

Sampling Location: **Faga'itua**

filename: fagaitua tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
TUAALO5280127	C6WF	134	15.5	Acanthurus lineatus									
TUAALO5280128	C6WF	195	17.0	Acanthurus lineatus									
TUAALO5280129	C6WF	168	16.5	Acanthurus lineatus									
TUAALO5280130	C6WF	138	16.0	Acanthurus lineatus									
TUAMAL5280101	C1MT	151	18.0	Sargocentron sp	K2203698-028	ND[4]	0.046	0.02579	6.53	0.395	NA	6.7	26.7
TUAMAL5280102	C1MT	136	17.5	Sargocentron sp									
TUAMAL5280103	C1MT	153	17.5	Sargocentron sp									
TUAMAL5280104	C1MT	115	16.5	Sargocentron sp									
TUAMAL5280105	C1MT	123	15.0	Sargocentron sp									
TUAMAL5280106	C2MT	148	17.5	Sargocentron sp	K2203698-029	ND[4]	0.084	0.02579	15.3	0.169	NA	3.9	27.3
TUAMAL5280107	C2MT	166	18.0	Sargocentron sp									
TUAMAL5280108	C2MT	165	18.0	Sargocentron sp									
TUAMAL5280109	C2MT	235	19.5	Sargocentron sp									
TUAMAL5280110	C2MT	122	17.0	Sargocentron sp									
TUAMAL5280111	C3MT	NA	18.0	Sargocentron sp	K2203698-030	ND[4]	0.077	ND[8]	7.91	0.000	NA	5.0	28.8
TUAMAL5280112	C3MT	NA	16.5	Sargocentron sp									
TUAMAL5280113	C3MT	NA	18.0	Sargocentron sp									
TUAMAL5280114	C3MT	NA	16.5	Sargocentron sp									
TUAMAL5280115	C3MT	NA	18.5	Sargocentron sp									
TUAMAL5280116	C4WF	178	18.5	Sargocentron sp	K2203701-040	0.082	0.024	0.01949	4.03	0.484	NA	11.0	42.8
TUAMAL5280117	C4WF	142	17.5	Sargocentron sp									
TUAMAL5280118	C4WF	162	18.0	Sargocentron sp									
TUAMAL5280119	C4WF	179	17.0	Sargocentron sp									
TUAMAL5280120	C4WF	206	19.5	Sargocentron sp									
TUAMAL5280121	C5WF	196	19.0	Sargocentron sp	K2203701-041	0.046	0.032	0.00575 [7]	4.11	0.140	NA	10.0	42.7

American Samoa Environmental Protection Agency
Tier 2 Fish Toxicity Study

Sampling Location: **Faga'itua**

filename: fagaitua tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
TUAMAL5280122	C5WF	235	20.5	Sargocentron sp									
TUAMAL5280123	C5WF	184	19.0	Sargocentron sp									
TUAMAL5280124	C5WF	263	20.0	Sargocentron sp									
TUAMAL5280125	C5WF	249	20.5	Sargocentron sp									
TUAMAL5280126	C6WF	151	17.0	Sargocentron sp	K2203701-042	0.023	0.037	ND[8]	9.84	0.000	NA	8.6	44.2
TUAMAL5280127	C6WF	123	15.5	Sargocentron sp									
TUAMAL5280128	C6WF	117	15.0	Sargocentron sp									
TUAMAL5280129	C6WF	107	15.5	Sargocentron sp									
TUAMAL5280130	C6WF	104	15.5	Sargocentron sp									
TUAULA5280101	WSF1	320	10.0	Panulirus sp	K2203513-007	ND[4]	0.041	0.00879 [7]	48.5	0.018	NA	1.5	24.2
TUAULA5280102	WSF2	1020	15.5	Panulirus sp	K2203513-008	ND[4]	0.016	0.03193	53.3	0.060	NA	0.8	20.6
TUAULA5280103	WSF3	326	10.5	Panulirus sp	K2203513-009	0.002	0.012	0.00077 [7]	21.5	0.004	NA	1.3	20.0

Notes:

1. CAS = Columbia Analytical Services, Kelso, WA, USA
2. Pb, Hg, PCBs, lipids, solids; analyses per wet weight by CAS
3. As(i) (inorganic As), As(t) (total As); analyses per wet weight by Battelle Marine Science Laboratories, Sequim, WA, USA
4. ND = not detected at method detection limit
5. NA = not analyzed for

6. Detection Limits:
   - Pb = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - Hg = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - As(i) = 0.0091 ug/g (established by Battelle Marine Science Laboratories, see Battelle/Peshut notes in file)
   - As(t) = 0.0025 ug/g (per method)
   - PCBs = 5.0-6.3 ug/kg (per method)
   - Lipids = 0.25 % (per method)
   - Solids = <1-4 relative % difference among duplicates (freeze-dry method)

American Samoa Environmental Protection Agency

Sampling Location: **Faga'itua**

Tier 2 Fish Toxicity Study

filename: fagaitua tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)

7. Value reported is below the detection limit; see Battelle/Peshut notes in file

8. ND = not detected based on blank correction; see Battelle/Peshut notes in file

9. Carapace length for Panulirus, Parribacus

American Samoa Environmental Protection Agency

Sampling Location: **Lauli'i**

Tier 2 Fish Toxicity Study

filename: laulii tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
LAUALO5280101	C1MT	248	19.0	Acanthurus lineatus	K2202880-007	0.004	0.004	NA	NA	NA	NA	1.3	23.5
LAUALO5280102	C1MT	165	16.0	Acanthurus lineatus									
LAUALO5280103	C1MT	201	17.0	Acanthurus lineatus									
LAUALO5280104	C1MT	173	16.5	Acanthurus lineatus									
LAUALO5280105	C1MT	202	17.0	Acanthurus lineatus									
LAUALO5280106	C2MT	234	18.0	Acanthurus lineatus	K2202880-008	ND[4]	0.005	NA	NA	NA	NA	1.1	24.3
LAUALO5280107	C2MT	210	17.0	Acanthurus lineatus									
LAUALO5280108	C2MT	176	16.5	Acanthurus lineatus									
LAUALO5280109	C2MT	184	17.0	Acanthurus lineatus									
LAUALO5280110	C2MT	237	18.0	Acanthurus lineatus									
LAUALO5280111	C3MT	243	18.0	Acanthurus lineatus	K2202880-009	ND[4]	0.004	NA	NA	NA	NA	1.4	24.3
LAUALO5280112	C3MT	186	17.0	Acanthurus lineatus									
LAUALO5280113	C3MT	188	17.5	Acanthurus lineatus									
LAUALO5280114	C3MT	191	17.0	Acanthurus lineatus									
LAUALO5280115	C3MT	175	16.5	Acanthurus lineatus									
LAUALO5280116	C4WF	223	18.0	Acanthurus lineatus	K2202880-010	0.083	0.006	NA	NA	NA	NA	4.5	25.3
LAUALO5280117	C4WF	241	18.0	Acanthurus lineatus									
LAUALO5280118	C4WF	211	16.5	Acanthurus lineatus									
LAUALO5280119	C4WF	194	17.0	Acanthurus lineatus									
LAUALO5280120	C4WF	170	16.0	Acanthurus lineatus									
LAUALO5280121	C5WF	193	17.0	Acanthurus lineatus	K2202880-011	0.106	0.006	NA	NA	NA	NA	4.8	29.1
LAUALO5280122	C5WF	228	17.5	Acanthurus lineatus									
LAUALO5280123	C5WF	189	17.0	Acanthurus lineatus									
LAUALO5280124	C5WF	195	17.0	Acanthurus lineatus									
LAUALO5280125	C5WF	171	16.5	Acanthurus lineatus									

American Samoa Environmental Protection Agency

Sampling Location: **Lauli'i**

Tier 2 Fish Toxicity Study

filename: laulii tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
LAUALO5280126	C6WF	178	17.0	Acanthurus lineatus	K2202880-012	0.100	0.007	NA	NA	NA	NA	4.3	28.2
LAUALO5280127	C6WF	212	17.5	Acanthurus lineatus									
LAUALO5280128	C6WF	204	17.0	Acanthurus lineatus									
LAUALO5280129	C6WF	150	16.0	Acanthurus lineatus									
LAUALO5280130	C6WF	145	15.0	Acanthurus lineatus									
LAUMAL5280101	C1MT	152	18.0	Sargocentron sp	K2203701-007	0.003	0.120	ND[8]	18.3	0.000	NA	4.2	29.5
LAUMAL5280102	C1MT	195	18.5	Sargocentron sp									
LAUMAL5280103	C1MT	196	19.5	Sargocentron sp									
LAUMAL5280104	C1MT	156	18.0	Sargocentron sp									
LAUMAL5280105	C1MT	180	18.0	Sargocentron sp									
LAUMAL5280106	C2MT	131	16.5	Sargocentron sp	K2203701-008	0.013	0.108	0.00385 [7]	18.7	0.021	NA	3.0	27.4
LAUMAL5280107	C2MT	195	19.0	Sargocentron sp									
LAUMAL5280108	C2MT	198	19.5	Sargocentron sp									
LAUMAL5280109	C2MT	203	20.0	Sargocentron sp									
LAUMAL5280110	C2MT	150	18.0	Sargocentron sp									
LAUMAL5280111	C3MT	137	17.5	Sargocentron sp	K2203701-009	0.007	0.112	0.00259 [7]	16.9	0.015	NA	4.2	31.5
LAUMAL5280112	C3MT	213	19.5	Sargocentron sp									
LAUMAL5280113	C3MT	168	18.0	Sargocentron sp									
LAUMAL5280114	C3MT	166	18.0	Sargocentron sp									
LAUMAL5280115	C3MT	167	18.5	Sargocentron sp									
LAUMAL5280116	C4WF	215	19.5	Sargocentron sp	K2203701-010	0.031	0.076	ND[8]	11.9	0.000	NA	7.2	38.6
LAUMAL5280117	C4WF	166	18.0	Sargocentron sp									
LAUMAL5280118	C4WF	214	19.0	Sargocentron sp									
LAUMAL5280119	C4WF	209	19.5	Sargocentron sp									
LAUMAL5280120	C4WF	145	17.0	Sargocentron sp									

American Samoa Environmental Protection Agency
Tier 2 Fish Toxicity Study

Sampling Location: **Lauli'i**

filename: laulii tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)		As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
LAUMAL5280121	C5WF	222	20.0	Sargocentron sp	K2203701-011	0.025	0.056	0.00028	[7]	10.0	0.003	NA	9.6	35.1
LAUMAL5280122	C5WF	201	19.5	Sargocentron sp										
LAUMAL5280123	C5WF	185	18.5	Sargocentron sp										
LAUMAL5280124	C5WF	204	19.0	Sargocentron sp										
LAUMAL5280125	C5WF	153	17.5	Sargocentron sp										
LAUMAL5280126	C6WF	124	16.5	Sargocentron sp	K2203701-012	0.038	0.077	0.00318	[7]	7.85	0.041	NA	7.8	39.3
LAUMAL5280127	C6WF	150	18.0	Sargocentron sp										
LAUMAL5280128	C6WF	196	19.0	Sargocentron sp										
LAUMAL5280129	C6WF	141	17.0	Sargocentron sp										
LAUMAL5280130	C6WF	109	15.5	Sargocentron sp										
LAUULA5280101	WSF1	795	12.5	Panulirus sp	K2203513-004	ND[4]	0.076	0.00959		30.4	0.032	NA	3.0	31.0
LAUULA5280102	WSF2	590	12.0	Panulirus sp	K2203513-005	0.006	0.042	0.01189		81.7	0.015	NA	1.0	22.2
LAUULA5280103	WSF3	538	11.0	Panulirus sp	K2203513-006	ND[4]	0.021	0.00436	[7]	19.8	0.022	NA	2.5	23.3

Notes:

1. CAS = Columbia Analytical Services, Kelso, WA, USA
2. Pb, Hg, PCBs, lipids, solids; analyses per wet weight by CAS
3. As(i) (inorganic As), As(t) (total As); analyses per wet weight by Battelle Marine Science Laboratories, Sequim, WA, USA
4. ND = not detected at method detection limit
5. NA = not analyzed for

6. Detection Limits:
   - Pb = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - Hg = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - As(i) = 0.0091 ug/g (established by Battelle Marine Science Laboratories, see Battelle/Peshut notes in file)
   - As(t) = 0.0025 ug/g (per method)
   - PCBs = 5.0-6.3 ug/kg (per method)

American Samoa Environmental Protection Agency

Sampling Location: **Lauli'i**

Tier 2 Fish Toxicity Study

filename: laulii tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
	Lipids = 0.25 % (per method)												
	Solids = <1-4 relative % difference among duplicates (freeze-dry method)												

7. Value reported is below the detection limit; see Battelle/Peshut notes in file
8. ND = not detected based on blank correction; see Battelle/Peshut notes in file
9. Carapace length for Panulirus, Parribacus

American Samoa Environmental Protection Agency

Sampling Location: **Leone**

Tier 2 Fish Toxicity Study

filename: leone tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
LEALO5220101	C1MT	200	17.5	Acanthurus lineatus	K2202879-013	0.038	0.003	NA	NA	NA	NA	2.9	23.7
LEALO5220102	C1MT	226	18.0	Acanthurus lineatus									
LEALO5220103	C1MT	225	18.5	Acanthurus lineatus									
LEALO5220104	C1MT	220	18.0	Acanthurus lineatus									
LEALO5220105	C1MT	252	19.0	Acanthurus lineatus									
LEALO5220106	C2MT	232	19.0	Acanthurus lineatus	K2202879-014	0.008	0.003	NA	NA	NA	NA	2.1	25.4
LEALO5220107	C2MT	236	18.5	Acanthurus lineatus									
LEALO5220108	C2MT	198	17.0	Acanthurus lineatus									
LEALO5220109	C2MT	210	18.0	Acanthurus lineatus									
LEALO5220110	C2MT	216	17.5	Acanthurus lineatus									
LEALO5220111	C3MT	188	17.5	Acanthurus lineatus	K2202879-015	0.011	0.002	NA	NA	NA	NA	2.0	26.0
LEALO5220112	C3MT	223	18.0	Acanthurus lineatus									
LEALO5220113	C3MT	248	19.0	Acanthurus lineatus									
LEALO5220114	C3MT	256	18.0	Acanthurus lineatus									
LEALO5220115	C3MT	239	18.5	Acanthurus lineatus									
LEALO5220116	C4WF	226	18.0	Acanthurus lineatus	K2202879-016	0.231	0.008	NA	NA	NA	NA	4.7	27.7
LEALO5220117	C4WF	144	17.5	Acanthurus lineatus									
LEALO5220118	C4WF	208	17.5	Acanthurus lineatus									
LEALO5220119	C4WF	157	16.5	Acanthurus lineatus									
LEALO5220120	C4WF	249	18.0	Acanthurus lineatus									
LEALO5220121	C5WF	315	20.5	Acanthurus lineatus	K2202879-017	0.156	0.008	NA	NA	NA	NA	5.6	29.9
LEALO5220122	C5WF	239	19.0	Acanthurus lineatus									
LEALO5220123	C5WF	201	17.0	Acanthurus lineatus									
LEALO5220124	C5WF	266	19.0	Acanthurus lineatus									
LEALO5220125	C5WF	223	18.0	Acanthurus lineatus									
LEALO5220126	C6WF	205	17.5	Acanthurus lineatus	K2202879-018	0.095	0.004	NA	NA	NA	NA	4.2	29.2

American Samoa Environmental Protection Agency
Tier 2 Fish Toxicity Study

Sampling Location: **Leone**

filename: leone tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
LEALO5220127	C6WF	176	16.0	Acanthurus lineatus									
LEALO5220128	C6WF	238	19.0	Acanthurus lineatus									
LEALO5220129	C6WF	188	17.0	Acanthurus lineatus									
LEALO5220130	C6WF	188	17.0	Acanthurus lineatus									
LEMAL5220101	C1MT	193	19.0	Sargocentron sp	K2203698-031	ND[4]	0.056	ND[8]	6.13	0.000	NA	5.9	31.3
LEMAL5220102	C1MT	158	16.0	Sargocentron sp									
LEMAL5220103	C1MT	187	18.5	Sargocentron sp									
LEMAL5220104	C1MT	194	18.5	Sargocentron sp									
LEMAL5220105	C1MT	203	19.0	Sargocentron sp									
LEMAL5220106	C2MT	178	19.0	Sargocentron sp	K2203698-032	ND[4]	0.064	ND[8]	7.29	0.000	NA	4.4	28.5
LEMAL5220107	C2MT	169	18.5	Sargocentron sp									
LEMAL5220108	C2MT	140	17.0	Sargocentron sp									
LEMAL5220109	C2MT	146	18.0	Sargocentron sp									
LEMAL5220110	C2MT	186	19.5	Sargocentron sp									
LEMAL5220111	C3MT	157	18.0	Sargocentron sp	K2203698-033	ND[4]	0.066	0.00097 [7]	11.5	0.008	NA	4.2	27.7
LEMAL5220112	C3MT	134	17.0	Sargocentron sp									
LEMAL5220113	C3MT	132	16.5	Sargocentron sp									
LEMAL5220114	C3MT	133	16.0	Sargocentron sp									
LEMAL5220115	C3MT	176	18.0	Sargocentron sp									
LEMAL5220116	C4WF	154	17.5	Sargocentron sp	K2203698-034	0.018	0.046	ND[8]	4.19	0.000	NA	11.0	40.3
LEMAL5220118	C4WF	161	17.5	Sargocentron sp									
LEMAL5220120	C4WF	142	17.0	Sargocentron sp									
LEMAL5220122	C5WF	172	18.0	Sargocentron sp	K2203698-035	0.019	0.030	ND[8]	5.65	0.000	NA	11.0	41.1
LEMAL5220123	C5WF	152	17.0	Sargocentron sp									

American Samoa Environmental Protection Agency
Tier 2 Fish Toxicity Study

Sampling Location: **Leone**

filename: leone tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
LEMAL5220124	C5WF	130	16.5	Sargocentron sp									
LEMAL5220126	C6WF	206	19.5	Sargocentron sp	K2203698-036	0.018	0.032	ND[8]	4.96	0.000	NA	8.7	38.0
LEMAL5220130	C6WF	143	16.5	Sargocentron sp									
LEMAL5220121	C6WF	178	18.5	Sargocentron sp									
LEULA5220101	WSF1	113	9.0	Panulirus sp	K2203513-010	0.003	0.020	0.04189	89.7	0.047	NA	0.8	20.2
LEULA5220102	WSF2	454	14.0	Panulirus sp	K2203513-011	0.003	0.021	0.03149	81.9	0.038	NA	0.8	21.3
LEULA5220103	WSF3	341	11.0	Panulirus sp	K2203513-012	0.003	0.013	0.02259	95.9	0.024	NA	0.7	19.9

Notes:

1. CAS = Columbia Analytical Services, Kelso, WA, USA
2. Pb, Hg, PCBs, lipids, solids; analyses per wet weight by CAS
3. As(i) (inorganic As), As(t) (total As); analyses per wet weight by Battelle Marine Science Laboratories, Sequim, WA, USA
4. ND = not detected at method detection limit
5. NA = not analyzed for

6. Detection Limits:
   - Pb = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - Hg = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - As(i) = 0.0091 ug/g (established by Battelle Marine Science Laboratories, see Battelle/Peshut notes in file)
   - As(t) = 0.0025 ug/g (per method)
   - PCBs = 5.0-6.3 ug/kg (per method)
   - Lipids = 0.25 % (per method)
   - Solids = <1-4 relative % difference among duplicates (freeze-dry method)

7. Value reported is below the detection limit; see Battelle/Peshut notes in file
8. ND = not detected based on blank correction; see Battelle/Peshut notes in file
9. Carapace length for Panulirus, Parribacus

American Samoa Environmental Protection Agency

Sampling Location: **Matu'u**

Tier 2 Fish Toxicity Study

filename: matuu tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
MAALO5240101	C1MT	274	20.0	Acanthurus lineatus	K2202879-007	ND[4]	0.003	NA	NA	NA	NA	2.5	25.5
MAALO5240102	C1MT	142	15.0	Acanthurus lineatus									
MAALO5240103	C1MT	199	18.0	Acanthurus lineatus									
MAALO5240104	C1MT	230	17.5	Acanthurus lineatus									
MAALO5240105	C1MT	239	18.0	Acanthurus lineatus									
MAALO5240106	C2MT	186	17.5	Acanthurus lineatus	K2202879-008	0.007	0.003	NA	NA	NA	NA	1.4	23.9
MAALO5240107	C2MT	142	16.5	Acanthurus lineatus									
MAALO5240108	C2MT	138	15.0	Acanthurus lineatus									
MAALO5240109	C2MT	186	17.0	Acanthurus lineatus									
MAALO5240110	C2MT	273	19.0	Acanthurus lineatus									
MAALO5240111	C3MT	237	19.0	Acanthurus lineatus	K2202879-009	ND[4]	0.003	NA	NA	NA	NA	1.7	23.3
MAALO5240112	C3MT	197	17.5	Acanthurus lineatus									
MAALO5240113	C3MT	153	16.0	Acanthurus lineatus									
MAALO5240114	C3MT	200	17.5	Acanthurus lineatus									
MAALO5240115	C3MT	141	15.5	Acanthurus lineatus									
MAALO5240116	C4WF	195	17.0	Acanthurus lineatus	K2202879-010	0.060	0.007	NA	NA	NA	NA	4.8	29.4
MAALO5240117	C4WF	223	17.0	Acanthurus lineatus									
MAALO5240118	C4WF	216	17.5	Acanthurus lineatus									
MAALO5240119	C4WF	132	14.5	Acanthurus lineatus									
MAALO5240120	C4WF	180	17.0	Acanthurus lineatus									
MAALO5240121	C5WF	211	16.5	Acanthurus lineatus	K2202879-011	0.078	0.008	NA	NA	NA	NA	5.2	29.3
MAALO5240122	C5WF	174	16.0	Acanthurus lineatus									
MAALO5240123	C5WF	209	17.0	Acanthurus lineatus									
MAALO5240124	C5WF	147	15.0	Acanthurus lineatus									
MAALO5240125	C5WF	264	18.5	Acanthurus lineatus									

American Samoa Environmental Protection Agency

Sampling Location: **Matu'u**

Tier 2 Fish Toxicity Study

filename: matuu tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
MAALO5240126	C6WF	243	18.5	Acanthurus lineatus	K2202879-012	0.104	0.008	NA	NA	NA	NA	5.1	29.5
MAALO5240127	C6WF	232	17.0	Acanthurus lineatus									
MAALO5240128	C6WF	230	18.0	Acanthurus lineatus									
MAALO5240129	C6WF	253	18.0	Acanthurus lineatus									
MAALO5240130	C6WF	131	17.0	Acanthurus lineatus									
MAMAL5240101	C1MT	221	21.0	Sargocentron sp	K2203701-025	0.002	0.056	0.00179 [7]	12.1	0.015	NA	1.6	24.8
MAMAL5240102	C1MT	112	17.0	Sargocentron sp									
MAMAL5240103	C1MT	113	17.0	Sargocentron sp									
MAMAL5240104	C1MT	126	17.0	Sargocentron sp									
MAMAL5240105	C1MT	98	16.0	Sargocentron sp									
MAMAL5240106	C2MT	177	18.5	Sargocentron sp	K2203701-026	ND[4]	0.058	0.00172 [7]	14.4	0.012	NA	2.7	24.9
MAMAL5240107	C2MT	119	16.5	Sargocentron sp									
MAMAL5240108	C2MT	116	16.0	Sargocentron sp									
MAMAL5240109	C2MT	120	16.5	Sargocentron sp									
MAMAL5240110	C2MT	80	14.0	Sargocentron sp									
MAMAL5240111	C3MT	169	19.0	Sargocentron sp	K2203701-027	ND[4]	0.063	0.00110 [7]	14.2	0.008	NA	2.5	25.5
MAMAL5240112	C3MT	108	17.0	Sargocentron sp									
MAMAL5240113	C3MT	140	17.5	Sargocentron sp									
MAMAL5240114	C3MT	134	17.0	Sargocentron sp									
MAMAL5240115	C3MT	65	14.5	Sargocentron sp									
MAMAL5240117	C4WF	129	17.0	Sargocentron sp	K2203701-028	0.028	0.034	ND[8]	5.46	0.000	NA	6.6	37.3
MAMAL5240118	C4WF	143	17.5	Sargocentron sp									
MAMAL5240119	C4WF	113	16.0	Sargocentron sp									
MAMAL5240120	C4WF	77	14.0	Sargocentron sp									

American Samoa Environmental Protection Agency
Tier 2 Fish Toxicity Study

Sampling Location: **Matu'u**

filename: matuu tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
MAMAL5240121	C5WF	269	22.0	Sargocentron sp	K2203701-029	0.023	0.035	0.00498 [7]	7.21	0.069	NA	8.2	38.3
MAMAL5240122	C5WF	114	16.5	Sargocentron sp									
MAMAL5240123	C5WF	146	18.0	Sargocentron sp									
MAMAL5240124	C5WF	90	15.0	Sargocentron sp									
MAMAL5240125	C6WF	130	17.0	Sargocentron sp	K2203701-030	0.051	0.038	0.00058 [7]	60.0	0.001	NA	7.1	40.1
MAMAL5240126	C6WF	198	18.0	Sargocentron sp									
MAMAL5240127	C6WF	137	16.5	Sargocentron sp									
MAMAL5240128	C6WF	111	15.5	Sargocentron sp									
MAULA5240101	WSF1	636	12.0	Panulirus sp	K2203513-013	ND[4]	0.045	0.01719	79.3	0.022	NA	1.7	25.3
MAULA5240102	WSF2	681	14.0	Panulirus sp	K2203513-014	ND[4]	0.020	0.01699	27.0	0.063	NA	2.5	26.5
MAULA5240103	WSF3	953	14.0	Panulirus sp	K2203513-015	ND[4]	0.048	0.00969	38.4	0.025	NA	1.8	22.4

Notes:

1. CAS = Columbia Analytical Services, Kelso, WA, USA
2. Pb, Hg, PCBs, lipids, solids; analyses per wet weight by CAS
3. As(i) (inorganic As), As(t) (total As); analyses per wet weight by Battelle Marine Science Laboratories, Sequim, WA, USA
4. ND = not detected at method detection limit
5. NA = not analyzed for

6. Detection Limits:
   - Pb = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - Hg = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - As(i) = 0.0091 ug/g (established by Battelle Marine Science Laboratories, see Battelle/Peshut notes in file)
   - As(t) = 0.0025 ug/g (per method)
   - PCBs = 5.0-6.3 ug/kg (per method)
   - Lipids = 0.25 % (per method)
   - Solids = <1-4 relative % difference among duplicates (freeze-dry method)

American Samoa Environmental Protection Agency

Sampling Location: **Matu'u**

Tier 2 Fish Toxicity Study

filename: matuu tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)

7. Value reported is below the detection limit; see Battelle/Peshut notes in file

8. ND = not detected based on blank correction; see Battelle/Peshut notes in file

9. Carapace length for Panulirus, Parribacus

American Samoa Environmental Protection Agency

Sampling Location: **Nu'uuli**

Tier 2 Fish Toxicity Study

filename: nuuuli tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
NUALO5240101	C1MT	216	17.5	Acanthurus lineatus	K2202880-001	0.006	0.003	NA	NA	NA	NA	1.2	23.6
NUALO5240102	C1MT	156	15.5	Acanthurus lineatus									
NUALO5240103	C1MT	159	16.0	Acanthurus lineatus									
NUALO5240104	C1MT	150	16.0	Acanthurus lineatus									
NUALO5240105	C1MT	197	17.5	Acanthurus lineatus									
NUALO5240106	C2MT	171	16.5	Acanthurus lineatus	K2202880-002	0.025	0.003	NA	NA	NA	NA	2.0	24.8
NUALO5240107	C2MT	150	16.0	Acanthurus lineatus									
NUALO5240108	C2MT	157	16.5	Acanthurus lineatus									
NUALO5240109	C2MT	207	18.0	Acanthurus lineatus									
NUALO5240110	C2MT	198	17.0	Acanthurus lineatus									
NUALO5240111	C3MT	270	19.0	Acanthurus lineatus	K2202880-003	0.003	0.003	NA	NA	NA	NA	1.2	26.5
NUALO5240112	C3MT	141	16.0	Acanthurus lineatus									
NUALO5240113	C3MT	168	16.5	Acanthurus lineatus									
NUALO5240114	C3MT	223	18.5	Acanthurus lineatus									
NUALO5240115	C3MT	202	17.5	Acanthurus lineatus									
NUALO5240116	C4WF	163	16.0	Acanthurus lineatus	K2202880-004	0.051	0.004	NA	NA	NA	NA	4.6	28.6
NUALO5240116	C4WF	150	15.0	Acanthurus lineatus									
NUALO5240118	C4WF	149	15.0	Acanthurus lineatus									
NUALO5240119	C4WF	135	15.0	Acanthurus lineatus									
NUALO5240120	C4WF	164	16.0	Acanthurus lineatus									
NUALO5240121	C5WF	183	17.0	Acanthurus lineatus	K2202880-005	0.041	0.007	NA	NA	NA	NA	4.4	26.7
NUALO5240122	C5WF	172	16.5	Acanthurus lineatus									
NUALO5240123	C5WF	199	16.5	Acanthurus lineatus									
NUALO5240124	C5WF	140	15.0	Acanthurus lineatus									
NUALO5240125	C5WF	203	17.0	Acanthurus lineatus									
NUALO5240126	C6WF	189	17.0	Acanthurus lineatus	K2202880-006	0.043	0.008	NA	NA	NA	NA	5.2	25.6

American Samoa Environmental Protection Agency

Sampling Location: **Nu'uli**

Tier 2 Fish Toxicity Study

filename: nuuli tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
NUALO5240127	C6WF	155	16.0	Acanthurus lineatus									
NUALO5240128	C6WF	171	16.5	Acanthurus lineatus									
NUALO5240129	C6WF	154	16.0	Acanthurus lineatus									
NUALO5240130	C6WF	148	15.0	Acanthurus lineatus									
NUMAL5240101	C1MT	196	19.5	Sargocentron sp	K2203701-019	ND[4]	0.039	0.00195 [7]	7.47	0.026	NA	4.9	27.4
NUMAL5240105	C1MT	134	16.5	Sargocentron sp									
NUMAL5240115	C1MT	131	17.0	Sargocentron sp									
NUMAL5240109	C2MT	162	19.0	Sargocentron sp	K2203701-020	ND[4]	0.072	ND[8]	11.6	0.000	NA	2.0	24.0
NUMAL5240110	C2MT	138	17.0	Sargocentron sp									
NUMAL5240114	C2MT	139	16.5	Sargocentron sp									
NUMAL5240111	C3MT	201	19.0	Sargocentron sp	K2203701-021	ND[4]	0.085	0.00194 [7]	10.4	0.019	NA	6.6	30.2
NUMAL5240112	C3MT	190	18.5	Sargocentron sp									
NUMAL5240113	C3MT	203	19.0	Sargocentron sp									
NUMAL5240117	C4WF	130	17.0	Sargocentron sp	K2203701-022	0.029	0.031	0.00293 [7]	7.86	0.037	NA	7.3	37.3
NUMAL5240119	C4WF	117	16.0	Sargocentron sp									
NUMAL5240120	C4WF	153	16.5	Sargocentron sp									
NUMAL5240121	C5WF	183	19.0	Sargocentron sp	K2203701-023	0.030	0.034	ND[8]	5.26	0.000	NA	6.3	39.5
NUMAL5240123	C5WF	201	20.0	Sargocentron sp									
NUMAL5240124	C5WF	157	18.0	Sargocentron sp									
NUMAL5240127	C6WF	110	16.0	Sargocentron sp	K2203701-024	0.025	0.038	ND[8]	11.2	0.000	NA	6.8	38.7
NUMAL5240128	C6WF	115	16.0	Sargocentron sp									
NUMAL5240129	C6WF	149	18.0	Sargocentron sp									

American Samoa Environmental Protection Agency
Tier 2 Fish Toxicity Study

Sampling Location: **Nu'uli**

filename: nuuuli tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
NUULA5240101	WSF1	800	15.0	Panulirus sp	K2203513-019	ND[4]	0.020	0.04229	55.2	0.077	NA	1.7	25.4
NUULA5240102	WSF2	860	16.0	Panulirus sp	K2203513-020	ND[4]	0.040	0.08279	40.6	0.204	NA	2.0	24.8
NUULA5240103	WSF3	730	15.0	Panulirus sp	K2203513-021	0.003	0.042	0.00689 [7]	38.1	0.018	NA	2.4	27.1

Notes:

1. CAS = Columbia Analytical Services, Kelso, WA, USA
2. Pb, Hg, PCBs, lipids, solids; analyses per wet weight by CAS
3. As(i) (inorganic As), As(t) (total As); analyses per wet weight by Battelle Marine Science Laboratories, Sequim, WA, USA
4. ND = not detected at method detection limit
5. NA = not analyzed for

6. Detection Limits:
   - Pb = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - Hg = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - As(i) = 0.0091 ug/g (established by Battelle Marine Science Laboratories, see Battelle/Peshut notes in file)
   - As(t) = 0.0025 ug/g (per method)
   - PCBs = 5.0-6.3 ug/kg (per method)
   - Lipids = 0.25 % (per method)
   - Solids = <1-4 relative % difference among duplicates (freeze-dry method)

7. Value reported is below the detection limit; see Battelle/Peshut notes in file
8. ND = not detected based on blank correction; see Battelle/Peshut notes in file
9. Carapace length for Panulirus, Parribacus

American Samoa Environmental Protection Agency
Tier 2 Fish Toxicity Study

Sampling Location: **Ofu National Park**

filename: ofu national park tier 2 data summ.xls

Island: **Ofu**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
PARK2ALO6110103	C1MT	204	18.5	Acanthurus lineatus	K2203698-025	0.005	ND[4]	0.00879 [7]	0.328	2.68	NA	1.8	24.1
PARK2ALO6110106	C1MT	186	17.5	Acanthurus lineatus									
PARK2ALO6110109	C1MT	200	17.0	Acanthurus lineatus									
PARK2ALO3160201	C1MT	NA	NA	Acanthurus lineatus									
PARK2ALO6110101	C2MT	189	19.0	Acanthurus lineatus	K2203698-026	0.007	0.002	0.02439	0.559	4.36	NA	1.3	23.8
PARK2ALO6110105	C2MT	177	17.5	Acanthurus lineatus									
PARK2ALO6110107	C2MT	186	17.5	Acanthurus lineatus									
PARK2ALO3160202	C2MT	NA	NA	Acanthurus lineatus									
PARK2ALO6110102	C3MT	174	17.5	Acanthurus lineatus	K2203698-027	0.005	ND[4]	0.01679	0.432	3.89	NA	1.0	21.8
PARK2ALO6110104	C3MT	159	16.5	Acanthurus lineatus									
PARK2ALO3160203	C3MT	NA	NA	Acanthurus lineatus									
PARK2ALO6110107	C4WF	178	16.5	Acanthurus lineatus	K2203501-001	0.048	0.007	NA	NA	NA	NA	6.8	34.4
PARK2ALO6110108	C4WF	173	17.0	Acanthurus lineatus									
PARK2ALO6110109	C4WF	178	15.5	Acanthurus lineatus									
PARK2ALO3160204	C5WF	139	14.5	Acanthurus lineatus	K2203501-002	0.040	0.004	NA	NA	NA	NA	6.8	30.3
PARK2ALO3160205	C5WF	159	15.5	Acanthurus lineatus									
PARK2ALO3160206	C5WF	127	14.5	Acanthurus lineatus									
PARK2ALO3160207	C6WF	128	14.5	Acanthurus lineatus	K2203501-003	0.033	0.004	NA	NA	NA	NA	6.0	28.0
PARK2ALO3160208	C6WF	123	14.0	Acanthurus lineatus									
PARK2ALO6110110	C6WF	107	13.5	Acanthurus lineatus									
PARK2MAL6110101	C1MT	338	23.0	Sargocentron sp	K2203698-022	0.004	0.056	0.00227 [7]	13.8	0.016	NA	3.8	27.9
PARK2MAL6110102	C1MT	235	20.5	Sargocentron sp									
PARK2MAL6110106	C1MT	276	21.5	Sargocentron sp									
PARK2MAL3160201	C1MT	NA	NA	Sargocentron sp									

American Samoa Environmental Protection Agency
Tier 2 Fish Toxicity Study

Sampling Location: **Ofu National Park**

filename: ofu national park tier 2 data summ.xls

Island: **Ofu**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
PARK2MAL6110104	C2MT	204	20.0	Sargocentron sp	K2203698-023	0.006	0.068	0.00221 [7]	11.9	0.019	NA	4.6	28.6
PARK2MAL6110105	C2MT	188	19.5	Sargocentron sp									
PARK2MAL6110110	C2MT	200	19.0	Sargocentron sp									
PARK2MAL3160202	C2MT	NA	NA	Sargocentron sp									
PARK2MAL6110103	C3MT	174	19.0	Sargocentron sp	K2203698-024	ND[4]	0.048	ND[8]	8.91	0.000	NA	4.9	27.9
PARK2MAL6110109	C3MT	176	19.0	Sargocentron sp									
PARK2MAL3160203	C3MT	NA	NA	Sargocentron sp									
PARK2MAL6110107	C4WF	171	18.0	Sargocentron sp	K2203701-016	0.053	0.031	0.00599 [7]	14.5	0.041	NA	7.3	38.6
PARK2MAL6110108	C4WF	163	17.0	Sargocentron sp									
PARK2MAL6110109	C4WF	146	16.0	Sargocentron sp									
PARK2MAL3160204	C5WF	84	14.5	Sargocentron sp	K2203701-017	0.023	0.022	0.00499 [7]	2.11	0.236	NA	2.2	33.6
PARK2MAL3160205	C5WF	77	14.5	Sargocentron sp									
PARK2MAL3160206	C5WF	69	14.5	Sargocentron sp									
PARK2MAL3160207	C6WF	63	14.0	Sargocentron sp	K2203701-018	0.017	0.018	0.00540 [7]	3.05	0.177	NA	2.4	35.9
PARK2MAL3160208	C6WF	58	14.0	Sargocentron sp									
PARK2MAL6110110	C6WF	60	14.0	Sargocentron sp									
PARK2ULA6110101	C1WSF	540	13.0	Panulirus sp	K2203513-022	0.004	0.054	0.00809 [7]	42.5	0.019	NA	2.2	24.1
PARK2ULA6110102	C2WSF	404	7.0	Panulirus sp	K2203513-023	ND[4]	ND[4]	0.00889 [7]	21.7	0.041	NA	2.6	25.8
PARK2ULA3180201	C3WSF	558	8.5	Panulirus sp	K2203513-024	0.002	0.002	0.00849 [7]	29.8	0.028	NA	1.4	22.2

Notes:

1. CAS = Columbia Analytical Services, Kelso, WA, USA

American Samoa Environmental Protection Agency
Tier 2 Fish Toxicity Study

Sampling Location: **Ofu National Park**

filename: ofu national park tier 2 data summ.xls

Island: **Ofu**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)

2. Pb, Hg, PCBs, lipids, solids; analyses per wet weight by CAS

3. As(i) (inorganic As), As(t) (total As); analyses per wet weight by Battelle Marine Science Laboratories, Sequim, WA, USA

4. ND = not detected at method detection limit

5. NA = not analyzed for

6. Detection Limits:
Pb = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
Hg = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
As(i) = 0.0091 ug/g (established by Battelle Marine Science Laboratories, see Battelle/Peshut notes in file)
As(t) = 0.0025 ug/g (per method)
PCBs = 5.0-6.3 ug/kg (per method)
Lipids = 0.25 % (per method)
Solids = <1-4 relative % difference among duplicates (freeze-dry method)

7. Value reported is below the detection limit; see Battelle/Peshut notes in file

8. ND = not detected based on blank correction; see Battelle/Peshut notes in file

9. Carapace length for Panulirus, Parribacus

American Samoa Environmental Protection Agency

Sampling Location: **Onesosopo**

Tier 2 Fish Toxicity Study

filename: onesosopo tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
ANAALO5280101	C1MT	163	16.5	Acanthurus lineatus	K2203501-004	0.012	0.009	NA	NA	NA	NA	3.5	25.0
ANAALO5280102	C1MT	221	18.0	Acanthurus lineatus									
ANAALO5280103	C1MT	136	15.5	Acanthurus lineatus									
ANAALO5280104	C1MT	146	15.5	Acanthurus lineatus									
ANAALO5280105	C1MT	156	16.0	Acanthurus lineatus									
ANAALO5280106	C2MT	257	19.5	Acanthurus lineatus	K2203501-005	0.037	0.016	NA	NA	NA	NA	2.1	24.5
ANAALO5280107	C2MT	160	16.0	Acanthurus lineatus									
ANAALO5280108	C2MT	113	14.5	Acanthurus lineatus									
ANAALO5280109	C2MT	161	16.0	Acanthurus lineatus									
ANAALO5280110	C2MT	152	16.5	Acanthurus lineatus									
ANAALO5280111	C3MT	128	16.0	Acanthurus lineatus	K2203501-006	0.026	0.007	NA	NA	NA	NA	2.7	24.9
ANAALO5280112	C3MT	122	15.0	Acanthurus lineatus									
ANAALO5280113	C3MT	139	15.5	Acanthurus lineatus									
ANAALO5280114	C3MT	136	15.5	Acanthurus lineatus									
ANAALO5280115	C3MT	158	16.0	Acanthurus lineatus									
ANAALO5280116	C4WF	126	15.0	Acanthurus lineatus	K2203501-007	0.159	0.012	NA	NA	NA	NA	6.4	30.2
ANAALO5280117	C4WF	151	16.0	Acanthurus lineatus									
ANAALO5280118	C4WF	176	17.0	Acanthurus lineatus									
ANAALO5280119	C4WF	109	14.0	Acanthurus lineatus									
ANAALO3140201	C4WF	146	15.5	Acanthurus lineatus									
ANAALO5280120	C5WF	129	14.0	Acanthurus lineatus	K2203501-008	0.124	0.011	NA	NA	NA	NA	6.7	29.6
ANAALO5280121	C5WF	118	15.0	Acanthurus lineatus									
ANAALO5280122	C5WF	117	15.0	Acanthurus lineatus									
ANAALO5280123	C5WF	126	14.0	Acanthurus lineatus									
ANAALO3140202	C5WF	117	15.0	Acanthurus lineatus									
ANAALO5280124	C6WF	154	16.0	Acanthurus lineatus	K2203501-009	0.182	0.019	NA	NA	NA	NA	5.4	29.2

American Samoa Environmental Protection Agency

Sampling Location: **Onesosopo**

Tier 2 Fish Toxicity Study

filename: onesosopo tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
ANAALO5280125	C6WF	143	16.0	Acanthurus lineatus									
ANAALO5280126	C6WF	193	16.0	Acanthurus lineatus									
ANAALO5280127	C6WF	131	14.3	Acanthurus lineatus									
ANAALO3140203	C6WF	205	15.0	Acanthurus lineatus									
ANAMAL5280101	C1MT	151	16.5	Sargocentron sp	K2203698-019	0.005	0.251	0.00035 [7]	13.0	0.003	NA	1.5	24.6
ANAMAL5280103	C1MT	112	14.0	Sargocentron sp									
ANAMAL3090201	C1MT	NA	NA	Sargocentron sp									
ANAMAL5280104	C2MT	117	16.0	Sargocentron sp	K2203698-020	0.003	0.619	0.00127 [7]	19.6	0.006	NA	2.2	27.2
ANAMAL5280105	C2MT	110	16.0	Sargocentron sp									
ANAMAL5280106	C2MT	226	20.0	Sargocentron sp									
ANAMAL3090202	C2MT	NA	NA	Sargocentron sp									
ANAMAL5280108	C3MT	137	17.0	Sargocentron sp	K2203698-021	0.006	0.473	0.00209 [7]	14.2	0.015	NA	3.7	26.3
ANAMAL5280109	C3MT	218	20.0	Sargocentron sp									
ANAMAL3090203	C3MT	NA	NA	Sargocentron sp									
ANAMAL5280110	C4WF	185	19.0	Sargocentron sp	K2203701-013	0.037	0.105	0.00464 [7]	7.49	0.062	NA	2.3	29.6
ANAMAL5280111	C4WF	177	17.0	Sargocentron sp									
ANAMAL5280112	C4WF	77	14.0	Sargocentron sp									
ANAMAL3090204	C4WF	NA	NA	Sargocentron sp									
ANAMAL5280113	C5WF	132	16.0	Sargocentron sp	K2203701-014	0.032	0.156	0.00299 [7]	7.83	0.038	NA	9.8	39.4
ANAMAL5280114	C5WF	109	16.5	Sargocentron sp									
ANAMAL5280115	C5WF	84	13.0	Sargocentron sp									
ANAMAL3090205	C5WF	NA	NA	Sargocentron sp									
ANAMAL5280116	C6WF	116	16.0	Sargocentron sp	K2203701-015	0.057	0.319	0.00474 [7]	8.65	0.055	NA	5.1	33.8

American Samoa Environmental Protection Agency

Sampling Location: **Onesosopo**

Tier 2 Fish Toxicity Study

filename: onesosopo tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
ANAMAL5280117	C6WF	109	16.5	Sargocentron sp									
ANAMAL5280118	C6WF	84	13.0	Sargocentron sp									
ANAULA5280101	WSF1	450	14.0	Panulirus sp	K2203513-025	0.006	0.624	0.03149	98.2	0.032	NA	2.1	27.2
ANAULA5280102	WSF2	1020	15.5	Panulirus sp	K2203513-026	0.009	1.160	0.02709	97.4	0.028	NA	1.1	23.3
ANAULA5280103	WSF3	198	11.0	Parribacus sp	K2203513-027	0.007	0.165	0.00533 [7]	32.1	0.017	NA	1.5	22.5

Notes:

1. CAS = Columbia Analytical Services, Kelso, WA, USA
2. Pb, Hg, PCBs, lipids, solids; analyses per wet weight by CAS
3. As(i) (inorganic As), As(t) (total As); analyses per wet weight by Battelle Marine Science Laboratories, Sequim, WA, USA
4. ND = not detected at method detection limit
5. NA = not analyzed for

6. Detection Limits:
   - Pb = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - Hg = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - As(i) = 0.0091 ug/g (established by Battelle Marine Science Laboratories, see Battelle/Peshut notes in file)
   - As(t) = 0.0025 ug/g (per method)
   - PCBs = 5.0-6.3 ug/kg (per method)
   - Lipids = 0.25 % (per method)
   - Solids = <1-4 relative % difference among duplicates (freeze-dry method)

7. Value reported is below the detection limit; see Battelle/Peshut notes in file
8. ND = not detected based on blank correction; see Battelle/Peshut notes in file
9. Carapace length for Panulirus, Parribacus

American Samoa Environmental Protection Agency
Tier 2 Fish Toxicity Study

Sampling Location: **Pago Pago Inner Harbor**

filename: pago inner harbor tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight[9] (g)	Standard Length (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
PAJA8280101	C1MT	1360	34	Caranx papuensis	K2203698-001	ND[4]	0.426	0.00368 [7]	0.311	1.183	94[11]	5.6	31.6
PAJA8280102	C1MT	1317	35.5	Caranx papuensis							120[12]		
PAJA8280103	C1MT	908	32	Caranx papuensis									
PAJA8280104	C2MT	1090	34	Caranx papuensis	K2203698-002	0.005	0.481	ND[8]	0.294	0.000	45[11]	1.9	26.3
PAJA8280105	C2MT	910	30	Caranx papuensis							65[12]		
PAJA8280106	C2MT	730	30	Caranx papuensis									
PAJA8300101	C3MT	640	28	Caranx papuensis	K2203698-003	0.004	0.450	0.00357 [7]	0.675	0.529	61[11]	4.3	29.2
PAJA8300102	C3MT	1450	36	Caranx papuensis							85[12]		
PAJA8300103	C3MT	1544	33	Caranx papuensis									
PAJA8300104	C4WF	680	29	Caranx papuensis	K2203698-004	0.014	0.276	0.00039 [7]	0.277	0.141	110[11]	8.0	33.1
PAJA8300105	C4WF	953	34	Caranx papuensis							190[12]		
PAJA8300106	C4WF	1180	35	Caranx papuensis									
PAGOJA3090201	C5WF	NA	NA	Caranx papuensis	K2203698-005	0.020	0.148	ND[8]	0.380	0.000	85[11]	7.8	34.6
PAGOJA3110202	C5WF	NA	NA	Caranx papuensis							75[12]		
PAGOJA3110203	C5WF	NA	NA	Caranx papuensis									
PAGOJA3110204	C6WF	NA	NA	Caranx papuensis	K2203698-006	0.006	0.044	0.00090 [7]	0.935	0.096	41[11]	5.9	31.4
PAGOJA3110205	C6WF	NA	NA	Caranx papuensis							41[12]		
PAGOJA3080206	C6WF	NA	NA	Caranx papuensis									
PAMAC8280101	C1MT	245	24.0	Megalaspis cordyla	K2203698-007	0.003	0.208	0.00019 [7]	2.04	0.009	51[11]	1.3	26.4
PAMAC8280102	C1MT	230	24.0	Megalaspis cordyla							53[12]		
PAMAC8280103	C1MT	247	25.0	Megalaspis cordyla									

American Samoa Environmental Protection Agency

Sampling Location: **Pago Pago Inner Harbor**

Tier 2 Fish Toxicity Study

filename: pago inner harbor tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight[9] (g)	Standard Length (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
PAMAC8280104	C1MT	221	23.0	Megalaspis cordyla									
PAMAC8280105	C1MT	188	22.0	Megalaspis cordyla									
PAMAC8290106	C2MT	179	22.5	Megalaspis cordyla	K2203698-008	0.007	0.169	ND[8]	1.88	0.000	48[11]	1.2	27.6
PAMAC8290107	C2MT	127	24.0	Megalaspis cordyla							56[12]		
PAMAC8290108	C2MT	134	24.5	Megalaspis cordyla									
PAMAC8290109	C2MT	125	24.0	Megalaspis cordyla									
PAMAC8290110	C2MT	150	24.5	Megalaspis cordyla									
PAMAC8290111	C3MT	227	24.5	Megalaspis cordyla	K2203698-009	0.005	0.158	0.00170 [7]	2.53	0.067	42[11]	1.3	25.2
PAMAC8290112	C3MT	206	23.0	Megalaspis cordyla							52[12]		
PAMAC8290113	C3MT	229	24.5	Megalaspis cordyla									
PAMAC8290114	C3MT	234	24.0	Megalaspis cordyla									
PAMAC8290115	C3MT	218	23.5	Megalaspis cordyla									
PAMAC8290116	C4WF	232	24.0	Megalaspis cordyla	K2203698-013	0.040	0.098	ND[8]	1.55	0.000	130[11]	3.7	28.2
PAMAC8290117	C4WF	200	23.5	Megalaspis cordyla							190[12]		
PAMAC8290118	C4WF	207	23.0	Megalaspis cordyla									
PAMAC8290119	C4WF	223	24.0	Megalaspis cordyla									
PAMAC8290120	C4WF	254	25.0	Megalaspis cordyla									
PAMAC8290121	C5WF	250	25.0	Megalaspis cordyla	K2203698-014	0.038	0.109	ND[8]	1.17	0.000	110[11]	2.8	29.3
PAMAC8290122	C5WF	219	23.5	Megalaspis cordyla							170[12]		
PAMAC8290123	C5WF	261	24.0	Megalaspis cordyla									
PAMAC8290124	C5WF	233	24.0	Megalaspis cordyla									
PAMAC8290125	C5WF	202	23.0	Megalaspis cordyla									
PAMAC8290126	C6WF	223	24.5	Megalaspis cordyla	K2203698-015	0.031	0.106	ND[8]	1.43	0.000	150[11]	4.0	28.8

American Samoa Environmental Protection Agency

Sampling Location: **Pago Pago Inner Harbor**

Tier 2 Fish Toxicity Study

filename: pago inner harbor tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight[9] (g)	Standard Length (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
PAMAC8290127	C6WF	219	25.0	Megalaspis cordyla							220[12]		
PAMAC8290128	C6WF	215	24.5	Megalaspis cordyla									
PAMAC8290129	C6WF	231	24.5	Megalaspis cordyla									
PAMAC8290130	C6WF	223	24.0	Megalaspis cordyla									
PAGOMUL10210101	C1 MT	670	30.0	Mugilidae sp	K2203698-016	0.073	0.008	0.01639	0.807	2.031	10[11]	1.4	26.1
PAGOMUL10210102	C1 MT	800	32.0	Mugilidae sp							22[12]		
PAGOMUL10210103	C1 MT	762	32.0	Mugilidae sp									
PAGOMUL8210101	C2 MT	798	34.0	Mugilidae sp	K2203698-017	0.047	0.020	0.00221 [7]	0.607	0.364	10[12]	0.5	21.8
PAGOMUL8210102	C2 MT	340	25.5	Mugilidae sp									
PAGOMUL8210103	C2 MT	NA	NA	Mugilidae sp									
PAGOMUL10210104	C3 MT	NA	NA	Mugilidae sp	K2203698-018	0.026	0.016	0.00535 [7]	0.371	1.442	11[12]	0.6	22.2
PAGOMUL10210105	C3 MT	NA	NA	Mugilidae sp									
PAGOMUL10210106	C3 MT	NA	NA	Mugilidae sp									
101C1-S1001[10]	C4 WF	84	NA	Mugilidae sp	K2200118-001	3.96	0.050	0.12979	0.779	16.661	78[12]	2.1	33.0
101C1-S1002[10]	C4 WF	86	NA	Mugilidae sp									
101C1-S1003[10]	C4 WF	71	NA	Mugilidae sp									
101C1-S1004[10]	C5 WF	93	NA	Mugilidae sp	K2200118-002	3.03	0.150	0.10979	0.770	14.258	130[12]	1.9	31.1
101C1-S1005[10]	C5 WF	103	NA	Mugilidae sp									
101C1-S1006[10]	C5 WF	79	NA	Mugilidae sp									
101C1-S1007[10]	C6 WF	66	NA	Mugilidae sp	K2200118-003	2.37	0.040	0.09459	0.944	10.020	52[12]	1.5	28.7
101C1-S1008[10]	C6 WF	73	NA	Mugilidae sp									
101C1-S1009[10]	C6 WF	85	NA	Mugilidae sp									

American Samoa Environmental Protection Agency

Sampling Location: **Pago Pago Inner Harbor**

Tier 2 Fish Toxicity Study

filename: pago inner harbor tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight[9] (g)	Standard Length (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
102C1-S7001[10]	C1WF	245	NA	Serranidae sp	K2200118-004	0.160	0.670	NA	59.5	NA	520[12]	4.2	28.0
102C1-S7002[10]	C1WF	109	NA	Serranidae sp									
102C1-S7003[10]	C1WF	82	NA	Serranidae sp									
102C1-S2004[10]	C1WF	182	NA	Serranidae sp									
102C1-S3005[10]	C1WF	99	NA	Serranidae sp									
104C2-S1006[10]	C1WF	218	NA	Mullidae sp	K2200118-005	0.100	0.400	NA	29.6	NA	640[12]	4.4	28.5
104C2-S3007[10]	C1WF	134	NA	Mullidae sp									
104C2-S2008[10]	C1WF	138	NA	Mullidae sp									
104C2-S2009[10]	C1WF	477	NA	Mullidae sp									
104C2-S2010[10]	C1WF	520	NA	Mullidae sp									
106C1-S6001[10]	WSF1	67	NA	Asaphis violascens	K2200118-006	10.5	0.080	0.21179	5.08	4.169	ND[4]	1.1	22.3
106C1-S6002[10]	WSF1	49	NA	Asaphis violascens									
106C1-S6003[10]	WSF1	56	NA	Asaphis violascens									
106C1-S6004[10]	WSF2	62	NA	Asaphis violascens	K2200118-007	11.9	0.090	0.21679	4.70	4.613	ND[4]	1.5	21.0
106C1-S6005[10]	WSF2	61	NA	Asaphis violascens									
106C1-S6006[10]	WSF2	54	NA	Asaphis violascens									
106C1-S6007[10]	WSF3	54	NA	Asaphis violascens	K2200118-008	11.5	0.070	0.24379	5.90	4.132	ND[4]	1.3	21.7
106C2-S6001[10]	WSF3	23	NA	Asaphis violascens									
106C2-S6002[10]	WSF3	25	NA	Asaphis violascens									
106C2-S6003[10]	WSF3	23	NA	Asaphis violascens									
106C2-S6004[10]	WSF3	37	NA	Asaphis violascens									
107C2-S6001[10]	WSF1	19	NA	Trochus maculatus	K2200118-009	1.68	0.070	NA	53.5	NA	ND[4]	1.1	24.4
107C2-S6002[10]	WSF1	15	NA	Trochus maculatus									
107C2-S6003[10]	WSF1	15	NA	Trochus maculatus									

American Samoa Environmental Protection Agency
Tier 2 Fish Toxicity Study

Sampling Location: **Pago Pago Inner Harbor**

filename: pago inner harbor tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight[9] (g)	Standard Length (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
107C2-S6004[10]	WSF1	16	NA	Trochus maculatus									
107C2-S6005[10]	WSF1	18	NA	Trochus maculatus									
107C2-S6006[10]	WSF1	16	NA	Trochus maculatus									
107C2-S6007[10]	WSF1	17	NA	Trochus maculatus									
107C2-S6008[10]	WSF1	17	NA	Trochus maculatus									
107C2-S6009[10]	WSF1	18	NA	Trochus maculatus									
107C2-S6010[10]	WSF1	17	NA	Trochus maculatus									
107C2-S6011[10]	WSF1	18	NA	Trochus maculatus									
109C1-S6001[10]	WSF1	629	NA	Octopus cyanea	K2200118-010	0.330	0.200	NA	190	NA	50[12]	0.6	20.2

Notes:

1. CAS = Columbia Analytical Services, Kelso, WA, USA
2. Pb, Hg, PCBs, lipids, solids; analyses per wet weight by CAS
3. As(i) (inorganic As), As(t) (total As); analyses per wet weight by Battelle Marine Science Laboratories, Sequim, WA, USA
4. ND = not detected at method detection limit
5. NA = not analyzed for

6. Detection Limits:
   - Pb = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - Hg = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - As(i) = 0.0091 ug/g (established by Battelle Marine Science Laboratories, see Battelle/Peshut notes in file)
   - As(t) = 0.0025 ug/g (per method)
   - PCBs = 5.0-6.3 ug/kg (per method)
   - Lipids = 0.25 % (per method)
   - Solids = <1-4 relative % difference among duplicates (freeze-dry method)

7. Value reported is below the detection limit; see Battelle/Peshut notes in file
8. ND = not detected based on blank correction; see Battelle/Peshut notes in file
9. For Asaphis and Trochus, includes entire animal (shell, soft tissue, body fluids)

American Samoa Environmental Protection Agency
Tier 2 Fish Toxicity Study

Sampling Location: **Pago Pago Inner Harbor**

filename: pago inner harbor tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight[9] (g)	Standard Length (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)

10. Data from *Joint Cannery Fish Tissue Study* , CH2M Hill, 2002, for ASEPA

11. Aroclor 1254

12. Aroclor 1260

American Samoa Environmental Protection Agency

Sampling Location: **Pala Lagoon**

Tier 2 Fish Toxicity Study

filename: pala lagoon tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight[10] (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
PALACLAM10120101	C1SF	4.1	4.2	Asaphis violascens	K2203701-037	0.163	0.028	0.08339	1.26	6.62	ND[4]	1.0	15.1
PALACLAM10120102	C1SF	3.6	4.1	Asaphis violascens									
PALACLAM10120103	C1SF	3.9	4.5	Asaphis violascens									
PALACLAM10120104	C1SF	1.8	3.6	Asaphis violascens									
PALACLAM10120105	C1SF	2.3	3.8	Asaphis violascens									
PALACLAM10120106	C2SF	5.7	5.0	Asaphis violascens	K2203701-038	0.141	0.029	0.07109	1.30	5.47	ND[4]	0.9	15.4
PALACLAM10120107	C2SF	3.0	4.1	Asaphis violascens									
PALACLAM10120108	C2SF	4.0	4.3	Asaphis violascens									
PALACLAM10120109	C2SF	3.2	4.5	Asaphis violascens									
PALACLAM10120110	C2SF	5.0	3.7	Asaphis violascens									
PALACLAM10120111	C3SF	1.9	3.8	Asaphis violascens	K2203701-039	0.167	0.027	0.10179	1.53	6.65	ND[4]	0.8	15.5
PALACLAM10120112	C3SF	1.4	3.4	Asaphis violascens									
PALACLAM10120113	C3SF	2.6	3.8	Asaphis violascens									
PALACLAM10120114	C3SF	2.4	3.8	Asaphis violascens									
PALACLAM10120115	C3SF	2.9	3.9	Asaphis violascens									
PALACRAB10170101	C1SF	493	14.5	Not identified	K2203701-034	0.003	0.011	0.00468 [7]	1.16	0.403	ND[4]	2.1	22.1
PALACRAB10170102	C1SF	380	13.0	Not identified									
PALACRAB10170103	C1SF	414	13.0	Not identified									
PALACRAB10170104	C2SF	970	16.5	Not identified	K2203701-035	0.003	0.004	0.00442 [7]	0.527	0.839	ND[4]	2.9	21.3
PALACRAB10170105	C2SF	336	12.5	Not identified									
PALACRAB10170106	C2SF	241	11.5	Not identified									
PALACRAB10170107	C3SF	450	14.0	Not identified	K2203701-036	0.006	0.007	0.01259	1.93	0.652	ND[4]	1.8	22.0
PALACRAB10170108	C3SF	354	12.0	Not identified									
PALACRAB10170109	C3SF	460	14.5	Not identified									

American Samoa Environmental Protection Agency

Sampling Location: **Pala Lagoon**

Tier 2 Fish Toxicity Study

filename: pala lagoon tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight[10] (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
PALAMUL10130101	C1MT	54	13.5	Mugilidae sp	K2203701-031	0.017	0.005	0.00432 [7]	0.389	1.11	ND[4]	0.8	23.8
PALAMUL10130102	C1MT	42	12.5	Mugilidae sp									
PALAMUL10130103	C1MT	46	12.5	Mugilidae sp									
PALAMUL10130104	C1MT	37	12.0	Mugilidae sp									
PALAMUL10130105	C1MT	36	12.0	Mugilidae sp									
PALAMUL10130106	C2MT	41	12.5	Mugilidae sp	K2203701-032	0.061	0.005	0.00274 [7]	0.432	0.634	ND[4]	1.2	22.7
PALAMUL10130107	C2MT	45	13.0	Mugilidae sp									
PALAMUL10130108	C2MT	36	12.0	Mugilidae sp									
PALAMUL10130109	C2MT	32	11.5	Mugilidae sp									
PALAMUL10130110	C2MT	37	12.0	Mugilidae sp									
PALAMUL10130111	C3MT	38	13.0	Mugilidae sp	K2203701-033	0.022	0.004	0.00639 [7]	0.316	2.02	ND[4]	1.1	22.7
PALAMUL10130112	C3MT	43	13.0	Mugilidae sp									
PALAMUL10130113	C3MT	34	12.0	Mugilidae sp									
PALAMUL10130114	C3MT	37	12.5	Mugilidae sp									
PALAMUL10130115	C3MT	35	12.0	Mugilidae sp									
PALAMUL10130116	C4WF	38	13.0	Mugilidae sp	K2203698-010	0.349	0.008	0.18179	0.496	36.7	ND[4]	3.2	30.5
PALAMUL10130117	C4WF	35	12.0	Mugilidae sp									
PALAMUL10130118	C4WF	32	12.0	Mugilidae sp									
PALAMUL10130119	C4WF	44	13.0	Mugilidae sp									
PALAMUL10130120	C4WF	38	12.0	Mugilidae sp									
PALAMUL10130121	C5WF	37	12.0	Mugilidae sp	K2203698-011	0.495	0.007	0.10879	0.570	19.1	6.6[11]	3.2	32.3
PALAMUL10130122	C5WF	41	12.5	Mugilidae sp									
PALAMUL10130123	C5WF	39	12.0	Mugilidae sp									
PALAMUL10130124	C5WF	36	12.0	Mugilidae sp									

American Samoa Environmental Protection Agency
Tier 2 Fish Toxicity Study

Sampling Location: **Pala Lagoon**

filename: pala lagoon tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight[10] (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
PALAMUL10130125	C5WF	41	12.5	Mugilidae sp									
PALAMUL10130126	C6WF	36	12.0	Mugilidae sp	K2203698-012	0.543	0.009	0.13579	0.602	22.6	9.8[11]	3.9	33.8
PALAMUL10130127	C6WF	36	12.0	Mugilidae sp									
PALAMUL10130128	C6WF	36	12.0	Mugilidae sp									
PALAMUL10130129	C6WF	33	12.0	Mugilidae sp									
PALAMUL10130130	C6WF	36	12.0	Mugilidae sp									

Notes:

1. CAS = Columbia Analytical Services, Kelso, WA, USA
2. Pb, Hg, PCBs, lipids, solids; analyses per wet weight by CAS
3. As(i) (inorganic As), As(t) (total As); analyses per wet weight by Battelle Marine Science Laboratories, Sequim, WA, USA
4. ND = not detected at method detection limit
5. NA = not analyzed for

6. Detection Limits:
   - Pb = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - Hg = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - As(i) = 0.0091 ug/g (established by Battelle Marine Science Laboratories, see Battelle/Peshut notes in file)
   - As(t) = 0.0025 ug/g (per method)
   - PCBs = 5.0-6.3 ug/kg (per method)
   - Lipids = 0.25 % (per method)
   - Solids = <1-4 relative % difference among duplicates (freeze-dry method)

7. Value reported is below the detection limit; see Battelle/Peshut notes in file
8. ND = not detected based on blank correction; see Battelle/Peshut notes in file
9. Shell width at greastest point for Asaphis, carapace width at greatest point for PALACRAB
10. For Asaphis includes soft tissue and body fluids only, no shell; for PALACRAB includes entire animal (shell, soft tissue, body fluids)
11. Aroclor 1254

American Samoa Environmental Protection Agency

Sampling Location: **Poloa**

Tier 2 Fish Toxicity Study

filename: poloa tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
POALO5220101	C1MT	172	17.0	Acanthurus lineatus	K2202879-001	0.003	0.003	NA	NA	NA	NA	1.2	23.3
POALO5220102	C1MT	238	18.0	Acanthurus lineatus									
POALO5220103	C1MT	216	18.0	Acanthurus lineatus									
POALO5220104	C1MT	246	18.5	Acanthurus lineatus									
POALO5220105	C1MT	172	16.0	Acanthurus lineatus									
POALO5220106	C2MT	158	15.5	Acanthurus lineatus	K2202879-002	ND[4]	0.003	NA	NA	NA	NA	1.3	24.7
POALO5220107	C2MT	235	18.5	Acanthurus lineatus									
POALO5220108	C2MT	141	17.0	Acanthurus lineatus									
POALO5220109	C2MT	193	17.5	Acanthurus lineatus									
POALO5220110	C2MT	211	18.0	Acanthurus lineatus									
POALO5220111	C3MT	221	18.0	Acanthurus lineatus	K2202879-003	0.003	0.002	NA	NA	NA	NA	2.0	24.3
POALO5220112	C3MT	245	18.5	Acanthurus lineatus									
POALO5220113	C3MT	275	20.0	Acanthurus lineatus									
POALO5220114	C3MT	228	18.0	Acanthurus lineatus									
POALO5220115	C3MT	256	19.0	Acanthurus lineatus									
POALO5220116	C4WF	228	18.0	Acanthurus lineatus	K2202879-004	0.049	0.008	NA	NA	NA	NA	5.9	30.0
POALO5220117	C4WF	213	18.0	Acanthurus lineatus									
POALO5220118	C4WF	188	16.5	Acanthurus lineatus									
POALO5220119	C4WF	260	19.0	Acanthurus lineatus									
POALO5220120	C4WF	242	18.5	Acanthurus lineatus									
POALO5220121	C5WF	198	17.0	Acanthurus lineatus	K2202879-005	0.040	0.004	NA	NA	NA	NA	4.8	28.1
POALO5220122	C5WF	238	18.0	Acanthurus lineatus									
POALO5220123	C5WF	205	17.5	Acanthurus lineatus									
POALO5220124	C5WF	193	17.5	Acanthurus lineatus									
POALO5220125	C5WF	265	18.0	Acanthurus lineatus									

American Samoa Environmental Protection Agency

Sampling Location: **Poloa**

Tier 2 Fish Toxicity Study

filename: poloa tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
POALO5220126	C6WF	196	18.0	Acanthurus lineatus	K2202879-006	0.039	0.005	NA	NA	NA	NA	4.4	28.4
POALO5220127	C6WF	190	18.0	Acanthurus lineatus									
POALO5220128	C6WF	187	17.5	Acanthurus lineatus									
POALO5220129	C6WF	200	17.0	Acanthurus lineatus									
POALO5220130	C6WF	193	18.0	Acanthurus lineatus									
POMAL5220101	C1MT	166	18.0	Sargocentron sp	K2203701-001	0.005	0.048	0.00128 [7]	11.8	0.011	NA	3.2	27.0
POMAL5220102	C1MT	109	16.5	Sargocentron sp									
POMAL5220103	C1MT	170	19.0	Sargocentron sp									
POMAL5220104	C2MT	142	18.0	Sargocentron sp	K2203701-002	0.004	0.043	ND[8]	13.3	0.000	NA	3.6	26.9
POMAL5220130	C2MT	175	18.0	Sargocentron sp									
POMAL5220110	C2MT	135	16.5	Sargocentron sp									
POMAL5220111	C3MT	132	17.5	Sargocentron sp	K2203701-003	0.004	0.068	0.00639 [7]	26.9	0.024	NA	5.5	30.0
POMAL5220114	C3MT	169	18.0	Sargocentron sp									
POMAL5220115	C3MT	122	16.5	Sargocentron sp									
POMAL5220116	C4WF	242	21.0	Sargocentron sp	K2203701-004	0.036	0.047	ND[8]	4.85	0.000	NA	8.9	37.0
POMAL5220117	C4WF	191	19.0	Sargocentron sp									
POMAL5220119	C4WF	156	19.0	Sargocentron sp									
POMAL5220120	C4WF	120	16.0	Sargocentron sp									
POMAL5220121	C5WF	155	18.0	Sargocentron sp	K2203701-005	0.021	0.035	ND[8]	15.5	0.000	NA	9.4	36.8
POMAL5220122	C5WF	246	21.0	Sargocentron sp									
POMAL5220123	C5WF	232	20.0	Sargocentron sp									
POMAL5220125	C5WF	249	20.5	Sargocentron sp									
POMAL5220126	C6WF	177	18.5	Sargocentron sp	K2203701-006	0.020	0.029	0.00286 [7]	13.2	0.022	NA	8.3	30.1

American Samoa Environmental Protection Agency
Tier 2 Fish Toxicity Study

Sampling Location: **Poloa**

filename: poloa tier 2 data summ.xls

Island: **Tutuila**

Sample Name	ASEPA Composite Number	Whole Weight (g)	Standard Length[9] (cm)	Genus species	CAS[1] Code (composite)	Pb[2,6] (mg/kg)	Hg[2,6] (mg/kg)	As(i)[3,6] (ug/g)	As(t)[3,6] (ug/g)	As(i)/As(t) (%)	PCBs[2,6] (ug/kg)	Lipids[2,6] (%)	Solids[2,6] (%)
POMAL5220127	C6WF	178	18.5	Sargocentron sp									
POMAL5220128	C6WF	204	19.5	Sargocentron sp									
POMAL5220129	C6WF	149	18.0	Sargocentron sp									
POULA5220101	WSF1	681	13.0	Panulirus sp	K2203513-016	ND[4]	0.031	0.01459	43.9	0.033	NA	3.4	27.6
POULA5220102	WSF2	908	16.0	Panulirus sp	K2203513-017	0.007	0.075	0.02669	60.1	0.044	NA	0.7	18.4
POULA5220103	WSF3	454	12.0	Panulirus sp	K2203513-018	ND[4]	0.034	0.04059	65.4	0.062	NA	2.3	28.3

Notes:

1. CAS = Columbia Analytical Services, Kelso, WA, USA
2. Pb, Hg, PCBs, lipids, solids; analyses per wet weight by CAS
3. As(i) (inorganic As), As(t) (total As); analyses per wet weight by Battelle Marine Science Laboratories, Sequim, WA, USA
4. ND = not detected at method detection limit
5. NA = not analyzed for

6. Detection Limits:
   - Pb = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - Hg = 0.002-0.003 mg/kg (per method, varies due to individual sample weights, see CAS notes in file)
   - As(i) = 0.0091 ug/g (established by Battelle Marine Science Laboratories, see Battelle/Peshut notes in file)
   - As(t) = 0.0025 ug/g (per method)
   - PCBs = 5.0-6.3 ug/kg (per method)
   - Lipids = 0.25 % (per method)
   - Solids = <1-4 relative % difference among duplicates (freeze-dry method)

7. Value reported is below the detection limit; see Battelle/Peshut notes in file
8. ND = not detected based on blank correction; see Battelle/Peshut notes in file
9. Carapace length for Panulirus, Parribacus

American Samoa Environmental Protection Agency — Arsenic Analysis Summary (all sites)

Tier 2 Fish Toxicity Study

filename: arsenic analysis summ.xls

Sample Name	Genus species	CAS Code[1] (composite)	BML Code[2] (composite)	As(t)[3,8] (ug/g)	As(i)[4,8] (ug/g)	As(i) Blank (geom mean)[5] (ug/g)	As(i) (corrected per geom mean) (ug/g)	C[9]	As(i)/As(t) (corrected per geom mean) (%)	As(i) Blank (median)[6] (ug/g)	As(i) (corrected per median) (ug/g)	C[9]	As(i)/As(t) (corrected per median) (%)
FAULA WSF1	Panulirus sp	K2203513-001	1834-1	46.3	**0.00739**	0.00432	**0.00307**	B	0.007	0.00422	**0.00318**	B	0.007
FAULA WSF2	Panulirus sp	K2203513-002	1834-2	49.1	**0.01720**	0.00432	**0.01288**		0.026	0.00422	**0.01299**		0.026
FAULA WSF3	Panulirus sp	K2203513-003	1834-3	35.6	**0.03450**	0.00432	**0.03018**		0.085	0.00422	**0.03029**		0.085
LAUULA WSF1	Panulirus sp	K2203513-004	1834-4	30.4	**0.01380**	0.00432	**0.00948**		0.031	0.00422	**0.00959**		0.032
LAUULA WSF2	Panulirus sp	K2203513-005	1834-5	81.7	**0.01610**	0.00432	**0.01178**		0.014	0.00422	**0.01189**		0.015
LAUULA WSF3	Panulirus sp	K2203513-006	1834-6	19.8	**0.00857**	0.00432	**0.00425**	B	0.021	0.00422	**0.00436**	B	0.022
TUAULA WSF1	Panulirus sp	K2203513-007	1834-7	48.5	**0.01300**	0.00432	**0.00868**	B	0.018	0.00422	**0.00879**	B	0.018
TUAULA WSF2	Panulirus sp	K2203513-008	1834-8	53.3	**0.03614**	0.00432	**0.03182**		0.060	0.00422	**0.03193**		0.060
TUAULA WSF3	Panulirus sp	K2203513-009	1834-9	21.5	**0.00498**	0.00432	**0.00066**	B	0.003	0.00422	**0.00077**	B	0.004
LEULA WSF1	Panulirus sp	K2203513-010	1834-10	89.7	**0.04610**	0.00432	**0.04178**		0.047	0.00422	**0.04189**		0.047
LEULA WSF2	Panulirus sp	K2203513-011	1834-11	81.9	**0.03570**	0.00432	**0.03138**		0.038	0.00422	**0.03149**		0.038
LEULA WSF3	Panulirus sp	K2203513-012	1834-12	95.9	**0.02680**	0.00432	**0.02248**		0.023	0.00422	**0.02259**		0.024
MAULA WSF1	Panulirus sp	K2203513-013	1834-13	79.3	**0.02140**	0.00432	**0.01708**		0.022	0.00422	**0.01719**		0.022
MAULA WSF2	Panulirus sp	K2203513-014	1834-14	27.0	**0.02120**	0.00432	**0.01688**		0.063	0.00422	**0.01699**		0.063
MAULA WSF3	Panulirus sp	K2203513-015	1834-15	38.4	**0.01390**	0.00432	**0.00958**		0.025	0.00422	**0.00969**		0.025
POULA WSF1	Panulirus sp	K2203513-016	1834-16	43.9	**0.01880**	0.00432	**0.01448**		0.033	0.00422	**0.01459**		0.033
POULA WSF2	Panulirus sp	K2203513-017	1834-17	60.1	**0.03090**	0.00432	**0.02658**		0.044	0.00422	**0.02669**		0.044
POULA WSF3	Panulirus sp	K2203513-018	1834-18	65.4	**0.04480**	0.00432	**0.04048**		0.062	0.00422	**0.04059**		0.062
NUULA WSF1	Panulirus sp	K2203513-019	1834-19	55.2	**0.04650**	0.00432	**0.04218**		0.076	0.00422	**0.04229**		0.077
NUULA WSF2	Panulirus sp	K2203513-020	1834-20	40.6	**0.08700**	0.00432	**0.08268**		0.204	0.00422	**0.08279**		0.204
NUULA WSF3	Panulirus sp	K2203513-021	1834-21	38.1	**0.01110**	0.00432	**0.00678**	B	0.018	0.00422	**0.00689**	B	0.018
PARK2ULA WSF1	Panulirus sp	K2203513-022	1834-22	42.5	**0.01230**	0.00432	**0.00798**	B	0.019	0.00422	**0.00809**	B	0.019
PARK2ULA WSF2	Panulirus sp	K2203513-023	1834-23	21.7	**0.01310**	0.00432	**0.00878**	B	0.040	0.00422	**0.00889**	B	0.041
PARK2ULA WSF3	Panulirus sp	K2203513-024	1834-24	29.8	**0.01270**	0.00432	**0.00838**	B	0.028	0.00422	**0.00849**	B	0.028
ANAULA WSF1	Panulirus sp	K2203513-025	1834-25	98.2	**0.03570**	0.00432	**0.03138**		0.032	0.00422	**0.03149**		0.032
ANAULA WSF2	Panulirus sp	K2203513-026	1834-26	97.4	**0.03130**	0.00432	**0.02698**		0.028	0.00422	**0.02709**		0.028
ANAULA WSF3	Parribacus sp	K2203513-027	1834-27	32.1	**0.00954**	0.00432	**0.00522**	B	0.016	0.00422	**0.00533**	B	0.017
PAJA C1 MT	Caranx papuensis	K2203698-001	1834-28	0.311	**0.00789**	0.00432	**0.00357**	B	1.149	0.00422	**0.00368**	B	1.182
PAJA C2 MT	Caranx papuensis	K2203698-002	1834-29	0.294	**0.00398**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
PAJA C3 MT	Caranx papuensis	K2203698-003	1834-30	0.675	**0.00778**	0.00432	**0.00346**	B	0.513	0.00422	**0.00357**	B	0.528
PAJA C4 WF	Caranx papuensis	K2203698-004	1834-31	0.277	**0.00460**	0.00432	**0.00028**	B	0.102	0.00422	**0.00039**	B	0.139
PAJA C5 WF	Caranx papuensis	K2203698-005	1834-32	0.380	**0.00341**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
PAJA C6 WF	Caranx papuensis	K2203698-006	1834-33	0.935	**0.00511**	0.00432	**0.00079**	B	0.085	0.00422	**0.00090**	B	0.096
PAMAC C1 MT	Megalaspis cordyla	K2203698-007	1834-34	2.04	**0.00440**	0.00432	**0.00008**	B	0.004	0.00422	**0.00019**	B	0.009

American Samoa Environmental Protection Agency — Arsenic Analysis Summary (all sites)

Tier 2 Fish Toxicity Study

filename: arsenic analysis summ.xls

Sample Name	Genus species	CAS Code[1] (composite)	BML Code[2] (composite)	As(t)[3,8] (ug/g)	As(i)[4,8] (ug/g)	As(i) Blank (geom mean)[5] (ug/g)	As(i) (corrected per geom mean) (ug/g)	C[9]	As(i)/As(t) (corrected per geom mean) (%)	As(i) Blank (median)[6] (ug/g)	As(i) (corrected per median) (ug/g)	C[9]	As(i)/As(t) (corrected per median) (%)
PAMAC C2 MT	Megalaspis cordyla	K2203698-008	1834-35	1.88	**0.00351**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
PAMAC C3 MT	Megalaspis cordyla	K2203698-009	1834-36	2.53	**0.00591**	0.00432	**0.00159**	B	0.063	0.00422	**0.00170**	B	0.067
PAMAC C4 WF	Megalaspis cordyla	K2203698-013	1834-40	1.55	**0.00243**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
PAMAC C5 WF	Megalaspis cordyla	K2203698-014	1834-41	1.17	**0.00226**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
PAMAC C6 WF	Megalaspis cordyla	K2203698-015	1834-42	1.43	**0.00229**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
PALAMUL C1 MT	Mugilidae spp	K2203701-031	1834-100	0.389	**0.00853**	0.00432	**0.00421**	B	1.083	0.00422	**0.00432**	B	1.109
PALAMUL C2 MT	Mugilidae spp	K2203701-032	1834-101	0.432	**0.00695**	0.00432	**0.00263**	B	0.609	0.00422	**0.00274**	B	0.633
PALAMUL C3 MT	Mugilidae spp	K2203701-033	1834-102	0.316	**0.01060**	0.00432	**0.00628**	B	1.988	0.00422	**0.00639**	B	2.021
PALAMUL C4 WF	Mugilidae spp	K2203698-010	1834-37	0.496	**0.18600**	0.00432	**0.18168**		36.629	0.00422	**0.18179**		36.650
PALAMUL C5 WF	Mugilidae spp	K2203698-011	1834-38	0.570	**0.11300**	0.00432	**0.10868**		19.067	0.00422	**0.10879**		19.085
PALAMUL C6 WF	Mugilidae spp	K2203698-012	1834-39	0.602	**0.14000**	0.00432	**0.13568**		22.539	0.00422	**0.13579**		22.556
PAGOMUL C1 MT	Mugilidae spp	K2203698-016	1834-43	0.807	**0.02060**	0.00432	**0.01628**		2.018	0.00422	**0.01639**		2.030
PAGOMUL C2 MT	Mugilidae spp	K2203698-017	1834-44	0.607	**0.00642**	0.00432	**0.00210**	B	0.346	0.00422	**0.00221**	B	0.363
PAGOMUL C3 MT	Mugilidae spp	K2203698-018	1834-45	0.371	**0.00956**	0.00432	**0.00524**	B	1.413	0.00422	**0.00535**	B	1.441
PAGOMUL C4 WF[7]	Mugilidae spp	K2200118-001	1759-1	0.779	**0.13400**	0.00432	**0.12968**		16.647	0.00422	**0.12979**		16.660
PAGOMUL C5 WF[7]	Mugilidae spp	K2200118-002	1759-2	0.770	**0.11400**	0.00432	**0.10968**		14.244	0.00422	**0.10979**		14.258
PAGOMUL C6 WF[7]	Mugilidae spp	K2200118-003	1759-3	0.944	**0.09880**	0.00432	**0.09448**		10.009	0.00422	**0.09459**		10.020
ANAMAL C1 MT	Sargocentron spp	K2203698-019	1834-46	13.0	**0.00456**	0.00432	**0.00024**	B	0.002	0.00422	**0.00035**	B	0.003
ANAMAL C2 MT	Sargocentron spp	K2203698-020	1834-47	19.6	**0.00548**	0.00432	**0.00116**	B	0.006	0.00422	**0.00127**	B	0.006
ANAMAL C3 MT	Sargocentron spp	K2203698-021	1834-48	14.2	**0.00630**	0.00432	**0.00198**	B	0.014	0.00422	**0.00209**	B	0.015
ANAMAL C4 WF	Sargocentron spp	K2203701-013	1834-82	7.49	**0.00885**	0.00432	**0.00453**	B	0.061	0.00422	**0.00464**	B	0.062
ANAMAL C5 WF	Sargocentron spp	K2203701-014	1834-83	7.83	**0.00720**	0.00432	**0.00288**	B	0.037	0.00422	**0.00299**	B	0.038
ANAMAL C6 WF	Sargocentron spp	K2203701-015	1834-84	8.65	**0.00895**	0.00432	**0.00463**	B	0.054	0.00422	**0.00474**	B	0.055
PARK2MAL C1 MT	Sargocentron spp	K2203698-022	1834-49	13.8	**0.00648**	0.00432	**0.00216**	B	0.016	0.00422	**0.00227**	B	0.016
PARK2MAL C2 MT	Sargocentron spp	K2203698-023	1834-50	11.9	**0.00642**	0.00432	**0.00210**	B	0.018	0.00422	**0.00221**	B	0.019
PARK2MAL C3 MT	Sargocentron spp	K2203698-024	1834-51	8.91	**0.00164**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
PARK2MAL C4 WF	Sargocentron spp	K2203701-016	1834-85	14.5	**0.01020**	0.00432	**0.00588**	B	0.041	0.00422	**0.00599**	B	0.041
PARK2MAL C5 WF	Sargocentron spp	K2203701-017	1834-86	2.11	**0.00920**	0.00432	**0.00488**	B	0.231	0.00422	**0.00499**	B	0.236
PARK2MAL C6 WF	Sargocentron spp	K2203701-018	1834-87	3.05	**0.00961**	0.00432	**0.00529**	B	0.174	0.00422	**0.00540**	B	0.177
TUAMAL C1 MT	Sargocentron spp	K2203698-028	1834-52	6.53	**0.03000**	0.00432	**0.02568**		0.393	0.00422	**0.02579**		0.395
TUAMAL C2 MT	Sargocentron spp	K2203698-029	1834-53	15.3	**0.03000**	0.00432	**0.02568**		0.168	0.00422	**0.02579**		0.169
TUAMAL C3 MT	Sargocentron spp	K2203698-030	1834-54	7.91	**0.00319**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
TUAMAL C4 WF	Sargocentron spp	K2203701-040	1834-109	4.03	**0.02370**	0.00432	**0.01938**		0.481	0.00422	**0.01949**		0.483
TUAMAL C5 WF	Sargocentron spp	K2203701-041	1834-110	4.11	**0.00996**	0.00432	**0.00564**	B	0.137	0.00422	**0.00575**	B	0.140

American Samoa Environmental Protection Agency — Arsenic Analysis Summary (all sites)

Tier 2 Fish Toxicity Study

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Sample Name	Genus species	CAS Code[1] (composite)	BML Code[2] (composite)	As(t)[3,8] (ug/g)	As(i)[4,8] (ug/g)	As(i) Blank (geom mean)[5] (ug/g)	As(i) (corrected per geom mean) (ug/g)	C[9]	As(i)/As(t) (corrected per geom mean) (%)	As(i) Blank (median)[6] (ug/g)	As(i) (corrected per median) (ug/g)	C[9]	As(i)/As(t) (corrected per median) (%)
TUAMAL C6 WF	Sargocentron spp	K2203701-042	1834-111	9.84	**0.00313**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
LEMAL C1 MT	Sargocentron spp	K2203698-031	1834-55	6.13	**0.00154**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
LEMAL C2 MT	Sargocentron spp	K2203698-032	1834-56	7.29	**0.00369**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
LEMAL C3 MT	Sargocentron spp	K2203698-033	1834-57	11.5	**0.00518**	0.00432	**0.00086**	B	0.007	0.00422	**0.00097**	B	0.008
LEMAL C4 WF	Sargocentron spp	K2203698-034	1834-58	4.19	**0.00296**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
LEMAL C5 WF	Sargocentron spp	K2203698-035	1834-59	5.65	**0.00261**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
LEMAL C6 WF	Sargocentron spp	K2203698-036	1834-60	4.96	**0.00299**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
FAMAL C1 MT	Sargocentron spp	K2203698-037	1834-61	0.270	**0.00873**	0.00432	**0.00441**	B	1.634	0.00422	**0.00452**	B	1.672
FAMAL C2 MT	Sargocentron spp	K2203698-038	1834-62	0.235	**0.00633**	0.00432	**0.00201**	B	0.856	0.00422	**0.00212**	B	0.900
FAMAL C3 MT	Sargocentron spp	K2203698-039	1834-63	0.257	**0.00662**	0.00432	**0.00230**	B	0.896	0.00422	**0.00241**	B	0.936
FAMAL C4 WF	Sargocentron spp	K2203698-040	1834-64	7.96	**0.00262**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
FAMAL C5 WF	Sargocentron spp	K2203698-041	1834-65	5.77	**0.00190**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
FAMAL C6 WF	Sargocentron spp	K2203698-042	1834-66	6.32	**0.00729**	0.00432	**0.00297**	B	0.047	0.00422	**0.00308**	B	0.049
PARK2ALO C1 MT	Acanthurus lineatus	K2203698-025	1834-67	0.328	**0.01300**	0.00432	**0.00868**	B	2.647	0.00422	**0.00879**	B	2.678
PARK2ALO C2 MT	Acanthurus lineatus	K2203698-026	1834-68	0.559	**0.02860**	0.00432	**0.02428**		4.344	0.00422	**0.02439**		4.362
PARK2ALO C3 MT	Acanthurus lineatus	K2203698-027	1834-69	0.432	**0.02100**	0.00432	**0.01668**		3.862	0.00422	**0.01679**		3.885
POMAL C1 MT	Sargocentron spp	K2203701-001	1834-70	11.8	**0.00549**	0.00432	**0.00117**	B	0.010	0.00422	**0.00128**	B	0.011
POMAL C2 MT	Sargocentron spp	K2203701-002	1834-71	13.3	**0.00283**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
POMAL C3 MT	Sargocentron spp	K2203701-003	1834-72	26.9	**0.01060**	0.00432	**0.00628**	B	0.023	0.00422	**0.00639**	B	0.024
POMAL C4 WF	Sargocentron spp	K2203701-004	1834-73	4.85	**0.00281**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
POMAL C5 WF	Sargocentron spp	K2203701-005	1834-74	15.5	**0.00243**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
POMAL C6 WF	Sargocentron spp	K2203701-006	1834-75	13.2	**0.00707**	0.00432	**0.00275**	B	0.021	0.00422	**0.00286**	B	0.022
LAUMAL C1 MT	Sargocentron spp	K2203701-007	1834-76	18.3	**0.00240**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
LAUMAL C2 MT	Sargocentron spp	K2203701-008	1834-77	18.7	**0.00806**	0.00432	**0.00374**	B	0.020	0.00422	**0.00385**	B	0.021
LAUMAL C3 MT	Sargocentron spp	K2203701-009	1834-78	16.9	**0.00680**	0.00432	**0.00248**	B	0.015	0.00422	**0.00259**	B	0.015
LAUMAL C4 WF	Sargocentron spp	K2203701-010	1834-79	11.9	**0.00284**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
LAUMAL C5 WF	Sargocentron spp	K2203701-011	1834-80	10.0	**0.00449**	0.00432	**0.00017**	B	0.002	0.00422	**0.00028**	B	0.003
LAUMAL C6 WF	Sargocentron spp	K2203701-012	1834-81	7.85	**0.00739**	0.00432	**0.00307**	B	0.039	0.00422	**0.00318**	B	0.040
NUMAL C1 MT	Sargocentron spp	K2203701-019	1834-88	7.47	**0.00616**	0.00432	**0.00184**	B	0.025	0.00422	**0.00195**	B	0.026
NUMAL C2 MT	Sargocentron spp	K2203701-020	1834-89	11.6	**0.00387**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
NUMAL C3 MT	Sargocentron spp	K2203701-021	1834-90	10.4	**0.00615**	0.00432	**0.00183**	B	0.018	0.00422	**0.00194**	B	0.019
NUMAL C4 WF	Sargocentron spp	K2203701-022	1834-91	7.86	**0.00714**	0.00432	**0.00282**	B	0.036	0.00422	**0.00293**	B	0.037
NUMAL C5 WF	Sargocentron spp	K2203701-023	1834-92	5.26	**0.00358**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
NUMAL C6 WF	Sargocentron spp	K2203701-024	1834-93	11.2	**0.00329**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----

American Samoa Environmental Protection Agency — Arsenic Analysis Summary (all sites)

Tier 2 Fish Toxicity Study

filename: arsenic analysis summ.xls

Sample Name	Genus species	CAS Code[1] (composite)	BML Code[2] (composite)	As(t)[3,8] (ug/g)	As(i)[4,8] (ug/g)	As(i) Blank (geom mean)[5] (ug/g)	As(i) (corrected per geom mean) (ug/g)	C[9]	As(i)/As(t) (corrected per geom mean) (%)	As(i) Blank (median)[6] (ug/g)	As(i) (corrected per median) (ug/g)	C[9]	As(i)/As(t) (corrected per median) (%)
MAMAL C1 MT	Sargocentron spp	K2203701-025	1834-94	12.1	**0.00600**	0.00432	**0.00168**	B	0.014	0.00422	**0.00179**	B	0.015
MAMAL C2 MT	Sargocentron spp	K2203701-026	1834-95	14.4	**0.00593**	0.00432	**0.00161**	B	0.011	0.00422	**0.00172**	B	0.012
MAMAL C3 MT	Sargocentron spp	K2203701-027	1834-96	14.2	**0.00531**	0.00432	**0.00099**	B	0.007	0.00422	**0.00110**	B	0.008
MAMAL C4 WF	Sargocentron spp	K2203701-028	1834-97	5.46	**0.00296**	0.00432	**As(i)≤blank**	ND	-----	0.00422	**As(i)≤blank**	ND	-----
MAMAL C5 WF	Sargocentron spp	K2203701-029	1834-98	7.21	**0.00919**	0.00432	**0.00487**	B	0.068	0.00422	**0.00498**	B	0.069
MAMAL C6 WF	Sargocentron spp	K2203701-030	1834-99	60.0	**0.00479**	0.00432	**0.00047**	B	0.001	0.00422	**0.00058**	B	0.001
PALACRAB C1	Not identified	K2203701-034	1834-103	1.16	**0.00889**	0.00432	**0.00457**	B	0.394	0.00422	**0.00468**	B	0.403
PALACRAB C2	Not identified	K2203701-035	1834-104	0.527	**0.00863**	0.00432	**0.00431**	B	0.818	0.00422	**0.00442**	B	0.838
PALACRAB C3	Not identified	K2203701-036	1834-105	1.93	**0.01680**	0.00432	**0.01248**		0.647	0.00422	**0.01259**		0.652
PALACLAMS C1	Asaphis violascens	K2203701-037	1834-106	1.26	**0.08760**	0.00432	**0.08328**		6.610	0.00422	**0.08339**		6.618
PALACLAMS C2	Asaphis violascens	K2203701-038	1834-107	1.30	**0.07530**	0.00432	**0.07098**		5.460	0.00422	**0.07109**		5.468
PALACLAMS C3	Asaphis violascens	K2203701-039	1834-108	1.53	**0.10600**	0.00432	**0.10168**		6.646	0.00422	**0.10179**		6.653
PAGOCLAMS C1[7]	Asaphis violascens	K2200118-006	1759-4	5.08	**0.21600**	0.00432	**0.21168**		4.167	0.00422	**0.21179**		4.169
PAGOCLAMS C2[7]	Asaphis violascens	K2200118-007	1759-5	4.70	**0.22100**	0.00432	**0.21668**		4.610	0.00422	**0.21679**		4.612
PAGOCLAMS C3[7]	Asaphis violascens	K2200118-008	1759-6	5.90	**0.24800**	0.00432	**0.24368**		4.130	0.00422	**0.24379**		4.132

Notes:

1. CAS = Columbia Analytical Services, Kelso, WA, USA
2. BML = Battelle Marine Sciences Laboratories, Sequim, WA, USA
3. As(t) = Total Arsenic; detection limit 0.0025 ug/g (per method)
4. As(i) = Inorganic Arsenic; detection limit 0.0091 ug/g (established by BML; see BML/Peshut notes in file)
5. Geometric mean of batch blanks per BML (used for illustrative purposes only, not applicable to risk assessment)
6. Median of batch blanks per BML (applied as correction for risk assessment)
7. Data from *Joint Cannery Fish Tissue Study* , CH2M Hill, 2002, for ASEPA
8. All analyses per wet weight basis
9. C = ASEPA concentration qualifier; ND = Not detected (As(i) less than or equal to blank), B = reported below method detection limit