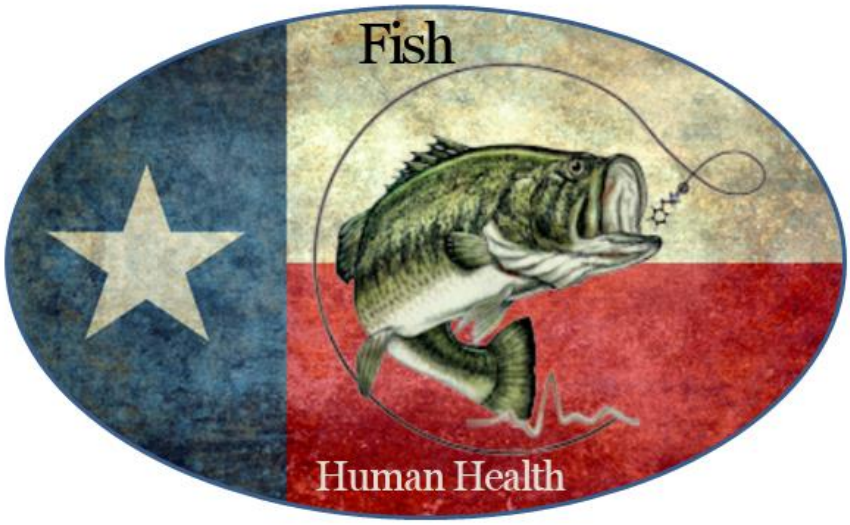
Texas Fish Consumption Advisory Program

Standard Operating Procedures

Field Operations and Data Quality



Department of State Health Services
Seafood and Aquatic Life Group
Survey Team

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LIST OF ACRONYMS

ATMP	Air Temperature
cfs	Cubic Feet per Second
CL	Clear
cm	Centimeter
COC	Chain-of Custody
CPR	Cardiopulmonary Resusitation
CRRL	Contract Required Reporting Limit
CT	Crab Trap
CWA	Clean Water Act
CY	Cloudy
dd	Two Digit Day
dd	Two Digit Day
DSHS	Department of State Health Services
E	East
EPA	Environmental Protection Agency
ES	Electrofishing
F	Female
FG	Fog
FL	Fork Length
FSAS	Fish Sampling Advisory Subcommittee
ft	Feet
g	Gram
GERG	Geochemical and Environmental Research Group
GN	Gill Net
GSMFC	Gulf States Marine Fisheries Commission
HL	Hook and Line
HZ	Hazy
in	Inch
IT	Incoming Tide
JL	Jug Line
kg	Kilogram
LAT	Latitude
lb	Pound
LONG	Longitude
LOQ	Limits of Quantitation
M	Male
µS	Microsiemens
mm	Millimeter
mm	Two Digit Month
msl	Mean sea level
N	North
N	No

LIST OF ACRONYMS CONT.

ND	Not Detected
NE	Northeast
NW	Northwest
OD	Oyster Dredge
OT	Outgoing Tide
PC	Partly Cloudy
PCB	Polychlorinated Biphenyl
PCDD	Polychlorinated Dibenzo-p-Dioxin
PCDF	Polychlorinated Dibenzofuran
PM	Project Manager
PO	Purchase Order
POC	Point of Contact
ppt	Parts per Thousand
PQL	Practical Quantitation Limit
PVC	Polyvinyl Chloride
QA	Quality Assurance
QAO	Quality Assurance Officer
QAP	Quality Assurance Plan
QAPP	Quality Assurance Project Plan
QC	Quality Control
RIVDIS	River Discharge
RIVSTG	River Stage
RL	Reporting Limit
RN	Rain
RPD	Relative Percent Difference
RSVRELV	Reservoir Elevation
S	South
SAL	Salinity
SALG	Seafood and Aquatic Life Group
SE	Southeast
SFT	Sport-Fishing Tournament
SOP	Standard Operating Procedure
SpCOND	Specific Conductance
SRM	Standard Reference Material
ST	Slack Tide
SVOC	Semivolatile Organic Compound
SW	Southwest
TIDE	Tidal Movement
TL	Trotline
TL	Total Length
TMDL	Total Maximum Daily Load
TPWD	Texas Parks and Wildlife Department

LIST OF ACRONYMS CONT.

TSCC	Toxic Substances Coordinating Committee
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Volatile Organic Compound
W	West
WDIR	Wind Direction
WSPD	Wind Speed
WTMP	Water Temperature
WX	Weather
Y	Yes
yy	Two Digit Year

1.0 Mission

The mission of the Seafood and Aquatic Life Group (SALG) Survey Team is to protect consumers and recreational fishers from disease or chemical contaminants found in fish and other aquatic organisms harvested from Texas' reservoirs, rivers, estuaries, near shore state waters, and offshore federal waters.

2.0 Purpose

The goal of the Seafood and Aquatic Life Group Survey Team is to provide data that are scientifically valid, legally defensible, and of known precision and accuracy for characterizing public health risks associated with the consumption of fish, shellfish, and other aquatic organisms (e.g., frogs) and making sound risk management decisions to communicate risks effectively to consumers.

3.0 Introduction

Chemical contamination of aquatic resources has occurred since the Industrial Revolution began in the early 1800s. Environmental concentrations of chemical contaminants have increased from the time of the Industrial Revolution to today due to intensifying urbanization, industrial development, and use of new agricultural chemicals.[1] In 1948, the first major U.S. law to address water pollution was implemented. It was known as the Federal Water Pollution Control Act of 1948.[2] Increased awareness of aquatic pollution along with concern for controlling it led to comprehensive amendments in 1972. The Federal Water Pollution Control Act of 1948, as amended in 1972, became commonly known as the Clean Water Act (CWA). These stronger environmental laws have decreased the concentrations of some chemical contaminants in aquatic resources over the past forty plus years. Chemical contaminants affecting our aquatic resources today come from a variety of sources including permitted point source discharges (e.g., industrial and municipal facilities), accidental spills, and nonpoint sources (e.g., agricultural practices, resource extraction, urban runoff, in-place sediment contamination, groundwater recharge, vehicle exhaust, and atmospheric deposition from various combustion and incineration processes). Typical chemical contaminants from these pollution sources may include heavy metals, pesticides, polychlorinated biphenyls (PCBs), polychlorinated dibenzo-*p*-dioxins and/or dibenzofurans (PCDDs/PCDFs), or other complex volatile and semi-volatile organic compounds.

Chemical contaminant monitoring of fish, shellfish, and other aquatic organisms serves as an important indicator for chemical contamination of our aquatic environments. As chemical contaminants reach surface waters, they become part of the aquatic food web. Some aquatic organisms easily absorb contaminants from their surrounding environment (i.e., water or sediments), or from consuming other aquatic organisms. If absorption of contaminants is not immediately balanced by excretion, the concentration of contaminants in the organism may exceed the concentration in the surrounding waters or foods, a process known as

bioconcentration. Some aquatic organisms have no physiological mechanisms for removing contaminants from their bodies. Continued absorption of contaminants from their surrounding environment or food without concomitant excretion results in accumulation of the substance in the organism, a process called bioaccumulation.[3] The result of bioconcentration, bioaccumulation and biotransfer of chemical contaminants in an aquatic food web is a process known as biomagnification whereby contaminant concentrations increase at each trophic level in the aquatic food web (e.g., increasing concentrations from algae, to zooplankton, to forage fish, to predator fish). Understanding the dynamic processes of bioconcentration, bioaccumulation, and biomagnification is important in protecting humans and other organisms from the adverse effects of chemical contaminant exposure and has also become a critical consideration in the regulation of chemicals.

The Texas Department of State Health Services (DSHS) is charged under the Health and Safety Code, Chapter 436, Texas Aquatic Life Act to declare a body of public water a prohibited area if a sanitary, chemical, or bacteriological survey indicates aquatic life is unfit for human consumption.[4] To carry out this charge, the DSHS Seafood and Aquatic Life Group monitors chemical contaminant levels in fish, shellfish, and other aquatic organisms from Texas' reservoirs, rivers, estuaries, nearshore state waters, and offshore federal waters to determine the public health risks associated with consumption of these food sources.

This manual was developed to provide standardized procedures for collecting, handling, processing, and analyzing fish, shellfish, and other aquatic organism samples and maintaining quality chemical contaminant data for Texas' Fish Consumption Advisory Program. It also serves as a reference or guidance document for biologists, epidemiologists, toxicologists, and risk assessors to provide information about sample collection and sample processing techniques for development of aquatic resource chemical contaminant studies. The quality of our sample collection methods and sample processing techniques determines the usefulness and reliability of the data for assessing public health risks associated with consumption of fish, shellfish, and other aquatic organisms. This manual is based, in part, on the procedures established by the *U.S. EPA Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volumes 1– 4* and guidance from the State of Texas' Toxic Substances Coordinating Committee (TSCC) Fish Sampling Advisory Subcommittee (FSAS).[5]

4.0 Study Design

The SALG conducts Tier 2 intensive studies to assess the magnitude of contamination in edible portions of commonly consumed fish, shellfish, and other aquatic organisms, to determine size-specific levels of chemical contamination; to assess the geographic extent of chemical contamination; and, to characterize potential human health risks associated with the consumption of environmentally contaminated fish, shellfish, and other aquatic organisms.

Prior to initiating a Tier 2 intensive study, the SALG staff develops a detailed sampling plan that clearly defines the following seven (7) major components: study objectives, site selection, target species and size class selection, sample type, target analyte selection, sample

collection period, and sample size. This section describes each of the seven major components and provides guidance for developing a detailed sampling plan.

4.1 Study Objectives

The primary objective of a SALG Tier 2 intensive study is to characterize the human health risks associated with the consumption of fish, shellfish, and other aquatic organisms and to formulate sound risk management strategies to communicate the health risks and benefits of fish consumption effectively to consumers.

4.2 Site Selection

Sample sites are selected based on the assessment and professional judgment of the following seven (7) factors by the SALG staff: 1) location of point source pollution, 2) fishing pressure (e.g., sport, commercial, and subsistence), 3) public access, 4) location of fish, shellfish, and other aquatic organisms' habitat, 5) review of relevant water, sediment, and tissue data (e.g., Tier 1-screening studies or historical fish and shellfish tissue data), 6) assessment of watershed activities and potential nonpoint source pollution inputs, and 7) site accessibility. When study resources are limited, sample sites shall be selected to target fish, shellfish, and other aquatic organisms from areas suspected of having the highest levels of chemical contamination and posing the greatest potential human health risk from consumption.

Studies designed to evaluate the effects of point-source pollution must have sample sites located at, or just downstream of, the discharge point, and include sample sites that are located in areas assumed minimally impacted from the point source discharge. This type of study design identifies extremes of bioconcentration, bioaccumulation, and biomagnification ranging from presumed undisturbed reference sites to sites where existing data or the presence of potential pollutant sources suggest significant chemical contamination. This approach allows the SALG to characterize the risk from consumption of chemically contaminated fish, shellfish, and other aquatic organisms for the entire study area.

Studies designed to reevaluate existing fish and shellfish tissue chemical contamination problems (i.e., consumption advisories and bans) should select sample sites based on the location of historical sample sites. This approach allows temporal and spatial data comparison and reevaluation of the existing human health risk management actions.

4.3 Target Species and Size Class Selection

The 1993 United States Environmental Protection Agency (EPA) Fish Contaminant Workgroup developed freshwater and estuarine/marine ecosystems target species lists for state contaminant monitoring programs assessing human consumption concerns.[1] The target species lists were developed based on review of species used in the following national monitoring programs: National Study of Chemical Residues in Fish (EPA), National Dioxin Study

(EPA), National Pesticide Monitoring Program (United States Fish and Wildlife Service [USFWS]), National Contaminant Biomonitoring Program (USFWS), National Water Quality Assessment Program (United States Geological Survey [USGS]), and on a review of fish and shellfish species cited in state fish and shellfish consumption advisories or bans. The criteria used to select target species were similar in all monitoring programs reviewed by the workgroup. However, the priority given to each criterion may vary depending on the monitoring program objectives. According to the 1993 EPA Fish Contaminant Workgroup, the three most important criterion for selecting target fish and shellfish for state contaminant monitoring programs assessing human consumption concerns were that species have the potential to bioaccumulate high concentrations of chemical contaminants, species were commonly consumed in the study area and were of commercial, recreational, or subsistence fishing value, and that species have a wide geographic distribution.[1] In addition to the three primary criteria for target species selection, it is also important that the target species be easy to identify taxonomically because of species-specific differences in bioaccumulation potential. It is also both practical and cost-effective to sample target species that are abundant, easy to capture, and large enough to provide adequate tissue samples for chemical analyses. The final selection of target species will rely on the expertise of risk assessors and/or fisheries biologists with knowledge of local species that meet selection criteria and knowledge of local human consumption patterns. Although, ideally, all aquatic organisms consumed by the local population should be monitored, resource constraints may dictate that only a few of the most frequently consumed species be sampled.

Use of two distinct ecological groups of fish (i.e., bottom-feeders and predators) as target species in freshwater and estuarine/marine systems is recommended. By sampling fish from different ecological groups, it allows the SALG to monitor ecological group-specific habitats, feeding strategies, and physiological factors. These ecological group-specific factors may contribute to differences in bioconcentration, bioaccumulation, and biomagnification of chemical contaminants. Tables 4.3.1– 4.3.4 list the recommended target species for Texas' reservoirs, rivers, estuaries, and nearshore and offshore marine environments, respectively. Preferred target species are identified for freshwater, estuaries, nearshore and offshore marine waters (Tables 4.3.1– 4.3.4). If the preferred or recommended target species are unavailable at the selected study site(s), the SALG collects available species as sample specimens. For reevaluation of previously studied waters, target species selected should be the same target species collected in previous studies.

Fish and shellfish sample specimens collected shall be of harvestable size as defined by Texas Parks and Wildlife Department (TPWD) freshwater and saltwater fishing statewide regulations or recreational fishing regulations for Gulf of Mexico Federal Waters for species managed by the Gulf of Mexico Fishery Management Council.[6, 7] When harvestable size fish, shellfish, or other aquatic organisms are unavailable, fish, shellfish, or other aquatic organisms of any size may be selected as sample specimens (refer to the ***Sample Type*** section for more details on selecting and processing small fish or shellfish sample specimens).

Table 4.3.1. Freshwater Target Species

Common Name	Scientific Name	Length Limit[a]
Predators		
Alligator gar	*Atractosteus spatula*	No length limit
Bass, largemouth[b]	*Micropterus salmoides*	≥ 14 inches
Bass, smallmouth	*Micropterus dolomieu*	≥ 14 inches
Bass, spotted	*Micropterus punctulatus*	No length limit
Black crappie	*Pomoxis nigromaculatus*	≥ 10 inches
Blue tilapia	*Tilapia aurea*	No length limit
Flathead catfish[b]	*Pylodictus olivaris*	≥ 18 inches
Freshwater drum[b]	*Aplodinotus grunniens*	No length limit
Hybrid striped bass[b]	*Morone saxatilis x M. chrysops*	≥ 18 inches
Longnose gar	*Lepisosteus osseus*	No length limit
Striped bass[b]	*Morone saxatilis*	≥ 18 inches
Sunfish species	*Lepomis spp.*	No length limit
Walleye	*Stizostedion vitreum*	No length limit
White bass[b]	*Morone chrysops*	≥ 10 inches
White crappie[b]	*Pomoxis annularis*	≥ 10 inches
Bottom Feeders		
Blue catfish[b]	*Ictalurus furcatus*	≥ 12 inches
Channel catfish[b]	*Ictalurus punctatus*	≥ 12 inches
Common carp[b]	*Cyprinus carpio*	No length limit
Redhorse species	*Moxostoma spp.*	No length limit
River carpsucker	*Carpoides carpio*	No length limit
Smallmouth buffalo[b]	*Ictiobus bubalus*	No length limit

[a] These are statewide regulations enforced by TPWD. Length limits may vary by water body due to special regulations. Exceptions to the statewide regulations are published in TPWD Outdoor Annual.[6]
[b] Indicates preferred target species.

Table 4.3.2. Estuarine Target Species

Common Name	Scientific Name	Length Limit[a] (minimum – maximum)
Predatory Species		
Red drum[b]	*Sciaenops ocellatus*	20 – 28 inches
Sand trout[b]	*Cynoscion arenarius*	No length limit
Southern flounder[b]	*Paralichthys lethostigma*	14 inches – no limit
Spotted seatrout[b]	*Cynoscion nebulosus*	15 – 25 inches
Bottom Feeding Species		
Atlantic croaker	*Micropogonias undulates*	No length limit
Atlantic stingray	*Dasyatis sabina*	No length limit
Black drum[b]	*Pogonias cromis*	14 – 30 inches
Gafftopsail catfish[b]	*Bagre marinus*	14 inches – no limit
Hardhead catfish	*Arius felis*	No length limit
Sheepshead[b]	*Archosargus probatocephalus*	15 inches – no limit
Oyster Species		
Eastern oyster	*Crassostrea virginica*	3 inches – no limit
Shrimp Species		
Brown shrimp[b]	*Penaeus aztecus*	No length limit
Pink shrimp	*Penaeus duorarum*	No length limit
White shrimp[b]	*Penaeus setiferus*	No length limit
Crab Species		
Blue crab[b]	*Callinectes sapidus*	5 inches – no limit
Stone crab	*Mennipe mercenaria*	2.5 inch right claw length

[a] These are statewide regulations enforced by TPWD. Length limits may vary by water body due to special regulations. Exceptions to the statewide regulations are published in TPWD Outdoor Annual.[6]
[b] Indicates preferred target species.

Table 4.3.3. Nearshore Marine Target Species

Common Name	Scientific Name	TPWD Length Limit (minimum – maximum)[a]	Gulf of Mexico Federal Water Length Limit (minimum – maximum)[b]
Near shore Species			
Little tunny (Bonito)	*Euthynnus alletteratus*	No length limit	No length limit
Cobia/Ling	*Rachycentron canadum*	37 inches – no limit	33 inches – no limit[c]
Crevalle jack	*Caranx hippos*	No length limit	No length limit
Greater amberjack	*Seriola dumerili*	34 inches – no limit	30 inches – no limit[c]
King mackerel	*Scomberomorus cavalla*	27 inches – no limit	24 inches – no limit[c]
Shark, atlantic sharpnose	*Rhizoprionodon terraenovae*	24 inches – no limit	No length limit
Shark, blacktip	*Carcharhinus limbatus*	24 inches – no limit	54 inches – no limit[c]
Shark, bonnethead	*Sphyrna tiburo*	24 inches – no limit	No length limit
Snapper, lane	*Lutjanus synagris*	8 inches – no limit	8 inches – no limit
Snapper, mangrove	*Lutjanus griseus*	No length limit	12 inches – no limit
Snapper, red	*Lutjanus campechanus*	15 inches – no limit	16 inches – no limit
Snapper, vermilion	*Rhomboplites aurorubens*	10 inches – no limit	10 inches – no limit
Spanish mackerel	*Scomberomorus maculatus*	14 inches – no limit	12 inches – no limit[c]
Tripletail	*Lobotes surinamensis*	17 inches – no limit	No length limit

[a] Statewide regulations enforced by TPWD are published in TPWD Outdoor Annual.[6]

[b] Federal water regulations published by the Gulf of Mexico Fishery Management Council.[7]

[c] Fork length

Table 4.3.4. Offshore Marine Target Species

Common Name	Scientific Name	TPWD Length Limit (minimum – maximum)[a]	Gulf of Mexico Federal Water Length Limit (minimum – maximum)[b]
Offshore Species			
Blackfin tuna	*Thunnus atlanticus*	No length limit	No length limit
Blue marlin	*Makaira nigricans*	131 inches – no limit	99 inches – no limit[d]
Shallow-water Groupers			
Grouper, gag	*Mycteroperca microlepis*	22 inches – no limit	22 inches – no limit
Grouper, black	*Mycteroperca bonaci*	No length limit	22 inches – no limit
Grouper, red	*Epinephelus morio*	No length limit	20 inches – no limit
Grouper, yellowfin	*Mycteroperca venenosa*	No length limit	20 inches – no limit
Grouper, scamp	*Mycteroperca phenax*	No length limit	16 inches – no limit
Grouper, yellowmouth	*Mycteroperca interstitialis*	No length limit	No length limit
Grouper, rock hind	*Epinephelus adscensionis*	No length limit	No length limit
Grouper, red hind	*Epinephelus guttatus*	No length limit	No length limit
Deep-water Groupers			
Grouper, yellowedge	*Epinephelus flavolimbatus*	No length limit	No length limit
Grouper, misty	*Epinephelus mystacinus*	No length limit	No length limit
Grouper, snowy	*Epinephelus niveatus*	No length limit	No length limit
Grouper, speckled hind	*Epinephelus drummondhayi*	No length limit	No length limit
Grouper, warsaw	*Epinephelus nigritus*	No length limit	No length limit
Mahi-mahi	*Coryphaena hippurus*	No length limit	No length limit
Swordfish	*Xiphias gladius*	No length limit	47 inches – no limit[d]
Wahoo	*Acanthocybium solandri*	No length limit	no limit
Yellowfin tuna	*Thunnus albacares*	No length limit	27 inches – no limit[c]

[a] Statewide regulations enforced by TPWD are published in TPWD Outdoor Annual.[6]
[b] Federal water regulations published by the Gulf of Mexico Fishery Management Council.[7]
[c] Fork length
[d] Minimum size lower jaw to fork

4.4 Sample Type

Individual fish tissue fillet samples (skin-off fillet) or edible muscle tissue for shellfish and other aquatic organisms are required, which allow for a more detailed analysis of size versus contaminant concentration for characterizing risk. The fillet or edible muscle tissue sample must consist of a minimum 50-gram tissue sample for inorganic and organic analyses or a minimum 5-gram tissue sample for mercury analysis. Fish tissue samples should be dorsal epaxial and hypaxial muscle tissue with the skin removed. For mercury analysis only, a small, skinless muscle plug or fillet of dorsal epaxial muscle tissue may be used. For small target fish species, shellfish, or other aquatic organism samples, composite samples are appropriate to meet the minimum tissue sample size requirements for laboratory analyses. In preparation of a composite sample, the smallest specimen in the composite must be at least 75% of the total length of the largest specimen in the composite. Composite samples shall consist of specimens from the same species and consist of two to five fish, four to six crabs, or an appropriate number of oysters to ensure that 50-gram or 5-gram minimum tissue sample size requirement for chemical contaminant analyses are met.

4.5 Target Analyte Selection

The appropriate target analyte selection is essential to the adequate protection of fish, shellfish, and other aquatic organism consumers.[1] The EPA has developed a list of recommended target analytes for fish and shellfish chemical contaminant studies from a review of the following information: pollutants analyzed in several national and regional fish contaminant monitoring programs, pesticides with active registrations, contaminants that have triggered states to issue fish and shellfish consumption advisories or bans, and published literature on the chemistry and health effects of potential contaminants. The SALG has developed a list of target analytes based on EPA's recommendations, chemical contaminants previously identified in water quality, sediment, and fish tissue studies, and guidance from the TSCC FSAS (Appendix A.1). The target analyte list is divided into sections by chemical contaminant type: metals, pesticides, polychlorinated biphenyls (PCBs), polychlorinated dibenzo-*p*-dioxins and/or dibenzofurans (PCDDs/PCDFs), semivolatile organic compounds (SVOCs), and volatile organic compounds (VOCs).

Fish tissue chemical contaminant studies are usually a result of the discovery of a specific chemical contaminant(s) during water quality monitoring, sediment monitoring, or identification of pollution sources. Ideally, a fish tissue contaminant study or fish contaminant monitoring program should look at all target analytes because this provides the greatest amount of information for fishers; however, financial resources available to complete the laboratory analyses are usually limited. Thus, the SALG uses a watershed-based approach to select target analytes.[1] This approach takes into consideration the following target analyte selection and prioritization factors: land use categories (i.e., rural, agricultural, suburban/urban, and industrial)[1], as well as geological characteristics, identified point source pollution, national pollution trends, available environmental data (i.e., fish tissue screening studies, water quality and sediment data), and financial resources. The watershed-based approach gives the highest

priority to chemical contaminants that are widely dispersed nationally, relatively inexpensive to analyze, and assigns priority selection to target analytes based on the target analyte selection factors.

SALG Tier 2 intensive tissue studies should adhere to the following target analyte selection guideline if financial resources are available: for every five (5) tissue samples collected for a study, one (1) full scan analysis (i.e., metals, pesticides, PCBs, PCDDs/PCDFs SVOCs, and VOCs) should be completed for a selected tissue sample. In the event that the SALG is the first to conduct a tissue chemical contaminant study of a water body, the SALG attempts to maximize the number of full scan analyses based on the financial resources available for the study to fully evaluate the extent of chemical contamination.

4.6 Sample Collection Period

Fish, shellfish, and other aquatic organism's tissue samples may be collected at any time during the year, with emphasis placed on the time of year when the target species are effectively sampled and most frequently harvested for consumption. Ideally, sampling for the same waterbody should remain consistent between years or sampling events by season of the year (e.g., fall).

4.7 Sample Sizes

SALG Tier 2 intensive tissue study sample sizes are generally subjectively determined by the SALG from the following guidelines: available financial resources; size of water body; contaminant(s) of concern; and if historical data are available, the use of a statistical test may be used to determine the appropriate sample size for a SALG Tier 2 intensive tissue study.[8] The SALG's goal of applying the statistical test is to determine the fish, shellfish, or other aquatic organism sample size necessary to accurately estimate the population chemical contaminant mean concentration as shown below:

$$\textbf{sample size} \cong \frac{(\text{t-value})^2\ (\text{sample variance})}{(\text{accuracy} \times \text{sample mean})^2}$$

Where:

t-value = value from t-table (n-1 degrees of freedom; two tails; p = 0.05)
sample variance = chemical contaminant concentration sample variance
accuracy = The relative accuracy in describing the true population mean. If, for example it was desired that the mean should be estimated within 90% of the true value, the accuracy should be set to 0.9.
sample mean = chemical contaminant concentration sample mean

5.0 Sample Collection

5.1 Scientific Collection Permit

A scientific collection permit must be obtained from the Texas Parks and Wildlife Department (TPWD) Wildlife Permits Office to collect fish, shellfish, and other aquatic organisms from Texas waters. The scientific collection permit must be renewed every three years. While collecting fish, shellfish, and other aquatic organisms under a, TPWD issued, scientific collection permit, the SALG is required to comply with the following items:

- Notify TPWD Law Enforcement Communications not less than 24 hours nor more than 72 hours prior to sample collection by telephone (512) 389-4848 or email to LE.Communications@tpwd.state.tx.us. For projects that extend beyond one sampling event (i.e., one day), the TPWD will accept an email notification describing the activities for the sample collection period. An example email is provided in Appendix A.2.
- Carry a copy of the scientific collection permit and a copy of this SOP at all times when exercising the provisions of the permit.
- Properly dispose of protected fish, shellfish, and other aquatic organisms taken under the authority of the permit.
- File a scientific collection permit report form (available: http://www.tpwd.state.tx.us/business/permits/land/wildlife/research/) annually with the TPWD, Wildlife Diversity Permits Section, 4200 Smith School Rd., Austin, Texas 78744, no later than fourteen days following the anniversary date of the permit. The preferred method to submit the annual report is email. Email to Christopher Maldonado, Wildlife Permits Specialist Christopher.Maldonado@tpwd.state.tx.us The permit is not valid unless an annual report form has been received by TPWD.

5.2 Methods of Collection

The method of collection chosen will depend on the target species sought and the conditions at the sample collection site. Both active and passive methods of collection may be used. The most effective or efficient method of collection should be used for the target species sought. The primary methods of collection for fish samples are electrofishing (active) and gill netting (passive). Other methods of collection for fish, shellfish, and other aquatic organisms include trap nets, juglines, trotlines, crab traps, oyster dredges, and, if needed hook and line may be used as a method of collection.

5.2.1 Electrofishing

Gear Requirements

- **Boat**: All electrofishing boats must have a semi-V or flat bottom aluminum hull that has sufficient bow deck size to accommodate at least one dipper. The boat must have a removable bow rail waist height constructed of metal extending to the rear of the bow deck. Outboard motor and options must be selected based on boat size and use. (e.g., river-small water body boat or reservoir-bay boat).

The reservoir-bay boat must be a minimum of 20 feet in length and equipped with a minimum of a 150 horsepower outboard motor with electric start, power trim/tilt, and hydraulic jackplate. The river-small water body boat must be a minimum of 14 feet in length and equipped with a minimum of a 40 horsepower outboard motor with electric start, power trim/tilt, and hydraulic jackplate.

- **Pulsator and Generator**: The electrofishing boat must be equipped with an electrofishing unit with specifications comparable to Smith-Root Model GPP 2.5, 5.0, or 7.5. The model chosen must be based on the boat size, specifications, and conductivity of waters sampled.

- **Booms and Arrays**: The electrofishing boat should have booms constructed from a rigid, non-metallic material such as polyvinyl chloride (PVC) pipe or fiberglass. Boom design must be based on boat size and use. The electrofishing boat may be customized with electrofishing booms that meet the needs determined by the staff. Boom length may be determined by staff not to exceed 8 feet in length and width. The booms shall be adjustable for height and direction, or the electrofishing boat may have a "T" boom design mounted from the center of the bow rail. The "T" boom must be adjustable for height. Another acceptable electrofishing boom design is booms 7-8 feet in length mounted from the corners of the bow. The "T" boom design is the preferred boom design. The electrofishing unit may be equipped with electrofishing anode arrays similar in design to Smith-Root SAA-6 adjustable anode arrays. The boat hull must be wired to act as the cathode.

- **Safety Equipment and Procedures:**

  1) The electrofishing unit must be equipped with a single or dual foot operated safety switch.
  2) The electrofishing unit generator must be grounded to the hull.
  3) Bow and boat floor decking must have a non-skid surface.
  4) Dip nets must have fiberglass handles.
  5) Dippers shall wear rubber-soled shoes or rubber boots and lineman gloves (1,000-volt minimum rated).
  6) The electrofishing boat operator-driver and dipper(s) shall wear hearing protection.
  7) All staff of the SALG Survey Team shall be trained in Cardiopulmonary Resuscitation (CPR) and First Aid.
  8) All staff of the SALG Survey Team and observers must be familiar with electrofishing safety procedures.

- **Sample Activities:** Electrofishing should be conducted in shoreline areas accessible by the electrofishing boat. Sampling areas within a designated sample site should be selected based on the availability of suitable fish habitat to

optimize sampling efficiency.

5.2.2 Gill Netting

Gear Requirements

- **Gill Net Size/Design:** No standard gill net size is required. Gill net length, depth, mesh size, and twine or monofilament size may vary depending on study objectives and/or size of target species sought (Appendix A.3). The recommended gill net size for reservoir and estuarine sampling ranges from 120 to 300 feet by four to eight feet deep consisting of single or multiple panels of square mesh monofilament ranging in size from 1– 3 inches (bar length). If multiple mesh sizes are chosen, the gill net should be divided into mesh panels of equal length and depth. The float and bottom lines shall be constructed of 3/8-inch braided polyfoamcore and #30 leadcore, respectively.

- **Gill net specification example:**

Net Length (ft)	Net Depth (ft)	No. of Panels	Panel Length(ft)	Bar Length (in)	Twine Size
120	8	1	40	2.0	No. 6/#139
		1	40	2.5	No. 6/#139
		1	40	3.0	No. 6/#139

- **Related Equipment:** At least two floating buoys, not less than 6 inches in length, width, and height must be attached with poly or nylon rope to both ends of the float line of each net, and at least two weights must be attached to the leadcore line, one weight at each end of the net. An alternate method may be used to secure gill nets in shallow water. This method requires the use of stakes or poles to stake the lead core line to reservoir or estuary bottom. All gill nets must be identified by an identification tag affixed to the gill net float line near the buoy or identification written on the buoy surface.

- **Sample Activities:** Gill nets should be set in the late afternoon – fished overnight – and retrieved the next day. Overnight gill net sets allow the nets to be fished during two low light periods optimizing fish catch. Gill nets may be set for shorter periods of time as determined by the staff that will be suited to the sampling needs and objectives. Suitable fish habitat should be located and seasonal fish movement should be accounted for when selecting areas to set gill nets.

5.2.3 Juglines

Gear Requirements

- **Jugline Size/Design:** No standard jugline design is required. The design may be determined by the staff that will be suited to the sampling needs and objectives (Appendix A.3). Juglines should be of similar construction and materials. The main body of the juglines shall be constructed of a rigid, non-metallic material such as PVC. The body shall be constructed at a minimum length of 12 inches. Width may vary based on the appropriate design used to meet the sampling objectives. All juglines will be glued and capped on each end and will have an eye bolt attached to one end cap to secure size 18 or larger untreated nylon twine. Each jugline will be equipped with a standard in-line or three-way swivel, leader, heavy wire hook, and/or lead sinker.

- **Related Equipment:** Designs using a one inch diameter non-metallic material or less should incorporate a closed-cell foam tube float, not less than six inches in length, during the assembly process. All juglines must be identified by an identification tag affixed to the body of the jugline or identification written on the float surface. The leader shall be monofilament, untreated nylon twine, or wire. The type of leader material chosen will depend upon the target species sought. The recommended leader type for catfish species is monofilament or untreated nylon twine, and for alligator gar it is wire.

- **Bait:** Bait for juglines may be fresh or frozen nongame fish and may be caught from additional sampling activities such as electrofishing or other acceptable methods. All unused bait must be properly discarded or frozen. Commercial baits may be substituted if staff has difficulties collecting bait.

- **Sampling Activities:** Juglines should typically be set in the late afternoon – fished overnight – and retrieved the next day. Overnight jugline sets allow the lines to be fished during two low light periods optimizing fish catch. Suitable fish habitat should be located and seasonal fish movement should be accounted for when selecting areas to set juglines. Staff may use alternative daytime sets to optimize catch rates.

5.2.4 Crab Traps

Gear Requirements

- **Trap Size/Design:** May not exceed 18 cubic feet. Traps are constructed of #20 gauge coated aluminum wire for protection against corrosion. Traps shall be constructed using square construction panels with two openings and a bait containing section. The trap lid shall be constructed of a degradable panel by

affixing untreated twine or small wire.

- **Related Equipment:** One floating buoy, not less than six inches in length, width, and height must be attached with poly or nylon rope to the crab trap. All crab traps shall be identified by an identification tag affixed to the line attaching the buoy to the crab trap or identification written on the buoy surface.

- **Bait:** Bait for crab traps may be fresh or frozen nongame fish and may be caught from additional sampling activities such as gill nets or other acceptable methods. All left over bait must be properly discarded or frozen. Commercial baits may be substituted if staff has difficulties collecting bait.

- **Trap Storage:** Crab traps must be washed after use with potable water and air-dried. Crab traps must be stored inside a covered area or shed to ensure the integrity of the trap.

- **Sample Activities:** Crab traps must be placed with the openings for entrapment portion toward the bottom with approximately two – four feet of water covering the trap. Set the traps in shallow waters during the summer and at deeper depths in winter for best results. As a precaution, do not place traps within 200 yards of a navigation channel. This will prevent possible damage and/or loss of equipment caused by commercial vessel traffic.

5.2.5 Oyster Dredge

Gear Requirements

- **Dredge Size/Design:** No standard oyster dredge design is required. The design may be determined by the staff that will be suited to the sampling needs and objectives (Appendix A.3). Oyster dredges are constructed of steel. The steel should be heavy enough to keep the dredge on the bottom when being pulled through the water behind the sampling vessel. The oyster dredge shall be constructed so that it will allow sand, sediment, and small crushed shell fragments to pass through while retaining live oysters. The oyster dredge shall have steel teeth on the bottom side of the dredge to dig oysters off the bay bottom and into the dredge.

- **Related Equipment:** The oyster dredge shall be attached to the boat with a rope that consists of a minimum three-strand line that is at least 0.563 inches in diameter. The rope shall be attached to the dredge with appropriate size corrosion resistant shackles and a swivel. A recovery line or rope shall be attached to the oyster dredge with a float to recover the dredge in the event that the main line breaks or comes off the cleat(s). The recovery line shall be

long enough to float the line and recover the dredge. The sampling vessel shall be equipped with a davit. The davit shall have cleat(s) to secure the oyster dredge while sampling and a winch to retrieve the dredge after sampling.

- **Dredge Storage:** The oyster dredge must be washed after use with potable water and air-dried. The oyster dredge shall be stored inside a covered area or shed to ensure the integrity of the dredge.

- **Sample Activities:** Before oyster dredge deployment, the sampling vessel crew must prepare for dredge deployment and sampling: 1) The crew should make sure that the pin has been removed from the davit allowing the davit to swivel; 2) The crew should also clear the deck of any equipment, gear, or potential hazards near the davit to prevent the line from snagging as the oyster dredge is deployed overboard and to prevent the crew from tripping while deploying or retrieving the dredge; and 3) A crew member should secure the rope attached to the oyster dredge to a cleat on the davit or a cleat on the sampling vessel and secure the tag end of the rope to a cleat on the sampling vessel. Following oyster dredge deployment preparations and receiving the all clear signal from the sampling vessel operator, a crew member deploys the oyster dredge away from the boat with the dredge teeth facing down. The crew member deploying the oyster dredge must be cognizant of the rope attached to the dredge being careful to not allow the rope to snag on his or her feet or legs. The sampling vessel operator should proceed at a very slow speed as the oyster dredge is being deployed and the rope is taut on the cleat. The dredge should be towed by the sampling vessel at a slow speed over the oyster reef until the crew thinks that the dredge may be full of oysters. Then the sampling vessel operator will put the vessel into neutral, so the oyster dredge can be retrieved using the winch on the davit. The crew member retrieving the oyster dredge must remove the line from the cleats and secure to the winch on the davit. As the oyster dredge is retrieved and approaches the sampling vessel a crew member will notify the operator to put the sampling vessel into a slow turn or spin while moving forward so that the dredge comes up outside of the sampling vessel and on the side where the davit and culling table are located. The oyster dredge is retrieved and placed on the culling table and the contents are dumped onto the table where oysters can be sorted and culled to produce the sample(s).

5.3 Sampling Gear Identification Tag

All sampling gear left unattended by staff shall be identified by an identification tag. The identification tag should be affixed to the gear as close to the water's surface as possible. Identification may be fastened to float lines, attached to marker buoys or legibly handwritten on the buoy surface. Each identification tag must designate agency name, group name, scientific permit number, and telephone number. Wording on the buoy or identification tag should read as follows:

6.0 Sample Collection Data Requirements & Documentation

6.1 Recording Data

All field collection data must be recorded on the *DSHS SALG Fish and Shellfish Tissue Data Form(s)* (Appendix A.4). There are two data forms: 1) fresh and estuarine waters and 2) nearshore and offshore waters. Choose the appropriate data form for the type of water being evaluated. A new form must be used for each sample site. Follow all instructions described in Tables 6.1.1 and 6.1.2 for recording data. For the purposes of recording field data, SALG staff must follow the basic rules for recording information as documented below:

- Write legibly in pencil or indelible ink.
- Changes or corrections should be made by crossing out original entries with a single line, entering the changes, and initialing and dating the corrections.
- Close-out incomplete pages with an initialed and dated diagonal line.

Table 6.1.1. Fresh and Estuarine Waters Data Form Requirements

Data Type	Documentation Instruction
Water Body	Record name of water body sampled (e.g., Fosdic Lake; Trinity River).
Site Name	Record geographic reference description of selected sample site. (e.g., Trinity River at U.S. Highway 287, State Land Tract 225, or Fish Point).
Site Code	Record using numeric code to identify sample sites within a water body (e.g., 01, 02, 03…).
Date	Record two digits for month, day, and year, respectively (e.g., mm/dd/yy).
Time	Record using a 24-hour format (e.g., 1500 = 3:00 p.m.).
Site Latitude/Longitude	Record sample site latitude and longitude geographic coordinates in decimal degrees to six decimal places.
Weather (WX)	Record weather conditions using the corresponding representative weather condition code: Clear (CL), Partly Cloudy (PC), Cloudy (CY), Fog (FG), Rain (RN), and Hazy (HZ). Weather data may be acquired from www.weather.gov. Enter the "City, St" or ZIP code nearest to each sample site to obtain the required data.
Air Temperature (ATMP)	Record air temperature to the nearest degree °F.

Table 6.1.1 cont.

Data Type	Documentation Instruction
Wind Direction (WDIR)	Record wind direction: N, S, E, W, NE, NW, SE, or SW.
Wind Speed (WSPD)	Record estimated wind speed in miles per hour.
Water Temperature (WTMP)	Record water temperature to the nearest degree °F.
Specific Conductance (SpCOND)	Record specific conductance to the nearest tenth (00000.0) in microsiemens per centimeter (µS/cm).
Salinity (SAL)	Record salinity to the nearest tenth (00.0) in parts per thousand (ppt).
Hydrologic Conditions	**Reservoir Level (RSVRELV):** record current reservoir elevation level in feet mean sea level (msl) http://waterdata.usgs.gov/tx/nwis/sw or http://www.swf-wc.usace.army.mil/reports/fish.htm **Tidal Movement (TIDE)**: record tidal movement as incoming tide (IT), outgoing tide (OT), or slack tide (ST) http://www.srh.noaa.gov/hgx/marine.htm **River Discharge (RIVDIS)**: record river flow in cubic feet per second (cfs) http://waterdata.usgs.gov/tx/nwis/sw **River Stage (RIVSTG)**: record river stage or gauge height in feet (ft) http://waterdata.usgs.gov/tx/nwis/sw
Collector(s)	Record names or initials of the tissue sample collectors.
Observations	Record any pertinent observations (i.e., site locations for weather data, RSVRELV, TIDE, RIVDIS, and RIVSTG; environmental or weather related abnormalities; fish abnormalities including deformities, wounds, or infections, etc.).
Sample Identification	Record sample number(s) using a three (3) letter number code for identifying tissue samples (e.g., TRR1 = Trinity River sample number 1). Code letters may be found in *Water Body Codes for Texas Public Waters* (Appendix A.5). All samples should be numbered sequentially in order of processing. If a new water body is sampled, create a three (3)-letter water body code and update *Water Body Codes for Texas Public Waters*.
Sample Date Collected	Record date tissue sample was collected.
Sample Date Processed	Record date tissue sample was processed.
Gear Type	Record method of collection (i.e., electrofishing (ES); crab trap (CT); gill net (GN); hook & line (HL); jugline (JL); oyster dredge (OD); or trot line (TL).

Table 6.1.1 cont.

Data Type	Documentation Instruction
DSHS Species or Species Code	Record three (3) letter species code or species common name. Species codes may be found in the *DSHS Species Code List* (Appendix A.6).
Total Length (TL)	Measure and record total length in millimeters (mm), centimeters (cm), or inches (in) for each fish tissue sample. ***Preferred total length units are millimeters (mm).***
Weight	Weigh and record the weight in grams (g), kilograms (kg), or pounds (lb) for each fish tissue sample. ***Preferred weight units are grams (g).***
Composite (Composite Sample)	Record Yes (Y) if sample is a composite sample or No (N) if not. In the *Total Length* and *Weight* data types, record the length in millimeters (mm), centimeters (cm), or inches (in) and weight in grams (g), or pounds (lb) for each sample included in the composite sample. ***Preferred recording method is millimeters (mm) and grams (g).***
Sex	Record sex of sample male (M) or female (F). ***Sex identification is not required and considered an optional data type.***
Otoliths	Record Yes (Y) if otolith(s) dissected from fish sample or No (N) if not. ***The removal of otoliths from fish samples for age estimation is not required and is considered an optional data type.***

Table 6.1.2. Nearshore and Offshore Waters Data Form Data Requirements

Data Type	Documentation Instruction
Water Body	Record name of water body sampled (e.g., Gulf of Mexico).
Site Name	Record geographic reference description of selected sample site (e.g., Galveston Offshore (GAO), Port O'Connor Offshore (POO), Port Aransas Offshore (PAO).
Site Code	Record using numeric code to identify sample sites within a water body (e.g., 01, 02, 03…).
Date	Record two digits for month, day, and year, respectively (e.g., mm/dd/yy).
Time	Record using a 24-hour format (e.g., 1500 = 3:00 p.m.).
Site Latittude/Longitude	Record sample site latitude and longitude geographic coordinates in decimal degrees to six decimal places.
Weather (WX)	Record weather conditions using the corresponding representative weather condition code: Clear (CL), Partly Cloudy (PC), Cloudy (CY), Fog (FG), Rain (RN), and Hazy (HZ). Weather data may be acquired from www.weather.gov. Enter the "City, St" or ZIP code nearest to each sample site to obtain the required data.
Air Temperature (ATMP)	Record air temperature to the nearest degree °F.
Wind Direction (WDIR)	Record wind direction: N, S, E, W, NE, NW, SE, or SW.
Wind Speed (WSPD)	Record estimated wind speed in miles per hour.
Water Temperature (WTMP)	Record water temperature to the nearest degree °F.
Collector(s)	Record names or initials of the tissue sample collectors.
Observations	Record any pertinent observations (i.e., site locations for weather data; environmental or weather related abnormalities; fish abnormalities including deformities, wounds, or infections, etc.).
Sample Identification	Record sample number(s) using a three (3) letter number code for identifying tissue samples (e.g., POO1 = Port O'Connor Offshore sample number 1). Code letters may be found in *Water body Codes for Texas Public Waters* (Appendix A.5). All samples should be numbered sequentially in order of processing.
Sample Date Collected	Record date tissue sample was collected.
Sample Date Processed	Record date tissue sample was processed.
Gear Type	Record method of collection (i.e., hook & line (HL); sport-fishing tournament (SFT).

Table 6.1.2 cont.

Data Type	Documentation Instruction
DSHS Species or Species Code	Record three (3) letter species code or species common name. Species codes may be found in the *DSHS Species Code List* (Appendix A.6).
Total Length (TL) or Fork Length (FL)	Measure and record total length or fork length in millimeters (mm), centimeters (cm), or inches (in) for each fish tissue sample. Circle chosen length type and unit of measure. ***Preferred measurement method is total length in millimeters (mm).***
Weight	Weigh and record the weight in grams (g), kilograms (kg), or pounds (lb) for each fish tissue sample. Circle chosen unit of measure. ***Preferred weight units are grams (g).***
Girth	Measure and record girth in millimeters (mm), centimeters (cm), or inches (in) for each fish tissue sample. Circle chosen unit of measure. If the fish sample weight is obtained, the girth measurement is not required. ***Preferred units are millimeters (mm).***
Fish Sample Latitude (LAT) and Longitude (LONG)	Record latitude and longitude geographic coordinates in decimal degrees to six decimal places for the collection location of each fish sample.
Sex	There is not the data type *Sex* on the *Nearshore and Offshore Waters Data Form*. If it is determined for the project that *Sex* is a required data type, record sex of sample male (M) or female (F) in the *Otolith* data field for each sample. ***Sex identification is not required and considered an optional data type.***
Otoliths	Record Yes (Y) if otoliths are dissected from the fish sample or No (N) if otoliths are not dissected from fish sample. ***The removal of otoliths from fish samples for age estimation is not required and is considered an optional data type.***

7.0 Sample Processing, Handling, and Storage Procedures

7.1 Sample Handling Precautions

Fish, shellfish, or other aquatic organisms not selected for analysis must be released at the site of collection. Specimens selected for analysis must be placed in a livewell or immediately placed in a clean ice chest and iced. All ice chests must be cleaned with bleach and rinsed with tap water, distilled water, or ambient water between uses.

A reasonable effort must be made to minimize sample handling and to avoid potential sources of contamination (e.g., sample cross contamination, grease, and/or gasoline contamination from sampling equipment).

7.2 Fish Fillet Sample Processing, Handling, and Storage

Processing Equipment Requirements

- Large, non-porous food grade cutting board
- Heavy duty aluminum foil
- Standard fillet knife
- De-ionized water
- Steel fillet gloves
- Nitrile gloves
- Plastic freezer bags
- Large heavy duty trash bags
- Paper towels or tech wipes
- Scale
- Measuring board or tape
- Waterproof permanent marker (fine point)
- Pencil(s)
- Data form(s)
- Clipboard
- Ice chest(s)
- Ice

Data Requirements

- Measure total length or fork length of each fish and record in millimeters (mm), centimeters (cm), or inches (in). The preferred length measurement is total length in millimeters.
- Weigh each fish and record weight in grams (g), kilograms (kg), or pounds (lb). The preferred weight units are grams.
- Measure girth of each fish and record in millimeters (mm), centimeters (cm), or inches (in). A girth measurement is only required for large fish that staff were unable to weigh.
- Record any unusual deformities, wounds, or infections observed.
- **Optional** – remove otoliths from fish samples for age analysis.

Sample Container Labeling Requirements

- The sample containers (e.g., Ziploc® freezer bags) must be labeled with a waterproof permanent marker including sample identification number, species identification, sample length, and sample weight.

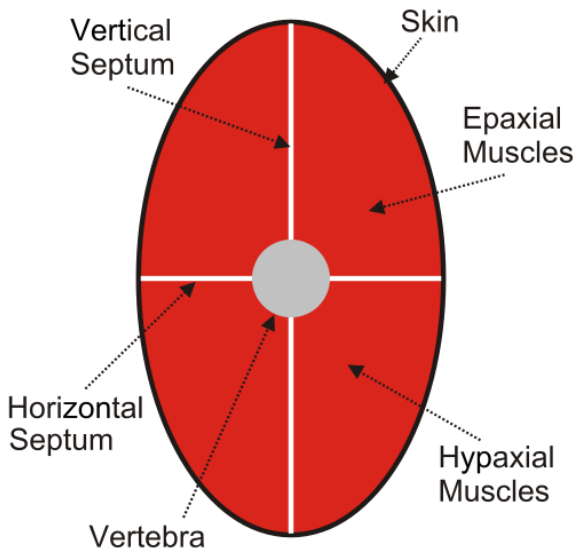
Fish Fillet Processing

For the purposes of this document, a fish fillet is defined as a longitudinal slice of de-boned, skin-off epaxial and hypaxial muscle tissue originating from the vertical septum or mid-dorsal line of the fish (Figure 7.2.1). The fillet sample must meet the following minimum weight requirements for selection as a tissue sample:

- The skin-off fillet weight must be ≥ 50 g for organic or full scan analyses.
- The skin-off fillet weight must be ≥ 5 g for mercury only analysis.

All fish tissue samples must be filleted with the skin removed. The fillet tissue sample may be removed from either side of the fish. The belly muscle and any dark muscle tissue should not be separated from the light muscle tissue. Bones still present in the muscle tissue after filleting should be carefully removed. For large fish samples, a posterior and anterior portion of the right or left fillet should be taken. For small fish samples the right and left side fillets may be combined to meet the tissue sample minimum weight requirements as specified above. When right and left side fillets will not meet the tissue sample minimum weight requirements, a composite sample composed of the same species and similar size specimens – the smallest specimen in the composite must be at least 75% of the total length of the largest specimen in the composite sample – may be used as a fish tissue sample. If a sufficient amount of fish tissue is obtained from the right or left side of the fish sample, the opposite side may be retained as a duplicate or backup tissue sample.

Figure 7.2.1. Cross Section View of Fish



Samples must be filleted on a non-porous cutting board covered with heavy-duty

aluminum foil. Aluminum foil must be replaced between each sample to prevent sample cross-contamination. Care must be exercised to avoid contamination from inadvertent puncture of the internal organs. If the fillet is contaminated with materials released from puncture of the internal organs, the fillet may be eliminated as a sample specimen or must be rinsed with deionized water and blotted dry with a clean, unused paper towel. A notation must be recorded on the data form regarding this procedure. The fillet knife must be rinsed with de-ionized water and dried with a clean, unused paper towel between each fish sample. For composite samples, the same foil may be used until preparation of all specimens in the composite is complete or the foil is damaged.

Fish Fillet Handling and Storage

All fish tissue samples (individual or composite) must be double wrapped with heavy-duty aluminum foil and placed in an appropriately labeled and sealed plastic freezer bag. Standard plastic freezer bags without a zipper mechanism must be used for all fish tissue samples. Do not use masking tape or wrapping tape, since the tissue sample may be contaminated if the foil or bag is damaged. Do not use the easy zip style plastic freezer bags with the sliding zipper mechanism to store an individual or composite fish tissue sample, as these bags do not seal completely and may allow leakage, possibly contaminating the fish tissue sample. Following proper processing, handling, and storage of the fish tissue sample, the sample must be immediately placed on wet ice and transferred to the SALG freezer as soon as possible. The freezer must be locked or located within a secure location to maintain chain-of-custody requirements. Fish tissue samples should remain frozen until delivered to the designated laboratory.

7.3 Otolith Extraction (Optional Procedure)

Extraction Equipment Requirements

- Hacksaw
- Heavy duty scissors or shears
- Side cutters
- Forceps
- Storage vials and caps or coin envelopes
- Waterproof permanent marker (ultra-fine point)

Data Requirements

- Otoliths for fish age estimation

Extraction Procedures

Remove sagittal otoliths from select target fish species following otolith

extraction procedures recommended by the Gulf States Marine Fisheries Commission (GSMFC) and unpublished procedures recommended by TPWD.[9,10] Perform all otolith extractions on each fish sample after the preparation of the skin-off fillet(s) tissue sample. Following extraction, otolith(s) must be placed in an individually labeled coin envelope or storage vial.

Storage Container Label Requirements

The coin envelope or storage vial must be labeled by sample identification number, species or species code, length, and weight.

7.4 Crab Sample Processing, Handling, and Storage

- The total width of the carapace shall be measured from the tip of lateral spine to the tip of the opposite lateral spine and recorded to the nearest millimeter (mm).
- The crab must be "backed" (by pulling away the carapace), and the internal organs and mouthparts must be removed, and then rinsed with distilled water.
- The crab tissue sample must be double wrapped with aluminum foil and placed in a sealed plastic freezer bag that has been labeled following the directions for sample container labeling outlined in *Fish Fillet Sample Processing, Handling, and Storage*.
- The sealed plastic freezer bag must be immediately placed on wet ice and transferred to the SALG freezer as soon as possible. The freezer must be locked to maintain chain-of-custody requirements. Crab samples must remain frozen until delivered to the designated laboratory.

7.5 Shrimp, Crawfish, and Prawn Sample Processing, Handling, and Storage

- The weight to the nearest gram, the number of specimens in the sample and the estimated size (count per pound) must be recorded.
- The entire shrimp, crawfish, or prawn must be used for the sample.
- Samples must be double wrapped with aluminum foil and placed in a plastic freezer bag that has been labeled following the directions for sample container labeling outlined in *Fish Fillet Sample Processing, Handling, and Storage*.
- The sealed plastic freezer bags must be immediately placed on wet ice and transferred to the SALG freezer as soon as possible. The freezer must be locked to maintain chain-of-custody requirements. Samples must remain frozen until delivered to the designated laboratory.

7.6 Oyster, Clam, and Mussel Sample Processing, Handling, and Storage

- Shells must be opened and the meat cut loose and dropped directly into a glass jar. The sample must include the "liquor" that is inside the shell.

- All samples must be placed in glass jars, which have been rinsed with distilled water and allowed to air dry. Lids must have seals or be lined with aluminum foil.
- The number of shellfish in the composite sample and the average shell length must be calculated and recorded.
- The glass jar must be labeled with a waterproof marker as outlined in *Fish Fillet Sample Processing, Handling, and Storage*.
- Sealed jar(s) must be immediately placed on wet ice and transferred to the SALG freezer as soon as possible. The freezer must be locked to maintain chain-of-custody requirements. Samples must remain frozen until delivered to the designated laboratory.

8.0 Tissue Sample Holding Times

Table 8.0.1. Holding Times for Tissue Samples

Analyte	Matrix	Preservation	Holding Time
Mercury	Tissue	Freeze at ≤ -20 °C	1 year
Other metals	Tissue	Freeze at ≤ -20 °C	1 year
Organics	Tissue	Freeze at ≤ -20 °C	1 year
Lipids	Tissue	Freeze at ≤ -20 °C	1 year

9.0 Chain-of-Custody and Tissue Sample Courier Service Procedures

9.1 Chain-of-Custody Procedures

The DSHS SALG Chain-of-Custody Record Form (Appendix A.7) must be used to provide SALG with information about physical control of the tissue samples from collection until arrival at the laboratory. The Chain-of-Custody Record Form must be used for all tissue samples. Follow all instructions described in Table 9.1.1 for completing the DSHS SALG Chain-of-Custody Record Form.

- All tissue samples must be stored in a secure (locked) SALG freezer until shipment or delivery to the laboratory. The tissue samples must remain in SALG personnel custody until relinquished to the courier or laboratory.

- For tissue sample deliveries by SALG staff, the laboratory and SALG personnel must verify all tissue samples and analyses listed on the Chain-of-Custody Record before signing the Chain-of-Custody Record and transferring custody of the tissue samples to the laboratory.

- For tissue sample deliveries by courier service, such as United Parcel Service or FedEx, follow all procedures outlined in *9.2 Tissue Sample Courier Service Procedures*.

Table 9.1.1. Chain-of-Custody Record Form Instructions

Form Field	Documentation Instruction
DSHS Contract Number	Record DSHS contract number (e.g., 2012-041914).
DSHS Purchase Order No.	Record DSHS purchase order number (e.g., 386723).
Water Body	Record name of water body.
Collector(s)	Record names or initials of the tissue sample collectors.
Sample Type	Record sample type (i.e., tissue).
Preservation Type	Record preservation type (e.g., wet ice, frozen, cooled to 4°C).
Relinquished by	*SALG personnel* – record date (e.g., mm/dd/yy), time using 24-hour format (e.g., 1500 = 3:00 p.m.), agency/company/lab name (i.e., DSHS SALG), and print and sign name to transfer custody of tissue samples to the laboratory or courier.
Accepted by Courier	*Courier* – record date (e.g., mm/dd/yy), time using 24-hour format (e.g., 1500 = 3:00 p.m.), agency/company/lab name (e.g., UPS), and print and sign name to accept custody of the tissue samples from SALG. If SALG personnel deliver samples to the laboratory record N/A in all form fields associated with *Accepted by Courier*.
Accepted by Laboratory	*Laboratory personnel* – record date (e.g., mm/dd/yy), time using 24-hour format (e.g., 1500 = 3:00 p.m.), agency/company/lab name (e.g., GERG), and print and sign name to accept custody of the tissue samples from SALG.
Sample Identification	Record sample identification number (e.g., TRR201).
Date of Collection	Record date tissue sample was collected (e.g., mm/dd/yy).
Time of Collection	Record time using 24-hour format (e.g., 1500 = 3:00 p.m.) tissue sample was collected.

Table 9.1.1. cont.

Form Field	Documentation Instruction
Species	Record three (3) letter species code or species common name. Species codes may be found in the *DSHS Species Code List* (Appendix A.6).
Laboratory Analyses	Check the appropriate square for the requested analyte group: pesticides, PCBs, SVOCs, VOCs, and Dioxins and/or circle the metal(s) requested for analyses.
Special Remarks	Record any observations or special remarks about the tissue sample (e.g., fish abnormalities including deformities, wounds, or infections, etc.).

9.2 Tissue Sample Courier Service Procedures

SALG personnel are responsible for preparing tissue sample shipments and ensuring that all chain-of-custody procedures are met. The following procedures outline the requirements for shipping tissue samples through a commercial courier service:

- The *DSHS SALG Chain-of-Custody Record Form* must be completed as described in Table 9.1.1. The completed form must be placed in a sealed envelope securely attached to or inside the shipping container in a water proof plastic bag and remain with the tissue sample shipment until the laboratory receives the tissue samples and are logged in by the laboratory.

- Prior to shipment, the laboratory must be contacted to determine a suitable delivery date.

- Overnight shipping is required. The laboratory should receive samples within 24 hours of shipment.

- Tissue samples must be frozen prior to shipping. To ensure tissue samples remain frozen during transport, ice chests may be packed with cold packs or wet ice.

- Ice chests must be sealed with heavy duty packaging tape to prevent tampering.

- The courier-receiving agent and DSHS staff must sign the chain-of-custody form and record the date and time that the courier service took possession of the tissue samples.

- For receiving tissue samples at the laboratory, the laboratory-receiving agent must check the integrity of the tissue sample shipping container and sign the chain-of-custody form, record the date and time of sample receipt, and notify

the SALG Point of Contact (POC) by email or phone (512-834-6762) of the tissue sample arrival time. The signed chain-of-custody form must be scanned and emailed to the SALG POC.

10.0 Project and Data Management

Robust project and data management procedures are essential to providing data that are scientifically valid, legally defensible, and of known precision and accuracy. Quality data that meet DSHS SALG data quality objectives are required for sound risk assessment, management, and communication.

10.1 Project Information Management

- An electronic file folder must be developed for each project or grant to store all administrative project documents. The project or grant may specify work for one or more bodies of water. The electronic file folder must be identified by project or grant title. This file folder shall contain five subfolders: 1) Planning, 2) Budget, 3) Contract, 4) Quality Assurance Project Plan (QAPP), and 5) Quarterly Reports (the QAPP and Quarterly Reports subfolder is only necessary for grant funded projects).

- Project progress must be monitored by water body from tissue sample collection through final approval of the risk assessment and any associated action. The SALG Project Manager must document completion of project milestones in the *DSHS SALG Project Status Database*. The SALG Project Manager must follow all instructions described in Table 10.1.1 for documenting project status.

Table 10.1.1 Project Status Database Instructions

Database Field	Documentation Instruction
Project Name	Input project name (e.g., TMDL Fish Contaminant Studies).
Funding Source	Input name of funding source (i.e., state agency, federal agency, or municipality).
Project Grant	Input DSHS Project Grant (e.g., 2X077IACQRCP).
Lab PO#	Input laboratory contract purchase order (PO) number (e.g., 386723)
Contract Executed	Input date contract is executed (e.g., 9/27/2013).
Contract Expiration	Input date contract expires.
Contract Amendment Expiration	Input date contract amendment expires. Only applies if contract period is amended.

Table 10.1.1 cont.

Database Field	Documentation Instruction
QAPP Approved	Input date QAPP is approved.
Work Order Issued	Input date Work Order is issued.
Work Plan Signed	Input date Work Plan is signed
Notice to Proceed	Input date Notice to Proceed is received.
Project Notes	Input any important project-related notes or details.
Water Body	Input water body name (e.g., Trinity River).
Project Name	Use drop-down menu to select Project Name (e.g., TMDL Fish Contaminant Studies).
Surface Acres Surveyed	Input size of water body in acres (lakes, ponds, and reservoirs).
Square Miles Surveyed	Input size of water body surveyed in square miles (estuaries, nearshore, and/or offshore waters).
River Miles	Input river miles surveyed.
Number of Samples	Input number of tissue samples.
Survey Start	Input date tissue collection starts (e.g., 3/31/2014)
Survey End	Input date tissue collection ends.
Samples to Lab	Input date samples delivered/shipped to laboratory.
Data from Lab	Input date all analyses from water body are received from laboratory.
Data Entry	Input date field/laboratory data entry is complete.
Data QA/QC	Input date field/laboratory data QA/QC is complete.
Draft Risk Assessment	Input date draft risk assessment is complete.
EPITOX Review	Input date draft risk assessment review is complete. The draft risk assessment is sent to the Environmental & Injury Epidemiology and Toxicology Unit, Health Assessment and Toxicology Program for peer review to finalize the risk assessment.
Final Risk Assessment	Input date final risk assessment is complete.
Risk Assessment Summary	Input date risk assessment summary is complete.
Action Memo Sent	Input date action memo is sent through the DSHS chain-of-command for approval.
Action Memo Approved	Input date action memo is approved.
Action Issued	Input date action is taken or issued.
Notes	Input any important notes related to the risk assessment and/or action.

10.2 Data Management

- Data management processes and flow of data is described in the *DSHS SALG Data Management Plan* (Appendix A.8).

- An electronic file folder must be developed for each water body associated with a project or grant. The electronic file folder must be named by water body (e.g., Trinity River). For bodies of water that have multiple years of data, a subfolder must be created to identify data by year of collection.

- Field data recorded on the *DSHS SALG Fish and Shellfish Tissue Collection Data Form* (Appendix A.4) and laboratory data must be entered into a *Tissue Database* Microsoft Excel template worksheet for each water body by chemical contaminant group (i.e., dioxins/furans, metals, pesticides, PCBs, SVOCs, and VOCs). The Microsoft Excel file must be saved following the standard file name format *water body name and collection year* (e.g., WelshReservoir2003).

10.3 Data Quality Assurance and Quality Control (QA/QC)

- DSHS or contract laboratories must provide the SALG with a *Quality Assurance Plan* (QAP) including detailed laboratory methods to document the use of consistent analytical methodology and to ensure accuracy and precision of data analysis.

- All field and laboratory data must be reviewed, verified, and validated by DSHS SALG staff to ensure that the data conform to project specifications and meet the conditions for assessing health risks associated with consuming fish, shellfish, or other aquatic life. All data must be approved by the SALG Quality Assurance Officer (QAO) or Project Manager before assessing risk.

- Verification, validation, and integrity review of the data will be performed by DSHS SALG staff through peer and management review. The data to be verified (listed in Table 10.3.1) are evaluated against project specifications (Appendix A.1) and data quality objectives established in this SOP or a project specific quality assurance project plan and are checked for errors in transcription, calculations, and data input.

Table 10.3.1 Data Verification Procedures

Data to be Verified	Lab Task	SALG Task
Field Data Review		
Field data reviewed for conformance with data collection procedures, sample handling and processing, and chain of custody		✓
Field data calculated, reduced, and transcribed correctly		✓
Laboratory Data Review		
Laboratory data reviewed for conformance with data collection, sample handling and chain of custody, analytical and QC requirements to include documentation, holding times, sample receipt, sample preparation, sample analysis, project and program QC results, and reporting	✓	
Laboratory data calculated, reduced, and transcribed correctly	✓	
LOQs consistent with requirements for CRRLs	✓	✓
Analytical data documentation evaluated for consistency, reasonableness and/or improper practices	✓	✓
Analytical QC information evaluated to determine impact on individual analyses	✓	✓
All laboratory samples analyzed for specified parameters	✓	✓
Data Set Review		
The laboratory report has all required information as described in Section A9 of the QAPP		✓
Confirmation that field and lab data have been reviewed		✓
Data set (to include field and laboratory data) evaluated for reasonableness and if corollary data agree		✓
Outliers confirmed and documented		✓
Sampling and analytical data gaps checked and documented		✓
Verification and validation confirmed. Data meets conditions of end use and are reportable	✓	✓

- SALG staff must document their review, verification, and validation of the field and laboratory data on the *DSHS SALG Data Review Form* (Appendix A.9). SALG staff must follow all instructions described in Table 10.3.2 for documenting data review.

Table 10.3.2. Data Review Form Requirements

Form Field	Documentation Instruction
Water Body, Sample Year	Record name of water body (e.g., Gulf of Mexico) and sample year (e.g., 2014).
Recovery at PQL	Verify that the recovery at PQL for all parameter group sample batches meet the measurement performance specifications or acceptance criteria (Appendix A.1). Check the appropriate box if all percent recoveries meet the acceptance criteria.
Precision of Laboratory Duplicates (RPD)	Verify that the RPD for all parameter group sample batches meet the measurement performance specifications or acceptance criteria (Appendix A.1). Check the appropriate box if all RPDs meet the acceptance criteria.
Accuracy of Matrix Spike (Percent Recovery)	Verify that the percent recovery of the matrix spike for all parameter group sample batches meet the measurement performance specifications or acceptance criteria (Appendix A.1). Check the appropriate box if all percent recoveries meet the acceptance criteria.
CRRL Verification	Verify that all tissue sample results are reported without qualification at or above the CRRL. Check "Yes" if all sample results are reported at or above the CRRLs and "No" if all samples results are not reported at the CRRL.
SRM Acceptance	Verify that the laboratory reported concentration for the analyzed SRM is within the acceptance range (Appendix A.1) of the certified concentration for the SRM.
Narrative	Record and describe analytical difficulties or data that does not meet the measurement performance specifications. The final decision to either accept or reject the data is based on the SALG's evaluation of the measurement performance specification, laboratory data report and/or discussing any potential data issues with the laboratory. If QC results are outside the measurement performance specifications or acceptance criteria and associated data are accepted for use by SALG, an explanation specifically explaining why the data were accepted must be included in the narrative.
Data Entered	Record two digits for month, day, and year, respectively (e.g., mm/dd/yy) and initials of SALG staff that completed the data entry or upload.
Data Reviewed	Record two digits for month, day, and year, respectively (e.g., mm/dd/yy) and initials of SALG staff that reviewed the data entry or upload.
Data Corrected	If corrections are needed, record two digits for month, day, and year, respectively (e.g., mm/dd/yy) and initials of DSHS SALG staff that completed any needed data corrections.
Corrections Verified	Record two digits for month, day, and year, respectively (e.g., mm/dd/yy) and initials of SALG staff that verified data corrections.
Final Review and Signature	The SALG QAO or Project Manager must sign and date the DSHS SALG Data Review Form to approve use of the data.

11.0 Data Qualification, Use, and Analysis

- Data reported at or above the contract required reporting limit (CRRL) is used as reported.

- Data reported below the CRRL including data reported as not-detected (ND) are assigned a value of one-half the CRRL.

- Due to the proximity of the CRRL to the DSHS SALG Health Assessment Comparison Value for PCDDs/PCDFs, estimated concentrations or J qualified concentrations are used as reported and NDs are assumed to be zero. The SALG deviates from the standard data use procedure for PCDDs/PCDFs because by assigning one-half the CRRL to data reported below the CRRL and data reported as ND the SALG will over estimate PCDD/PCDF concentrations and health risks to consumers of fish, shellfish, and other aquatic organisms. Over estimation of PCDD/PCDF concentrations will lead to the SALG recommending unnecessary consumption advisories.

- Statistical procedures shall be performed on IBM-compatible microcomputer(s) using a statistical software package (e.g., Systat 13). The following descriptive statistics shall be generated by water body, species of fish, and sample site for each chemical contaminant: mean concentration, standard deviation, minimum and maximum concentrations.

- Additional statistical analysis may be performed if needed

Appendices

Appendix A.1: Target Analyte List and Measurement Performance Specifications

List of Acronyms and Definitions	
CRRL	***Contract Required Reporting Limit(s)*** are specifications at or above which the DSHS-SALG requires the laboratory to report or quantify chemical contaminant concentrations.
CVAAS	***Cold Vapor Atomic Absorption Spectrometry***
GFAAS	***Graphite Furnace Atomic Absorption Spectrometry***
HRGC/HRMS	***High Resolution Gas Chromatography/High Resolution Mass Spectrometry***
HRGC/LRMS	***High Resolution Gas Chromatography/Low Resolution Mass Spectrometry***
ICP-MS	***Inductively Coupled Plasma-Mass Spectrometry***
PQL	***Practical Quantitation Limit*** is defined as the concentration that can be reliably reported within specific limits of precision and accuracy under routine laboratory operating conditions. The PQL is assumed to be equal to the minimum quantitation limit and detection limit. The PQLs may be lower than the CRRLs and are dependent upon the laboratory's capability to report or quantify at lower concentrations. Ongoing ability to recover an analyte at the PQL is demonstrated through analysis of a calibration check standard at the PQL. PQL verification standards will be conducted at least once per analytical batch or run sequence.
RPD	***Relative Percent Difference***
SCAN	***SCAN*** or full scan is a mass spectrometry scanning mode in which a broad spectrum range of mass-to-charge ratios (m/z; e.g., 45–450) is transmitted and/or detected by the instrument. This mode of operation is useful for identifying unknown compounds in samples.
SIM	***Selected Ion Monitoring*** is a mass spectrometry scanning mode in which a limited range of mass-to-charge ratios (m/z) is transmitted and/or detected by the instrument, as opposed to the full spectrum range. This mode of operation typically results in significantly increased sensitivity.

Metals

Analyte	CASRN	CRRL	Technique	Calculation Basis	Reporting Units	Recovery at PQL	Precision of Laboratory Duplicates (RPD)	Accuracy of Matrix Spikes (Percent Recovery)	SRM Acceptance
Arsenic	7440-38-2	0.1	GFAAS	Wet	µg/g	75-125%	35%	75-125%	± 25%
Cadmium	7440-43-9	0.1	ICP-MS	Wet	µg/g	75-125%	35%	75-125%	± 25%
Copper	7440-50-8	0.4	ICP-MS	Wet	µg/g	75-125%	35%	75-125%	± 25%
Lead	7439-92-1	0.4	ICP-MS	Wet	µg/g	75-125%	35%	75-125%	± 25%
Mercury	7439-97-6	0.1	CVAAS	Wet	µg/g	75-125%	35%	75-125%	± 25%
Selenium	7782-49-2	0.1	GFAAS	Wet	µg/g	75-125%	35%	75-125%	± 25%
Zinc	7440-66-6	0.4	ICP-MS	Wet	µg/g	75-125%	35%	75-125%	± 25%

Other Parameters

Analyte	CRRL	Technique	Reporting Units	Recovery at PQL	Precision of Laboratory Duplicates (RPD)	Accuracy of Matrix Spikes (Percent Recovery)	SRM Acceptance
Percent Lipid in Tissue	0.02	N/A	%	75-125%	35%	N/A	N/A
Percent Solids in Tissue	1	N/A	%	75-125%	35%	N/A	N/A

Pesticides									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
Tetrachlorobenzene 1,2,4,5	95-94-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Tetrachlorobenzene 1,2,3,4	634-66-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Pentachlorobenzene	608-93-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Hexachlorobenzene	118-74-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	20-120%	± 30%
Alpha HCH	319-84-6	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Beta HCH	319-85-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Gamma HCH	58-89-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Delta HCH	319-86-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Heptachlor	76-44-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Heptachlor Epoxide	1024-57-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Oxychlordane	27304-13-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Alpha Chlordane	5103-71-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Gamma Chlordane	5103-74-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Cis-Nonachlor	5103-73-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Trans-Nonachlor	39765-80-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Chlordane (Total)	N/A	5.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Aldrin	309-00-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Dieldrin	60-57-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Endrin	72-20-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Pentachloroanisole	1825-21-4	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Chlorpyrifos	2921-88-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Mirex	2385-85-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Endosulfan I	959-98-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Endosulfan II	33213-65-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%

Pesticides cont.									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
2,4' DDE	3424-82-6	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
4,4' DDE	72-55-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
2,4' DDD	53-19-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
4,4' DDD	72-54-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
2,4' DDT	789-02-6	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
4,4' DDT	50-29-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Alachlor	15972-60-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Dacthal	1861-32-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Diazinon	333-41-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Endosulfan Sulfate	1031-07-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Malathion	121-75-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Methoxychlor	72-43-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Parathion Ethyl	56-38-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Parathion Methyl	298-00-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
Toxaphene	8001-35-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%

Polychlorinated Biphenyls (PCBs)									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
PCB 1	2051-60-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 2	2051-61-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 3	2051-62-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 4	13029-08-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 5	16605-91-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 6	25569-80-6	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 7	33284-50-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 8	34883-43-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 9	34883-39-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 10	33146-45-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 11	2050-67-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 12	2974-92-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 13	2974-90-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 14	34883-41-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 15	2050-68-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 16	38444-78-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 17	37680-66-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 18	37680-65-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 19	38444-73-4	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 20	38444-84-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 21	55702-46-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 22	38444-85-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 23	55720-44-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 24	55702-45-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 25	55712-37-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%

PCBs cont.									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
PCB 26	38444-81-4	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 27	38444-76-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 28	7012-37-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 29	15862-07-4	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 30	35693-92-6	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 31	16606-02-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 32	38444-77-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 33	38444-86-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 34	37680-68-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 35	37680-69-6	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 36	38444-87-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 37	38444-90-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 38	53555-66-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 39	38444-88-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 40	38444-93-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 41	52663-59-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 42	36559-22-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 43	70362-46-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 44	41464-39-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 45	70362-45-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 46	41464-47-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 47	2437-79-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 48	70362-47-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 49	41464-40-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 50	62796-65-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%

PCBs cont.									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
PCB 51	68194-04-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 52	35693-99-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 53	41464-41-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 54	15968-05-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 55	74338-24-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 56	41464-43-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 57	70424-67-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 58	41464-49-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 59	74472-33-6	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 60	33025-41-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 61	33284-53-6	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 62	54230-22-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 63	74472-34-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 64	52663-58-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 65	33284-54-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 66	32598-10-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 67	73575-53-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 68	73575-52-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 69	60233-24-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 70	32598-11-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 71	41464-46-4	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 72	41464-42-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 73	74338-23-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 74	32690-93-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 75	32598-12-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%

PCBs cont.									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
PCB 76	70362-48-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 77	32598-13-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 78	70362-49-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 79	41464-48-6	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 80	33284-52-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 81	70362-50-4	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 82	52663-62-4	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 83	60145-20-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 84	52663-60-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 85	65510-45-4	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 86	55312-69-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 87	38380-02-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 88	55215-17-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 89	73575-57-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 90	68194-07-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 91	68194-05-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 92	52663-61-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 93	73575-56-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 94	73575-55-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 95	38379-99-6	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 96	73575-54-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 97	41464-51-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 98	60233-25-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 99	38380-01-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 100	39485-83-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%

PCBs cont.									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
PCB 101	37680-73-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 102	68194-06-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 103	60145-21-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 104	56558-16-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 105	32598-14-4	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 106	70424-69-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 107	70424-68-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 108	70362-41-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 109	74472-35-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 110	38380-03-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 111	39635-32-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 112	74472-36-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 113	68194-10-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 114	74472-37-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 115	74472-38-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 116	18259-05-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 117	68194-11-6	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 118	31508-00-6	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 119	56558-17-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 120	68194-12-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 121	56558-18-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 122	76842-07-4	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 123	65510-44-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 124	70424-70-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 125	74472-39-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%

PCBs cont.									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
PCB 126	57465-28-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 127	39635-33-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 128	38380-07-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 129	55215-18-4	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 130	52663-66-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 131	61798-70-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 132	38380-05-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 133	35694-04-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 134	52704-70-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 135	52744-13-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 136	38411-22-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 137	35694-06-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 138	35065-28-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 139	56030-56-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 140	59291-64-4	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 141	52712-04-6	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 142	41411-61-4	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 143	68194-15-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 144	68194-14-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 145	74472-40-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 146	51908-16-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 147	68194-13-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 148	74472-41-6	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 149	38380-04-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 150	68194-08-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%

PCBs cont.									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
PCB 151	52663-63-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 152	68194-09-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 153	35065-27-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 154	60145-22-4	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 155	33979-03-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 156	38380-08-4	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 157	69782-90-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 158	74472-42-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 159	39635-35-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 160	41411-62-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 161	74472-43-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 162	39635-34-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 163	74472-44-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 164	74472-45-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 165	74472-46-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 166	41411-63-6	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 167	52663-72-6	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 168	59291-65-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 169	32774-16-6	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 170	35065-30-6	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 171	52663-71-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 172	52663-74-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 173	68194-16-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 174	38411-25-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 175	40186-70-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%

PCBs cont.									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
PCB 176	52663-65-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 177	52663-70-4	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 178	52663-67-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 179	52663-64-6	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 180	35065-29-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 181	74472-47-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 182	60145-23-5	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 183	52663-69-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 184	74472-48-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 185	52712-05-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 186	74472-49-4	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 187	52663-68-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 188	74487-85-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 189	39635-31-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 190	41411-64-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 191	74472-50-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 192	74472-51-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 193	69782-91-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 194	35694-08-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 195	52663-78-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 196	42740-50-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 197	33091-17-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 198	68194-17-2	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 199	52663-75-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 200	52663-73-7	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%

PCBs cont.									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
PCB 201	40186-71-8	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 202	2136-99-4	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 203	52663-76-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 204	74472-52-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 205	74472-53-0	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 206	40186-72-9	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 207	52663-79-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 208	52663-77-1	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%
PCB 209	2051-24-3	1.0	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	± 30%

Polychlorinated Dibenzo-p-Dioxins (PCDDs) and Dibenzofurans (PCDFs)									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
chlorinated dibenzo-p-dioxins									
2,3,7,8-TCDD	1746-01-6	0.5	HRGC/HRMS	Wet	pg/g	75-125%	35%	30-150%	± 35%
1,2,3,7,8-PeCDD	40321-76-4	0.5	HRGC/HRMS	Wet	pg/g	75-125%	35%	30-150%	± 35%
1,2,3,4,7,8-HxCDD	39227-28-6	2.5	HRGC/HRMS	Wet	pg/g	75-125%	35%	30-150%	± 35%
1,2,3,6,7,8-HxCDD	57653-85-7	2.5	HRGC/HRMS	Wet	pg/g	75-125%	35%	30-150%	± 35%
1,2,3,7,8,9- HxCDD	19408-74-3	2.5	HRGC/HRMS	Wet	pg/g	75-125%	35%	30-150%	± 35%
1,2,3,4,6,7,8- HpCDD	35822-46-9	2.5	HRGC/HRMS	Wet	pg/g	75-125%	35%	30-150%	± 35%
OCDD	3268-87-9	5.0	HRGC/HRMS	Wet	pg/g	75-125%	35%	30-150%	± 35%
chlorinated dibenzofurans									
2,3,7,8-TCDF	51207-31-9	0.5	HRGC/HRMS	Wet	pg/g	75-125%	35%	30-150%	± 35%
1,2,3,7,8-PeCDF	57117-41-6	2.5	HRGC/HRMS	Wet	pg/g	75-125%	35%	30-150%	± 35%
2,3,4,7,8- PeCDF	57117-31-4	2.5	HRGC/HRMS	Wet	pg/g	75-125%	35%	30-150%	± 35%
1,2,3,4,7,8- HxCDF	70648-26-9	2.5	HRGC/HRMS	Wet	pg/g	75-125%	35%	30-150%	± 35%
1,2,3,6,7,8- HxCDF	57117-44-9	2.5	HRGC/HRMS	Wet	pg/g	75-125%	35%	30-150%	± 35%
2,3,4,6,7,8- HxCDF	60851-34-5	2.5	HRGC/HRMS	Wet	pg/g	75-125%	35%	30-150%	± 35%
1,2,3,7,8,9- HxCDF	72918-21-9	2.5	HRGC/HRMS	Wet	pg/g	75-125%	35%	30-150%	± 35%
1,2,3,4,6,7,8-HpCDF	67562-39-4	2.5	HRGC/HRMS	Wet	pg/g	75-125%	35%	30-150%	± 35%
1,2,3,4,7,8,9- HpCDF	55673-89-7	2.5	HRGC/HRMS	Wet	pg/g	75-125%	35%	30-150%	± 35%
OCDF	39001-02-0	5.0	HRGC/HRMS	Wet	pg/g	75-125%	35%	30-150%	± 35%

Semivolatile Organic Compounds (SVOCs)									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
Benzoic acid	65-85-0	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	30-120%	N/A
Phenol	108-95-2	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	30-120%	N/A
2-Methylphenol	95-48-7	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	20-120%	N/A
4-Methylpnenol	106-44-5	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
2-4-Dimethylphenol (or 1-4)	105-67-9	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
2-Chlorophenol	95-57-8	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	30-120%	N/A
4-Chloro-3-methylphenol	59-50-7	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
2,4-Dichlorophenol	120-83-2	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
2,6-Dichlorophenol	87-65-0	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
2,4,6-Trichlorophenol	88-06-2	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
2,4,5-Trichlorophenol	95-95-4	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	20-120%	N/A
2,3,4,6-Tetrachlorophenol	58-90-2	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	5-120%	N/A
Pentachlorophenol	87-86-5	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
2-Nitrophenol	88-75-5	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	30-120%	N/A
4-Nitrophenol	100-02-7	4.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
2,4 Dinitriphenol	51-28-5	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
4,6-Dinitro-2-methylphenol	534-52-1	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Bis (2-chloroethyl) ether	111-44-4	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	20-120%	N/A
Bis (2-chloroisopropyl) ether	108-60-1	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	10-120%	N/A
Bis (2-chloroethoxy)methane	111-91-1	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	30-120%	N/A
1,2-Dichlorobenzene	95-50-1	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	5-120%	N/A
1,3-Dichlorobenzene	541-73-1	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	5-120%	N/A
1,4-Dichlorobenzene	106-46-7	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	5-120%	N/A
1,2,4-Trichlorobenzene	120-82-1	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	5-120%	N/A

SVOCs cont.									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
1,2,4,5-Tetrachlorobenzene	95-94-3	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Pentachlorobenzene	608-93-5	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Pentachloronitrobenzene	82-68-8	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Hexachloroethane	67-72-1	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Hexachlorobutadiene	87-68-3	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Hexachlorophene	70-30-4	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Hexachloropropene	1888-71-7	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Hexachlorocyclopentadiene	77-47-4	4.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Hexachlorobenzene	118-74-1	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
1-Chloronaphthalene	90-13-1	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	5-120%	N/A
2-Chloronaphthalene	91-58-7	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
4-Chlorophenyl phenyl ether	7005-72-3	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Naphthalene	91-20-3	0.4	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
2-Methylnaphthalene	91-57-6	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Acenaphthene	83-32-9	0.4	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Acenaphthylene	208-96-8	0.4	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Fluorene	86-73-7	0.4	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Phenanthrene	85-01-8	0.4	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Anthracene	120-12-7	0.4	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Fluoranthene	206-44-0	0.4	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Pyrene	129-00-0	0.4	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Benzo(a)anthracene	56-55-3	0.4	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	20-120%	N/A
Chrysene	218-01-9	0.4	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Benzo(b)fluoranthene	205-99-2	0.4	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A

SVOCs cont.									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
Benzo(k)fluoranthene	207-08-9	0.4	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Benzo(g,h,i)perylene	191-24-2	0.4	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Benzo(a)pyrene	50-32-8	0.4	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Dibenz(a,j)acridine	224-42-0	0.4	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	30-120%	N/A
Dibenz(a,h)anthracene	53-70-3	0.4	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
7-12-Dimethylbenz(a)anthracene	57-97-6	0.4	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Indeno(1,2,3-cd)pyrene	193-39-5	0.4	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
3-Methylcholanthrene	56-49-5	0.4	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Bis (2-ethylhexyl)adipate	103-23-1	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Dimethyl phthalate	131-11-3	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Diethyl phthalate	84-66-2	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Di-n-butyl phtalate	84-74-2	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Bis (2-ethylhexy) phthalate	117-81-7	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Butyl benzyl phthalate	85-68-7	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Di-n-octyl phthalate	117-84-0	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
a-HCH	319-84-6	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
b-HCH	319-85-7	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
g-HCH (lindane)	58-89-9	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
d-HCH	319-86-8	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Heptachlor	76-44-8	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Heptachlor Epoxide	1024-57-3	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Isodrin	465-73-6	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Aldrin	309-00-2	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A

SVOCs cont.									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
Dieldrin	60-57-1	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Endrin	72-20-8	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Endrin Aldehyde	7421-93-4	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Endrin ketone	53494-70-5	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Endosulfan I	959-98-8	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Endosulfan II	33213-65-9	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Endosulfan sulfate	1031-07-8	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
4,4'-DDE	72-55-9	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
4,4'-DDD	72-54-8	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
4,4'-DDT	50-29-3	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
4,4'-Methoxychlor	72-43-5	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Terbufos	13071-79-9	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Fonofos (Dyfonate)	944-22-9	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Diazinon	333-41-5	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Disulfoton	298-04-4	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Benzyl alcohol	100-51-6	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	20-120%	N/A
Acetophenone	98-86-2	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Methyl methanasulfonate	66-27-3	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Ethyl methaneasulfonate	62-50-0	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
4-Bromophenyl phenyl ether	101-55-3	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Isophorone	78-59-1	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Phenacetin	62-44-2	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Dibenzofuran	132-64-9	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Pronamide	23950-58-5	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A

SVOCs cont.									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
Carbazole	86-74-8	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	20-120%	N/A
Prometon	1610-18-0	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Pyridine	110-86-1	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	30-120%	N/A
2-Picoline	109-06-8	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Aniline	62-53-3	4.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
2-Nitroanaline	88-74-4	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
3-Nitroaniline	99-09-2	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
4-Nitroaniline	100-01-6	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
4-Chloroaniline	106-47-8	4.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
a,a-Dimethylphenylamine	122-09-8	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	20-120%	N/A
1,4-Phenylenediamine	624-18-0	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	5-120%	N/A
Diphenylamine	122-39-4	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Benzidine	92-87-5	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	20-120%	N/A
3,3'-Dichlorobenzidine	91-94-1	4.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	20-120%	N/A
4-Aminobiphenyl	92-67-1	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
1-Naphthylamine	134-32-7	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	5-120%	N/A
2-Naphthylamine	91-59-8	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	20-120%	N/A
p-Dimethylaminoazobenzene	60-11-7	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Nitrobenzene	98-95-3	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
Azobenzene	103-33-3	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	20-120%	N/A
2,4-Dinitritoluene	121-14-2	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
2,6-Dinitrotoluene	606-20-2	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
n-Nitrosodi-n-methylamine	62-75-9	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	20-120%	N/A
n-Nitrosodiethylamine	55-18-5	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	20-120%	N/A

SVOCs cont.

Analyte	CASRN	CRRL	Technique	Calculation Basis	Reporting Units	Recovery at PQL	Precision of Laboratory Duplicates (RPD)	Accuracy of Matrix Spikes (Percent Recovery)	SRM Acceptance
N Nitrosodi-n-propylamine	621-64-7	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	30-120%	N/A
n-Nitrodi-n-butylamine	924-16-3	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
n-Nitrosodiphenylamine	86-30-6	1.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A
n-Nitrosopiperidine	100-75-4	2.0	HRGC/LRMS (SCAN)	Wet	µg/g	75-125%	35%	40-120%	N/A

Volatile Organic Contaminants (VOCs)

Analyte	CASRN	CRRL	Technique	Calculation Basis	Reporting Units	Recovery at PQL	Precision of Laboratory Duplicates (RPD)	Accuracy of Matrix Spikes (Percent Recovery)	SRM Acceptance
1,1,1,2 -Tetrachloroethane	930-20-6	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
1,1,1-Trichloroethane	71-55-6	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
1,1,2,2-Tetrachloroethane	79-34-5	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
1,1,2-Trichloroethane	79-00-5	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
1,1-Dichloroethane	75-34-3	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
1,1-Dichloroethene	75.35-4	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
1,1-Dichloropropene	563-58-6	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
1,2,3-Trichlorobenzene	87-61-6	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
1,2,3-Trichloropropane	96-18-4	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
1,2,4-Trichlorobenzene	120-82-1	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
1,2,4-Trimethylbenzene	95-63-6	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
1,2-Dibromo-3-Chloropropane	96-12-8	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A

Volatile Organic Contaminants (VOCs)									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
1,2-Dibromoethane	106-93-4	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
1,2-Dichlorobenzene	95-50-1	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
1,2-Dichloroethane	107-06-2	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
1,2-Dichloropropane	78-87-5	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
1,3,5-Trimethylbenzene	108-67-8	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
1,3-Dichlorobenzene	541-73-1	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
1,3-Dichloropropane	142-28-9	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
1,4-Dichlorobenzene	106-46-7	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
2,2-Dichloropropane	590-20-7	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
2-Butanone (MEK)	78-93-3	100	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
2-Chlorotoluene	95-49-8	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
2-Hexanone	591-78-6	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
4-Chlorotoluene	106-43-4	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
4-Isopropyl toluene	99-87-6	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
4-Methyl-2-Pentanone	108-10-1	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Acetone	67-64-1	200	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Acrylonitrile	107-13-1	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Benzene	71-43-2	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Bromobenzene	108-86-1	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Bromochloromethane	74-97-5	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Bromodichloromethane	75-27-4	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Bromoform	75-25-2	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Bromomethane	74-83-9	50	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Carbon Disulfide	75-15-0	50	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A

Volatile Organic Contaminants (VOCs)									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
Carbon Tetrachloride	56-23-5	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Chlorobenzene	108-90-7	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Chloroethane	75-00-3	50	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	30-120%	N/A
Chloroform	67-66-3	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Chloromethane	74-87-3	50	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
cis-1,2-Dichloroethene	156-59-2	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
cis-1,3-Dichloropropene	10061-01-5	100	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	15-120%	N/A
Dibromochloromethane	124-48-1	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	30-120%	N/A
Dibromomethane	74-95-3	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Dichlorodifluoromethane	75-71-8	50	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Ethyl Methacrylate	97-63-2	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Ethylbenzene	100-41-4	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Hexachlorobutadiene	87-68-3	50	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Iodomethane	74-88-4	50	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Isopropylbenzene	98-82-8	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	30-120%	N/A
m&p-Xylene	179601-23-1	40	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Methyl Methacrylate	80-62-6	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Methylene chloride	75-09-2	50	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Methyl-tert-butyl ether (MTBE)	1634-04-4	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Naphthalene	91-20-3	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
n-Butylbenzene	104-51-8	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
n-Propylbenzene	103-65-1	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
o-Xylene	95-47-6	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
sec-Butylbenzene	135-98-8	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A

Volatile Organic Contaminants (VOCs)									
Analyte	**CASRN**	**CRRL**	**Technique**	**Calculation Basis**	**Reporting Units**	**Recovery at PQL**	**Precision of Laboratory Duplicates (RPD)**	**Accuracy of Matrix Spikes (Percent Recovery)**	**SRM Acceptance**
Styrene	100-42-5	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
tert-Butylbenzene	98-06-6	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	20-120%	N/A
Tetrachloroethene	127-18-4	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	30-120%	N/A
Tetrahydrofuran	109-99-9	50	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Toluene	108-88-3	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
trans-1,2-Dichloroethene	156-60-5	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
trans-1,3-Dichloropropene	10061-02-6	100	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	5-120%	N/A
Trichloroethene	79-01-6	20	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Trichlorofluoromethane	75-69-4	50	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A
Vinyl Chloride	75-01-4	50	HRGC/LRMS (SIM)	Wet	ng/g	75-125%	35%	40-120%	N/A

Appendix A.2: TPWD Collection Permit Notification Email

Subject: Lake Livingston Fish Contaminant Sampling

TPWD Communications Personnel:

The Texas Department of State Health Services (DSHS) Seafood and Aquatic Life Group (SALG) will begin fish tissue contaminant sampling from March 4, 2013 through June 30, 2013 at Lake Livingston (Polk, San Jacinto, Trinity, Walker counties). The DSHS SALG staff will collect fish under Scientific Permit Number **SPR-0890-247** issued to Kirk Wiles effective March 12, 2012 through April 10, 2015. The DSHS SALG boat (boat description listed below) is marked with State of Texas decals and will have a copy of the DSHS SALG Standard Operating Procedures and Scientific Research Permit onboard the boat. Three DSHS SALG staff will collect samples from the following locations: 1) Lake Livingston near the Dam; 2) Lake Livingston near Wolf Creek; 3) Lake Livingston near the US Hwy 190 Bridge at Kickapoo Creek; 4) Lake Livingston near the US Hwy 190 Bridge (main-stem reservoir); 5) Lake Livingston near Rosewood Lane downstream of the SH 19 Bridge; and, 6) Lake Livingston at the SH 19 Bridge. The DSHS SALG staff will use the following sampling techniques to collect fish from Lake Livingston: boat electrofishing, gill nets, trot lines, and jug lines. Staff will mark all nets and lines with yellow floats. Staff will target collection of catfish species, common carp, crappie, gar species, largemouth bass, smallmouth buffalo, and striped/white bass and their hybrids.

DSHS Austin Field Office:
Vessel Make: Boat Right Marine flat-bottom aluminum boat with center console
Length (ft): 22
Outboard: Mercury Verado 150 HP
Hull color: unpainted aluminum

Please contact me if you have any questions or need additional information. I may also be contacted at 512-968-4334.

Regards,

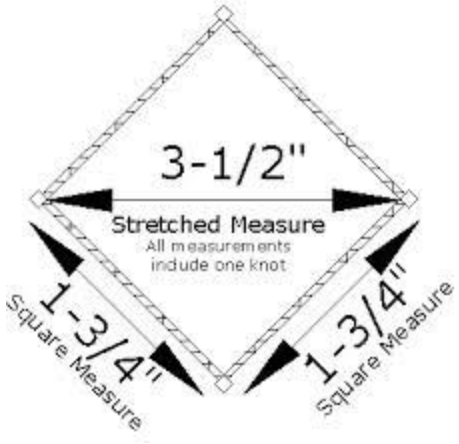
John Doe
Texas Department of State Health Services
Seafood and Aquatic Life Group
512-834-6757
512-834-6762 (fax)
john.doe@dshs.texas.gov

Appendix A.3: Sample Collection Gear Specifications

Monofilament Gill Net Data

Monofilament Size	American Size	Diameter (mm)	Strength (lb)
3	69	0.28	9
4	104	0.33	12
6	139	0.4	17
8	177	0.47	21
10	208	0.52	26
12	277	0.57	31

Bar Length or Square Mesh (in)	Stretched Mesh (in)
0.5	1
0.75	1.5
1	2
1.5	3
2	4
2.5	5
3	6
3.5	7
4	8



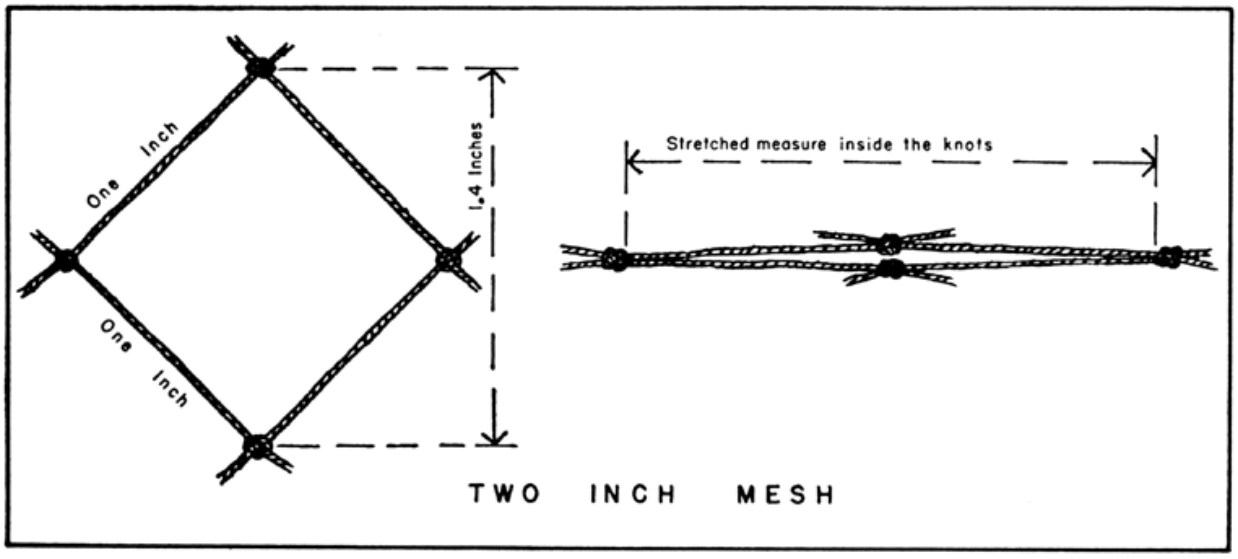


FIGURE 4. A two-inch mesh, open and stretched

Jugline Design and Use Pictures

- Jugline Picture

- Jug or float in horizontal position indicates that fish has not taken the bait

- Jug or float in vertical position indicates that a fish is on or has taken the bait

Oyster Dredge Picture

Appendix A.4: Field Data Forms

DSHS Seafood and Aquatic Life Group Fish and Shellfish Tissue Data Form for Fresh and Estuarine Waters

Water Body: _____ **Site Name:** _____ **Site Code:** _____ **Date:** _____ **Time:** _____

Site Latitude: _____ N **WX:** _____ **ATMP:** _____ **WDIR:** _____ **WSPD:** _____ **WTMP:** _____

Site Longitude: _____ W **SpCOND:** _____ **SAL:** _____ **RSVRELV:** _____ **TIDE:** _____ **RIVDIS:** _____

Collector(s): _____ **RIVSTG:** _____

Observations: _____

Sample Identification	Date Collected	Date Processed	Gear Type	Species or Species Code	Total Length (TL)	Weight	Composite	Sex	Otolith
					Length [mm]	[g or lb]	[Y or N]	[M or F]	[Y or N]

DSHS Seafood and Aquatic Life Group Fish Tissue Data Form for Nearshore and Offshore Waters

Water Body: _____ **Site Name:** _____ **Site Code:** _____ **Date:** _____ **Time:** _____

Site Latitude: _____ **N** **WX:** _____ **ATMP:** _____ **WDIR:** _____ **WSPD:** _____ **WTMP:** _____

Site Longitude: _____ **W** **Collector(s):** _____

Observations: _____

Sample Identification	Date Collected	Date Processed	Gear Type	Species or Species Code	Length [FL or TL]	Weight or Girth	Fish Sample LAT-LONG	Otolith
					[mm cm in]	[g lb] [mm cm in]		[Y or N]

Appendix A.5: Water Body Codes for Texas Waters

Waterbody	Water body Code
Adams Bayou	ADB
Alan Henry Reservoir	LAH
Aransas Bay	ARA
Arroyo Colorado	ARC
Arroyo Colorado (Port of Harlingen)	POH
B.A. Steinhagen Reservoir	BAS
Baffin Bay	BAF
Bastrop Bay	BAS
Big Cypress Creek	CYC
Black Cypress Bayou	BCB
Bouton Lake	BOU
Boykin Springs	BOY
Brakes Bayou	BRK
Brandy Branch Reservoir	BBR
Braunig Lake	BRL
Brazos River Channel (Old Channel)	OBC
Caddo Lake	CDL
Calaveras Lake	CAV
Canyon Lake	CAN
Carancahua Lake (West Galveston Bay)	CAL
Carancuhua Bay	CAR
Cement Creek Reservoir (Fort Worth area)	CCR
Chocolate Bayou	CHB
Christmas Bay	CHR
Clear Creek	CLC
Clear Lake	CLK
Clear Lake (Panola County)	CLR
Colorado River	COL
Como Lake	COM
Conroe Reservoir	CON
Copano Bay	COP
Corpus Christi (Port)	PCC
Corpus Christi Bay	COR
Cow Bayou	COW
Creek Bend Resaca (Brownsville)	CBR
Daingerfield Reservoir	DAI
Delta Lake	DTL
Donna Irrigation Canal	DIC

Waterbody	Water body Code
Drum Bay	DRM
East Galveston Bay	EAS
East Matagorda Bay	EMB
Echo Lake	ECH
Ellison Creek Reservoir	ECR
Espirito Santo Bay	ESP
Forest Park Lake	FOR
Fork Reservoir	FOR
Fosdic Lake	FOS
Freeport (offshore)	FRO
Freeport Area (Caney Creek to West Gal. Bay)	FRE
French Lake (Fort Worth)	FRL
Galveston (offshore)	GAO
Galveston Bay	GAL
Gordon Lake	GRL
Granger Lake	GRL
Greens Lake (West Galveston Bay)	GRL
Hidden Valley Resaca (Brownsville)	HID
Hills Lake	HIL
Hidalgo Settling Basin	HSB
Houston Reservoir	HOU
Houston Ship Channel	HSC
Lake Isabell	ISB
Joe Pool Reservoir	JPR
Kimball Lake	KIM
Laguna Madre	LAG
Lake O' the Pines	LOP
Lavaca Bay	LAV
Leon Creek	LEC
Livingston Reservoir	LLV
Llano Grande Lake	LLG
Lower Waterworks	LWW
Mabel Davis Park Pond	MDP
Lake Madisonville	LMD
Martin Creek Reservoir	MAR
Matagorda Bay	MAT
Mercedes Main Canal	MMC
Mercedes Settling Basin	MSB
Meredith Reservoir	LMR
Mesquite Bay	MES

Waterbody	Water body Code
Millwood Lake	MWL
Lake Mineral Wells	MWL
Moses Lake	MOL
Moss Lake	MOS
Mountain Creek Lake	MCL
Lake Nacogdoches	NAC
Neches River	NEC
Nueces Bay	NUE
O.H. Ivie Reservoir	OHI
Palestine Reservoir	PAL
Pine Island Bayou	PIB
Port Aransas (offshore)	PAO
Port O'Conner (offshore)	POO
Powderhorn lake	PWH
Lake Ratcliff	RAT
Lake Raven	RAV
Red Bluff Reservoir	RBR
Rio Grande River	RGR
Sabine Lake	SAB
Sam Rayburn Reservoir	SRR
San Antonio Bay	SAN
San Antonio River	SAR
San Jacinto River	SJR
South Bay (Lower Laguna Madre)	SOU
Swan Lake	SWL
Tabbs Bay	TAB
Tawakoni Reservoir	TAW
Taylor Bayou	TYB
Timpson Lake	TIM
Toledo Bend Reservoir	TBR
Town Lake	TNL
Trinity Bay	TRI
Trinity River	TRR
Twin Lakes (Town of Lytle)	TWI
Village Creek	VLC
Lake Waco	WAC
Welsh Reservoir	WEL
West Galveston Bay	WES
Lake Worth	LWO

Appendix A.6: Species Code Lists

Freshwater Species Code List

Species	Species Code
Alligator gar	ALG
Black crappie	BLC
Blue catfish	BCF
Blue tilapia	TAP
Bluegill sunfish	BLG
Channel catfish	CCF
Common carp	CRP
Flathead catfish	FHC
Freshwater drum	FWD
Grey redhorse	GRH
Green sunfish	GRS
Guadalupe bass	GLB
Hybrid striped bass	HSB
Largemouth bass	LMB
Longear sunfish	LES
Longnose gar	LNG
Orangespotted sunfish	OSS
Redbreast sunfish	RBS
Redear sunfish	RES
Rio Grande cichlid	RGP
River carpsucker	RCS
Saugeye	SGE
Shortnose gar	SNG
Smallmouth bass	SMB
Smallmouth buffalo	BUF
Spotted gar	SPG
Spotted bass	SPB
Striped bass	STB
Walleye	WAL
Warmouth	WAM
White crappie	WHC
White bass	WHB

Estuarine and Marine Species Code List

Species	Species Code
Atlantic sharpnose shark	ASH
Atlantic croaker	CRK
Alantic stingray	ASR
Barracuda	BAR
Black drum	BDR

Species	Species Code
Blackfin tuna	BFT
Blacktip shark	BTS
Blue Marlin	BLM
Bull shark	BLS
Bonnethead shark	BHS
Blue crab	BCR
Brown shrimp	BSH
Cobia / Ling	COB
Crevalle jack	CVJ
Cubera snapper	CSN
Dolphinfish / Dorado	DPH
Eastern oyster	EOY
Gafftopsail catfish	GTC
Gray triggerfish	GRT
Greater amberjack	ABJ
Gulf kingfish	GKF
Hardhead catfish	HHC
King Mackerel	KMC
Lane snapper	LSP
Little tunny / Bonito	LTT
Mangrove snapper	MSN
Pink Shrimp	PSH
Red drum	RDR
Red snapper	RSN
Sailfish	SLF
Sand trout	STR
Sheepshead	SSH
Snook	SNK
Southern flounder	SOF
Spanish mackerel	SPM
Spinner shark	SPS
Spotted seatrout	SST
Stone crab	SCR
Swordfish	SWF
Tripletail	TRT
Vermilion snapper	VSP
Wahoo	WHO
Warsaw grouper	WSG
White Marlin	WHM
White shrimp	WSH
Whiting	WHT
Yellowfin tuna	YFT

Appendix A.7: Chain-of-Custody Record Form

Texas Department of State Health Services

Chain-of-Custody Record

Seafood and Aquatic Life Group

8407 Wall Street
Austin, Texas 78754

Phone: (512) 834-6757
Fax: (512) 834-6762

SALG POC: Michael Tennant
michael.tennant@dshs.texas.gov

DSHS Contract Number:	**DSHS Purchase Order Number:**
Water Body:	**Collector(s):**
Sample Type:	**Preservation Type:**

Sample Tracking Record

Activity	Date	Time	Agency / Company/Lab	Print Name	Signature
Relinquished by					
Accepted by Courier					
Accepted by lab					

Tissue Analysis

Sample ID	Date of Collection	Time of Collection	Species	Dioxins	Pesticides	PCBs	SVOCs	VOCs	Metals (Circle Metal)	Special Remarks
									As Cd Cu Hg Pb Se Zn	
									As Cd Cu Hg Pb Se Zn	
									As Cd Cu Hg Pb Se Zn	
									As Cd Cu Hg Pb Se Zn	
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									As Cd Cu Hg Pb Se Zn	
									As Cd Cu Hg Pb Se Zn	

Appendix A.8: Data Management Plan

Data Management Process

Field Measurements

The DSHS SALG Field Staff will record field data and observations on the *DSHS SALG Fish and Shellfish Tissue Data Form* following procedures described in the *DSHS SALG SOP*. The DSHS SALG Project Manager will review each field data form for accuracy and completeness prior to data entry. The DSHS SALG Project Data Loaders will enter data into a project database. The DSHS SALG QAO will review the database for entry errors and document correct entry or entry errors on the *DSHS SALG Data Review Form*. If entry errors are found by the DSHS SALG QAO, the *DSHS SALG Data Review Form* is returned to the DSHS SALG Project Data Loader for corrections and the review process is repeated. The database and/or data are archived on the DSHS computer network as specified by DSHS Computer Policy. The original fish tissue field data forms are electronically scanned and archived on the DSHS computer network as part of the project record.

Flow of data: Field Staff (data collection, processing, and recording) → DSHS SALG Project Manager (field data form review) → DSHS SALG Project Data Loaders (data entry) → DSHS SALG QAO (data entry review) → DSHS SALG Project Manager (review performance of verification and validation methods)

Sample Chain of Custody

Tissue sample COC is maintained following procedures described in the *DSHS SALG SOP.* The DSHS SALG Project Manager or DSHS SALG QAO prepares the COC form to document the possession of tissue samples from the time of collection to receipt of samples by the laboratory. The DSHS SALG will deliver or ship tissue samples to the DSHS laboratory or designated contract laboratory. While the tissue samples are in possession of the laboratory, tissue sample COC is maintained following procedures described in the laboratory *QAP* or *QAPP*.

Flow of data: DSHS SALG → DSHS laboratory or designated contract laboratory or DSHS SALG → Shipping Company-Receiving Agent → DSHS laboratory or designated contract laboratory

Laboratory Measurements

Tissue sample analyses procedures including laboratory data reduction, validation, and reporting are outlined in the laboratory *QAP* or *QAPP* and *SOPs*. The Laboratory Manager will transfer via email the final laboratory reports and data to the DSHS SALG Project Manager in Adobe Systems Portable Document Format (PDF) and Microsoft Excel formats, respectively. The DSHS SALG Project Manager will transfer the laboratory reports and data files to the DSHS SALG QAO to upload to the DSHS computer network. The DSHS Project Data Loaders will import laboratory data into the project database. The DSHS SALG QAO will verify the database for accuracy and completeness and document correct data importation or any data importation errors on the *DSHS SALG Data Review Form.* If the DSHS SALG QAO finds any data importation errors, the *DSHS SALG Data Review Form* is returned to the DSHS SALG Project Data Loader for

corrections and the review process is repeated. The database and/or data are archived on the DSHS computer network as specified by DSHS Computer Policy.

Flow of data: Laboratory Manager (final approved report and data) → DSHS SALG Project Manager (transfer final approved report and data) → DSHS SALG QAO (upload reports and data) → DSHS SALG Project Data Loaders (data importation) → DSHS SALG QAO (data importation review) → DSHS SALG Project Manager (review performance of verification and validation methods)

Data Review and Verification

All data will be reviewed, verified and validated as described in the *DSHS SALG SOP* and laboratory *QAP* or *QAPP*. The data to be verified (listed by task in Table 10.3.1) are evaluated against project specifications (Appendix A.1) and are checked for errors in transcription, calculations, and data input. Potential outliers are identified by examination for unreasonable data, or identified using computer-based statistical software.

Flow of data: DSHS SALG Project Manager (final approved data) → Approved for preparation of risk characterization

Personnel

All DSHS SALG field staff are responsible for ensuring that the fish sampling activities are conducted according procedures outlined in the *DSHS SALG SOP*.

- The DSHS SALG Project Manager is responsible for ensuring that data is managed by DSHS and its laboratory subcontractors (GERG laboratory) according to this data management plan by reviewing the performance of verification and validation methods.
- The DSHS SALG QAO is responsible for reviewing the quality of the field and laboratory data and performing all verification and validation of the data.
- The Laboratory Manager is responsible for ensuring that the data resulting from laboratory analyses are managed according to the laboratory QAP or *QAPP, Quality Assurance Management Plan,* SOPs*,* and any approved QAPP.
- The DSHS SALG Project Data Loaders are responsible for entering the field data from the *DSHS SALG Fish and Shellfish Tissue Data Form* into the project database and uploading laboratory data in the project database. The DSHS SALG Project Data Loaders are responsible for archiving data on the DSHS computer network.

SYSTEMS DESIGN

The DSHS SALG will enter, upload, import, and/or archive all project data using personal computers (operating system: Microsoft Windows 7) running common commercially-available software. The DSHS SALG will use Microsoft Excel 2010 or Microsoft Access 2010 to maintain project databases. The DSHS SALG will perform statistical analyses of the data using SYSTAT 13.

DATA DICTIONARY

Terminology and field descriptions are included in Section 6 of this SOP.

QUALITY ASSURANCE/CONTROL

See Section 10.3 of this SOP.

BACKUP/DISASTER RECOVERY

The database and/or data are archived on the DSHS computer network as specified by DSHS Computer Policy.

Appendix A.9: Data Review Form

DSHS Seafood and Aquatic Life Group
Data Review Form

Water Body, Sample Year : _____

Measurement Performance Specifications

Parameter Group	Average Recovery at PQL (75-125%)	Precision of Laboratory Duplicates (RPD) (<35%)	Accuracy of Matrix Spikes (% Recovery)	CRRL Verification	SRM Acceptance
Dioxins	☐	☐	☐	☐ Yes ☐ No	☐ Yes ☐ No
Metals	☐	☐	☐	☐ Yes ☐ No	☐ Yes ☐ No
PCBs	☐	☐	☐	☐ Yes ☐ No	☐ Yes ☐ No
Pesticides	☐	☐	☐	☐ Yes ☐ No	☐ Yes ☐ No
SVOCs	☐	☐	☐	☐ Yes ☐ No	N/A
VOCs	☐	☐	☐	☐ Yes ☐ No	N/A

Narrative:

Data Entry Quality Assurance and Quality Control

Parameter Group Reviewed	Data Entered	Data Reviewed	Data Corrected	Corrections Verified
Dioxins				
Metals				
PCBs				
Pesticides				
SVOCs				
VOCs				
Field Data				
Other:				
Final Review of Corrections by SALG QAO:				
Signature:			**Date:**	

References

[1] United States Environmental Protection Agency (EPA). 2000. Guidance for assessing chemical contaminant data for use in fish advisories. vol. 1, fish sampling and analysis, 3rd ed. EPA-823-B-00-007. Office of Water, Washington, D.C.

[2] United States Environmental Protection Agency (EPA). History of the clean water act. Available: http://www2.epa.gov/laws-regulations/history-clean-water-act (July 8, 2015).

[3] United States Environmental Protection Agency (EPA). 2001. Water quality criterion for the protection of human health: methylmercury. EPA-823-R-01-001. Office of Science and Technology, Office of Water. Washington, DC 20460. Available; www.epa.gov/waterscience/criteria/methylmercury/merctitl.pdf (July 8, 2015).

[4] TEX. HEALTH AND SAFETY CODE § 436. Available: http://www.statutes.legis.state.tx.us/Docs/HS/htm/HS.436.htm (July 8, 2015).

[5] Toxic Substances Coordinating Committee. Meeting minutes. Available: http://www.tscc.state.tx.us/ (July 8, 2015).

[6] Texas Parks and Wildlife Department. 2015-2016 Outdoor Annual: Hunting and Fishing Regulations. Texas Monthly Custom Publishing, a division of Texas Monthly. 2014. Available: http://www.tpwd.state.tx.us/regulations/outdoor-annual/ (October 14, 2015).

[7] Gulf of Mexico Fishery Management Council. 2015. Recreational fishing regulations for the Gulf of Mexico federal waters for species managed by the Gulf of Mexico Fishery Management Council. Available: http://gulfcouncil.org/fishing_regulations/RecreationalRegulations.pdf (October 14, 2015).

[8] Eckblad, James W., How many samples should be taken? Bioscience, May 1991, pp. 346-348.

[9] Gulf States Marine Fisheries Commission (GSMFC). 2009. Practical handbook for determining the ages of Gulf of Mexico fishes, 2nd Edition. GSMFC Publication Number 167. Ocean Springs, MS.

[10] Texas Parks and Wildlife Department (TPWD). 2009. Texas inland fishery assessment procedures, TPWD Inland Fisheries Division unpublished manual. Austin, TX.