

Appendix A

Draft

**Sampling and Analysis Plan
for Biota at the Amchitka, Alaska, Site**

Draft

This page intentionally left blank

Contents

A1.0 Introduction	A-1
A2.0 Purpose and Scope	A-1
A3.0 Monitoring Approach.....	A-1
A3.1 Survey Timing	A-1
A3.2 Monitoring Design.....	A-2
A3.3 Monitoring Locations	A-2
A3.4 Personnel.....	A-2
A4.0 Sampling Methods.....	A-2
A4.1 Seawater Sampling	A-2
A4.2 Kelp Sampling	A-4
A4.3 Gull Egg Sampling	A-4
A4.4 Fish Sampling	A-4
A4.5 Field Forms.....	A-5
A4.5.1 Collection and Preservation Methods.....	A-5
A4.5.2 Sample Shipment	A-6
A4.5.3 Preservation Procedures.....	A-6
A4.6 Standard Environmental Sampling Procedures	A-7
A5.0 Other Monitoring Requirements and Procedures.....	A-7
A5.1 Equipment.....	A-7
A5.2 Health and Safety.....	A-8
A5.3 Quality Assurance.....	A-8
A6.0 Reporting.....	A-8

Table

Table A-1. Amchitka Monitoring: Sampling Species and Radionuclides for Selected Analysis.....	A-3
---	-----

Attachments

Attachment A-1.	Form Examples
Attachment A-2.	Statement of Understanding

This page intentionally left blank

A1.0 Introduction

Amchitka Island is located near the far western end of the Aleutian Islands, approximately 1,340 miles west-southwest of Anchorage, Alaska. It is part of the Aleutian Islands Unit of the Alaska Maritime National Wildlife Refuge, which is administered by the U.S. Fish and Wildlife Service (USFWS). Since World War II, Amchitka has been used by multiple U.S. Government agencies for a variety of military and research activities. From 1943 to 1950, it was used as a forward air base for the U.S. Armed Forces. During the late 1960s and early 1970s, the U.S. Department of Defense (DOD) and the U.S. Atomic Energy Commission (AEC) (predecessor agency to the U.S. Department of Energy [DOE]) used a portion of the island as a site for underground nuclear tests. During the late 1980s and early 1990s, the U.S. Navy constructed and operated a radar station on the island.

Three underground nuclear tests were conducted on Amchitka Island. DOD, in conjunction with AEC, conducted the first nuclear test (named Long Shot) to provide data that would improve the United States' capability of detecting underground nuclear explosions. The second nuclear test (Milrow) was a weapons-related test conducted by AEC as a means to study the feasibility of detonating a much larger device. Cannikin, the third and largest United States underground nuclear test, was a weapons-related test and was detonated on November 6, 1971. The radioactive fission products from the tests remain in the subsurface cavities at each test location.

A2.0 Purpose and Scope

This plan provides the sampling approach and rationale for the type, number, and location of samples to be collected. It also presents descriptions of sampling tasks, including descriptions of sampling equipment and collection methods to be used, the analyses to be performed, specifications for sample identification and vessel positioning, a description of sample documentation, and identification of appropriate sample handling and management procedures.

A3.0 Monitoring Approach

The sampling design presented in this plan is based on the data quality objectives (DQOs) presented in Appendix I of the Long-Term Surveillance and Maintenance Plan. The DQO requirements include (1) the radionuclides identified for analysis need to be present in the inventory for the cavity; (2) the biota species need to be present in the Aleut diet (or a major component the subsistence diet); (3) tritium should not be naturally occurring in the seawater; and (4) concentrations existing in the environment as of 2004 are considered baseline.

A3.1 Survey Timing

As proposed by the Consortium for Risk Evaluation with Stakeholder Participation (CRESP) (CRESP 2006), routine sampling will be conducted every 5 years unless unexpected events occur that warrant unscheduled sampling in conjunction with the mud pit inspections. Gull eggs are usually collected by area Aleuts during May and June. Sampling for these eggs, kelp (*Alaria fistulosa* and *Fucus* sp.), mussels, and all fish would ideally be done between mid-May and

mid-June. However, this time frame conflicts with the nesting of the geese on the island. The optimum time for sampling would be before the geese nesting ends, about the second week in June.

A3.2 Monitoring Design

Table A-1 shows the biota to be sampled and the radionuclides of interest that were identified through development of the DQOs. Samples will be collected along three transects,¹ one for each test site, and one from Kiska Island. Seawater will be collected from each transect.

Samples of nonmobile biota will be collected along the transect from shore at low tide. Specific collection methods are discussed in Section A4.

A3.3 Monitoring Locations

The potential pathway for exposure to the fission products in the test cavities is groundwater migrating through the subsurface and discharging radionuclides into the sea floor. Samples will be collected along the three CRESP-identified transects and the Kiska transect. The maximum sampling distance for each transect is not yet established, although it is believed to be less than 300 feet for each transect based on CRESP experience (CRESP 2005).

Kelp samples of *Alaria* and *Fucus* will be taken from the island end of the transects at low tide, and marine biota along the transects where subsistence fisherman are likely to get their catch. Sampling locations will be determined with Global Positions System (GPS) equipment to allow the location to be noted.

Gull eggs will be collected on Amchitka at traditional nesting areas along the cliffs.

All sampling locations will be documented with GPS on maps and in the field logbook.

A3.4 Personnel

The biota monitoring surveys and any required sampling will be conducted by personnel trained in appropriate sampling techniques and methods. DOE will use local personnel where possible and will consult Aleut tribal members to ensure that the sample collection reflects actual collection for subsistence consumption.

A4.0 Sampling Methods

A4.1 Seawater Sampling

At a minimum of three places along each transect, a seawater sample of at least 2 gallons will be collected and composited for analysis. The total sample volume for each transect will be a 5-gallon composite. A total of four composites will be collected: Cannikin transect, Milrow transect; Longshot transect, and Kiska transect.

¹ A line extending from shore out to sea. Each transect originates from an Amchitka test site.

Table A-1. Amchitka Monitoring: Sampling Species and Radionuclides Selected for Analysis

Species to be Sampled	Cesium-137 (gamma spectroscopy)	Americium-241	Tritium	Plutonium-239+240	Uranium (total)	Gross Alpha	Gross Beta	Gross Gamma
Biota								
Cod	X	X	Not applicable	X	X	X	X	X
Dolly Varden	X	X	Not applicable	X	X	X	X	X
Greenling (kelp or rock)	X	X	Not applicable	X	X	X	X	X
Halibut	X	X	Not applicable	X	X	X	X	X
Rockfish (black or dusky)	X	X	Not applicable	X	X	X	X	X
Sea Urchin	X	X	Not applicable	X	X	X	X	X
Mussels	X	X	Not applicable	X	X	X	X	X
Chitons (gumboots)	X	X	Not applicable	X	X	X	X	X
Gull eggs	X	X	Not applicable	X	X	X	X	X
Kelp (<i>Alaria f.</i> , <i>Fucus sp</i>)	X	X	Not applicable	X	X	X	X	X
Environment								
Seawater	Not applicable	Not applicable	X	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

A4.2 Kelp Sampling

Samples will be collected from the beach at low tide, and if possible, at the low tide of the month. Only the fronds will be collected, and they will be washed to remove any attached debris and stored in spill-proof plastic containers with seawater as a preservative.

A4.3 Gull Egg Sampling

Sampling of sea gull eggs will be conducted in a manner to avoid taking all the eggs from any one nest (e.g., if there are three eggs in a nest, no more than two would be collected for sampling). Once the eggs are removed, they will be refrigerated and handled in the same manner as the fish samples (Section A4.4), except for freezing.

A4.4 Fish Sampling

Samples of fish fillets or the edible portions of shellfish are recommended for analysis of target analytes in intensive studies. Separate composite samples may be prepared for selected size (age) classes within each target species.

Note: The same number of individual organisms should be used to prepare all replicate composite samples for a given target species at a given site. If this number is outside the recommended range, documentation should be provided.

The sampling team will collect live, intact fish and shellfish for use in sample analysis. The live, intact fish and shellfish will not be mutilated by the collection gear and will not have any skin, shell, or carapace lacerations or fin deterioration that would allow body fluids to leak out of the specimen or contaminants to pass into the specimen after collection. Due to the remoteness of Amchitka, and the analytic parameters to be analyzed for, when samples are composited, they will be composited at the time of collection (within 12–18 hours) in a clean area.

During sampling, the boat will be positioned so that engine exhausts do not fall on the deck. Ice chests will be scrubbed with detergent and rinsed with distilled water after each use to prevent contamination. To avoid contamination from melting ice, samples should be placed in resealable, waterproof plastic bags. Sampling equipment that has been contaminated by oils, grease, diesel fuel, or gasoline should not be used. All utensils or equipment to be used in handling fish or shellfish (e.g., fish measuring board, calipers) should be cleaned and sealed prior to the sampling trip or cleaned on-board ship before use. The cleaning procedure is a rinse in acetone and pesticide-grade hexane; seal the cleaned items in aluminum foil. Between sampling sites, the field collection team should clean each measurement device by rinsing it with ambient water and rewrapping it in aluminum foil to prevent contamination.

Only edible portions of the samples will be collected and preserved for analysis. Aleuts will be consulted to determine which portions of the samples are actually consumed.

Thorough documentation of all field sample collection and processing activities is necessary for proper interpretation of field survey results. The sampling team will use preprinted waterproof data forms, indelible ink, and writing implements that can function when wet. When multicopy forms are required, no-carbon-required paper will be used.

Four separate, preprinted sample-tracking forms should be used for each sampling site to document field activities from the time the sample is collected through processing and preservation until the sample is delivered to the analytical laboratory. These are

- Field record form.
- Chain-of-custody (COC) label or tag.
- Sample identification label.
- COC form.

A4.5 Field Forms

Field forms will be completed, noting sample location descriptions, water depth, and a description of recent weather conditions. Locations will also be photographed before collection of fish samples. A surface water sample will be collected once along each transect, according to the methods described in this section. Standard field parameters will be measured at these locations (pH, specific conductance, turbidity, temperature). The following information will be included on all field forms:

- Project number
- Sampling date and time: give date in the format YYYYMMDD and specify convention used for time (e.g., 24-hour clock)
- Sampling site location, including site name and number, latitude/longitude, water body transect/segment number, and site description
- Sampling depth (specify units)
- Collection method
- Collectors' names and signatures

A4.5.1 Collection and Preservation Methods

Fish should be placed in a resealable, waterproof plastic bag. Collection sites will be mapped or located with a GPS and photographs taken. The sample will be labeled with date, time of collection, and closest known existing sample location. The label will consist of information (1) written with indelible ink and placed inside the sample bag, or (2) written on the re-sealable bag with a permanent marker, or (3) written with indelible ink, placed inside the sample bag, and written on the resealable bag with a permanent marker (preferred method). Samples should be stored in a cool place and frozen as soon as possible.

A COC label or tag should be completed in indelible ink for each fish sample. The information to be completed for each sample is included in Attachment A-1. A COC form should be completed in indelible ink for each sample shipping container (e.g., ice chest) used. Information recommended for documentation on the COC form is necessary to track all samples from field collection to receipt at the analytical laboratory. In addition, this form can be used for tracking samples through initial laboratory processing. Before the ice chest is sealed, one copy of the COC form and a copy of the field record sheet should be sealed in a resealable, waterproof plastic bag. This plastic bag should be taped to the inside cover of the ice chest so that it is maintained with the samples being tracked. Ice chests should be sealed with reinforced tape.

Individual fish of the selected target species should be rinsed in ambient water to remove any foreign material from the external surface. Fish may be placed on ice immediately after collection to stun them, thereby facilitating processing and packaging procedures. Once stunned, individual specimens of the target species should be grouped by species and general size class and placed in clean holding trays to prevent contamination. All fish should be inspected carefully to ensure that their skin and fins have not been damaged by the sampling equipment, and damaged specimens should be discarded.

Bivalves (mussels) adhering to one another should be separated and scrubbed with a nylon or natural fiber brush to remove any adhering detritus or fouling organisms from the exterior shell surfaces. All bivalves should be inspected carefully to ensure that the shells have not been cracked or damaged by the sampling equipment, and damaged specimens should be discarded.

After initial processing to determine species and morphological abnormalities, each fish should be individually wrapped. The sample identification label should be taped to the outside of each package, each fish should be placed into a waterproof plastic bag and sealed, and the COC tag or label should be attached to the outside of the plastic bag with string or tape. All of the packaged individual specimens in a composite sample should be kept together (if possible) in one large waterproof plastic bag in the same shipping container (ice chest) for transport. Once packaged, samples should be placed in a freezer.

When samples are composited, the compositing should be done within 12–18 hours after collection rather than at the lab to avoid shipping unnecessary portions of the samples. All analyses will be conducted on the edible muscle portion of the species. Composites will be species specific and transect specific. Potential sources of contamination during compositing include dust, instruments, utensils, work surfaces, and containers that may contact the samples. All sample processing (i.e., filleting, removal of other edible tissue, homogenizing, compositing) should be done under clean-room conditions. The work area should be free of contaminants. Periodic wipe tests may be conducted in clean areas to verify the absence of significant levels of contaminants. All instruments, work surfaces, and containers used to process samples must be made of materials that can be cleaned easily and that are not themselves potential sources of contamination.

A4.5.2 Sample Shipment

Samples will be frozen on board the vessel until the end of the sampling event, when they will be shipped to the appropriate laboratories. Field collection staff must ensure that the samples are packed properly with adequate ice layered between samples so that sample degradation does not occur. In addition, a member of the field collection staff should telephone ahead to the analytical laboratories to alert them to the anticipated delivery time of the samples and the name and address of the carrier to be used.

A4.5.3 Preservation Procedures

Preservation of the samples will be freezing. Samples will be shipped frozen, with appropriate cooling material to prevent thawing. Samples may have to be shipped overnight express after the vessel returns to port.

Container Materials, Preservation, and Holding Times for Fish and Shellfish				
Analyte	Matrix	Sample container	Preservation	Preservation Holding time
Gross Alpha	Tissue (fillets and edible portions)	Plastic	maintain frozen	180 days
Gross Beta	Tissue (fillets and edible portions)	Plastic	maintain frozen	180 days
Gross Gamma	Tissue (fillets and edible portions)	Plastic	maintain frozen	180 days
⁹⁹ Tc	Tissue (fillets and edible portions)	Plastic	maintain frozen	180 days
⁹⁰ Sr	Tissue (fillets and edible portions)	Plastic	maintain frozen	180 days
²³⁸ Pu	Tissue (fillets and edible portions)	Plastic	maintain frozen	180 days
^{239/240} Pu	Tissue (fillets and edible portions)	Plastic	maintain frozen	180 days
Total U	Tissue (fillets and edible portions)	Plastic	maintain frozen	180 days
²⁴¹ Am	Tissue (fillets and edible portions)	Plastic	maintain frozen	180 days

A4.6 Standard Environmental Sampling Procedures

Standard procedures in the *Environmental Procedures Catalog* (LMS/POL/S04325) will be used where applicable. Deviations from these procedures will be noted in a field variance log with an explanation and a description of possible impacts on data quality. The following procedures from the *Environmental Procedures Catalog* will be used for sampling:

- GT-1(P), “Standard Practice for Field Documentation Processes.”
- GT-2(P), “Standard Practice for Sample Labeling.”
- GT-3(P), “Standard Practice for Chain-of-Sample-Custody and Physical Security of Samples.”
- LQ-4(T), “Standard Test Method for the Field Measurement of pH.”
- LQ-5(T), “Standard Test Method for the Field Measurement of Specific Conductance.”
- LQ-8(T), “Standard Test Method for the Field Measurement of Temperature.”
- LQ-11(P), “Standard Practice for the Sampling of Liquids.”
- LQ-24(T), “Standard Test Method for Turbidity of Water (ASTM D 1889-00).”

A5.0 Other Monitoring Requirements and Procedures

A5.1 Equipment

Sampling will be conducted according to the procedures described in Sections A4.1–A4.4. Standard equipment and methods will be employed. If, at any time during the monitoring period, clarification is needed regarding protocols, collection techniques, or other biota monitoring requirements, the Alaska Department of Environmental Conservation may be contacted.

A5.2 Health and Safety

Information on health and safety and emergency response will be developed in a separate plan. All activities performed in association with the biota sampling will be performed according to the health and safety requirements for the Amchitka test sites.

A5.3 Quality Assurance

This work will be performed according to the protocols in the *Quality Assurance Manual* (LMS/POL/S04320) (the QA Manual). The QA Manual implements the specific requirements and philosophy of DOE Order 414.1C, *Quality Assurance*, and includes the requirements of other standards that are regularly imposed by customers, regulators, or other DOE orders. Title 10 *Code of Federal Regulations* Part 830, Subpart A, “Quality Assurance Requirements;” ANSI/ASQC E4-2004, *Quality Systems for Environmental Data and Technology Programs: with Guidance for Use*; and ISO 14001-2004, *Environmental Management Systems*, have been included. These standards are similar in content.

The intent of the QA Manual is to provide a management system that incorporates the quality assurance (QA) requirements and philosophy of DOE and other customers. Criterion 1 of the QA Manual, “Quality Assurance Program,” identifies the fundamental requirements for establishing and implementing the QA management system. QA Instruction (QAI) 1.1, “QA Program Implementation,” lists company manuals developed for QA program implementation and identifies the contractor organizations that have responsibility for implementing the QA program requirements; and Appendix C of the QA Manual provides comparison tables that identify where the requirements of other standards are addressed throughout the manual.

A site-specific QA plan will be developed under the constraints of the QA Manual for the Amchitka project.

A6.0 Reporting

An Amchitka inspection and biota monitoring report will be prepared after each 5-year inspection and sampling event beginning in 2011. This report will be sent to ADEC and to other interested parties upon request. The report will be issued after receipt of the final data.

Attachment A-1

Form Examples

Draft

Draft

This page intentionally left blank

Example of a Checklist of Field Sampling Equipment and Supplies for Fish and Shellfish Contaminant Monitoring Programs

- ◆ Boat supplies
 - ◆ Fuel supply (primary and auxiliary supply)
 - ◆ Spare parts repair kit
 - ◆ Life preservers
 - ◆ First aid kit (including emergency phone numbers of available hospitals, family contacts for each member of the sampling team)
 - ◆ Spare oars
 - ◆ Nautical charts of sampling site locations
- ◆ Collection equipment (e.g., nets, traps, electroshocking device)
- ◆ Recordkeeping/documentation supplies
 - ◆ Field logbook
 - ◆ Sample request forms
 - ◆ Specimen identification labels
 - ◆ Chain-of-Custody (COC) forms and COC tags or labels
 - ◆ Indelible ink pens
- ◆ Sample processing equipment and supplies
 - ◆ Holding trays
 - ◆ Fish measuring board (metric units)
 - ◆ Calipers (metric units)
 - ◆ Shucking knife
 - ◆ Balance to weigh representative specimens for estimating tissue weight (metric units)
 - ◆ Aluminum foil (extra heavy duty)
 - ◆ Freezer tape
 - ◆ String
 - ◆ Several sizes of re-sealable plastic bags for holding individual or composite samples
 - ◆ Re-sealable watertight plastic bags for storage of field records, COC forms, and sample request forms
- ◆ Sample preservation and shipping supplies
 - ◆ Ice (wet ice, blue ice packets, or dry ice)
 - ◆ Ice chests
 - ◆ Filament-reinforced tape to seal ice chests for transport to the analytical laboratory

Attachment A-2
Statement of Understanding

Draft

This page intentionally left blank

I, the undersigned, have received, read, and understand the Sampling and Analysis Plan for Biota at the Amchitka, Alaska, Site.

	Name (Please Print)	Signature	Date	Position
1.	_____	_____	_____	_____
2.	_____	_____	_____	_____
3.	_____	_____	_____	_____
4.	_____	_____	_____	_____
5.	_____	_____	_____	_____
6.	_____	_____	_____	_____
7.	_____	_____	_____	_____
8.	_____	_____	_____	_____
9.	_____	_____	_____	_____
10.	_____	_____	_____	_____
11.	_____	_____	_____	_____
12.	_____	_____	_____	_____
13.	_____	_____	_____	_____
14.	_____	_____	_____	_____
15.	_____	_____	_____	_____
16.	_____	_____	_____	_____
17.	_____	_____	_____	_____
18.	_____	_____	_____	_____
19.	_____	_____	_____	_____
20.	_____	_____	_____	_____

This page intentionally left blank