

**CRESP Amchitka Expedition  
Radiation Survey Monitoring Report  
by C.D. Volz, DrPH, MPH**

## **I. Introduction**

The CRESP Amchitka Expedition Radiation Survey Monitoring Report directly addresses those sections of the CRESP Amchitka Expedition Health and Safety Plan (HASP) and associated Implementation Plan, which deal directly or more obliquely with **immediate detection** of sources of ionizing radiation while on expedition. All expedition members were issued TLD badges to determine their individual dose of radiation over the course of the expedition. The results of personnel monitoring can be found in *Appendix 4.F. Personnel Radiation Dosimetry Phase I and II*, no expedition member received a radiation dose in excess of what would be expected from natural background radiation sources. Personnel dosimetry only indicates the exposure of expedition members after the exposure has occurred, when the TLD badge is analyzed by the manufacturer. This report details the methods and results of a radiation monitoring program to insure that:

- Sources of radiation were discovered before significant exposure to expedition members could occur and;
- If sources of radiation were encountered how expedition member exposure would be kept “As Low As Reasonably Achievable” (ALARA) using shielding, extending distance from or limiting time exposed to the source.

It must be stressed that the finding of a radiation source by survey techniques is not only a health and safety concern but is an end point of the CRESP Amchitka Science and Implementation Plans. Evidence of radioactivity over regional ambient background or activity over background in water, sediment and biota samples would indicate that there is an accessible source of radiation on or near Amchitka Island, previously unknown to the DOE and CRESP.

Although there was extensive Department of Energy (DOE) sponsored remediation work on Amchitka Island and exposures in excess of those allowable for the general public were not anticipated, the CRESP Amchitka HASP contained provisions for radiation survey monitoring and associated safety procedures for both land and marine-based operations. Radiation survey monitoring and safety procedures, specifically included in the HASP and addressed in this report are:

- Section 2.0, Radiation, Screening of Water and Sediment Samples and Ambient Radiation Monitoring Aboard the Ocean Explorer- Water and Sediment samples were taken following procedures detailed in section II of this report. These samples were taken in the deep water marine environment in areas of possible radionuclide discharge from the Cannikin and Long Shot cavities. In-field discussions between Mark Johnson, PhD, Chief Oceanographic Scientist and

Conrad Volz, DrPH, MPH, CRESP Amchitka Project Director resulted in the development of a sampling design intended to evaluate the radiation levels of sediment and water. This sampling and radiation monitoring work was done to identify any radiation sources associated with Phase I Oceanographic operations and serve as an initial indicator of the presence of radionuclide sources that would present a hazard to expedition members during diving operations and marine biota collections to be performed during Phase II of the expedition. Additionally, ambient radiation measurements were made on board the Ocean Explorer during Oceanographic operations to identify sources of radiation that would present a hazard to shipboard personnel.

Water and sediment samples were also taken by divers at various depths ranging from 15 feet to 90 feet in areas of possible radionuclide discharge from the Cannikin, Long Shot, and Milrow Shot Cavities and from the Kiska reference site. These samples were taken to identify any source of radiation as soon as possible after the operation so that divers and other collectors' exposure to radiation be kept as low as possible.

- Section 2.3, Screening of Samples- The HASP required that all specimens brought on board the Ocean Explorer be screened to determine the level of radiation emitted by the specimen. An action level of 0.15 mR/hr was set to assure that samples reading at or above this level would be isolated in leaded bags to avoid prolonged exposure by expedition personnel and that total expedition exposure would not exceed 100 mrem. This report presents the methods used to screen all biological samples, the results of all screening assessments and conclusions regarding personnel exposure during specimen collection.
- Section 2.3.1, Sample Preparation and Handling-The HASP details a wipe sampling procedure to be followed at the conclusion of each work day to insure that High Density Molecular Weight (HDMW) laboratory counters are free from detectable levels of radionuclide. Although this is primarily an anti-cross contamination, Quality Assurance/ Quality Control issue, the presence of radiation levels in excess of background would indicate a source of radiation requiring further study and might also pose a hazard to expedition members. This report presents the location of methods used to assure that no samples were cross contaminated and the results of this sampling as it regards expedition personnel radiation exposure.
- Section 2.3.2, Land-Based Radiological Hazards- Although the risk from land-based radiological hazards as communicated by the DOE is low. The HASP required that ambient monitoring be performed initially during Phase I Base Camp set-up and Magnetotelluric operations. The methods used for and the results of this sampling are presented in this report.

## **II. Amchitka Expedition Water and Sediment Sample Radiation Monitoring and Ambient Radiation Monitoring Aboard the Ocean Explorer**

### **A. Purpose, Water and Sediment Sampling and Report Structure**

Water and sediment sampling in all shot site areas surrounding Amchitka Island was performed to fulfill the Radiological Health and Safety provisions of the overall Amchitka Expedition, Health and Safety Plan (HASP). By design, oceanographic work in Phase I and Phase II dive collections occurred in marine areas of highest probability of discharge of radionuclides from freshwater seeps through faults and/or fractures. The radiological health portions of the HASP were developed to insure that sources of radiation encountered by expedition personnel be detected as soon as possible to insure that exposures be kept “As Low As Reasonably Achievable” (ALARA).

To determine if bottom water or sediments were contaminated with radionuclides and could present a hazard to expedition personnel both water and sediment samples were taken offshore and near shore areas where expedition members would be handling equipment, such as the CTD probe, and collecting biological specimens. These samples were screened for radioactivity by the Amchitka Expedition Project Manager and technicians assisting him using radiation survey meters equipped with gamma scintillation and alpha, beta, gamma pancake probes. Readings were thus immediately available to indicate radiation levels that would mandate removal of personnel from the area or isolation of samples.

The initial water and sediment sample implementation plan was developed to take samples if salt-water/ freshwater anomalies were found during Phase I Oceanographic Operations. Section II.B. of this report contains this initial plan. Since no obvious salt-water/ freshwater anomalies were found during CTD drops, water and sediment samples were taken following a new rationale, developed while on-expedition, as described in Section II. C. of this report. Both water and sediment samples were taken non-randomly and each represents a convenience sample. Water samples were taken nearest to where CTD transects crossed known or projected fault lines and sediment samples were taken where bathymetry indicated a bottom mosaic indicative of the presence of sediment.

### **B. Implementation Plan Procedure for Taking Water and Sediment Samples During the Phase I Oceanographic Portion of the Amchitka Expedition, Developed 6/8/04, Volz**

1. Samples will be taken if salt-water/ freshwater anomalies are found in transects determined by Mark Johnson as a result of CTD scanning off shore from the Long Shot, Cannikin and Milrow blast sites.
2. The procedure for taking samples if an anomaly is found is as follows:
  - The GPS Location of the anomaly will be determined and logged.

- Five (5) water and sediment samples (sample package) will be taken in the area where the anomaly is found.
  - One sample package will be taken in the area where the salinity difference is the highest, one package will be taken 20 yards downstream of the area of highest salinity difference, two (2) sample packages will be taken 20 yards downstream from the point of highest salinity difference, each at 45 degree angles to the line formed by the area of highest salinity difference and the downstream point and one sample will be taken 20 yards upstream from the area of highest salinity difference.
  - If a current direction cannot be accurately determined than one (1) sample package will be taken in the area of highest salinity difference. The remaining samples will be taken on the circumference of a circle at 4 equidistant compass points, all within 20 yards of the circles center.
  - If the salinity difference cannot be pinpointed and is diffuse, 5 or more sample packages will be employed in an attempt to characterize the water and sediment in that area, the distance between sample packages will be determined by site conditions in consultation with Mark Johnson.
3. Sample packages will also be taken in the ocean transects at Cannikin, Long Shot and Milrow if no saltwater anomalies are found. The sample packages will be taken along the midline of the transects as determined by Mark Johnson.
  4. Sample Packages will be taken at our reference site Kiska. Five (5) sample packages will be in the Kiska area at similar depths to those taken at Amchitka.
  5. Water samples will be taken using a Niskin sampler (which opens at the depth desired and closes immediately). The Niskin Sampler takes .7 liters of water on each grab. Since 2 liters of water are needed for analysis and the Nalgene sample bottles are 1 liter. Each water sample will be a composite of three grabs. The GPS location and depth of each water sample will be recorded.
  6. Sediment Samples will be taken using a Van Veen Grab. At least 500 grams of sediment will be taken at each sampling location. The depth and GPS location of each sediment sample will be recorded.
  7. All sediment and water samples will be scanned for radiation activity before being brought on the boat. Longer sampling count times will occur in the hold before sample packaging.
  8. Each water and sediment sample will be given a unique identifier. All samples will first be given a letter for where they are taken from. These will be Cannikin, C; Milrow, M; Long Shot, LS and Kiska, K. Numbers will be sequential in each location starting with 001. Finally the type of sample will be recorded in the identifier, Sediment, S and Water, W. Therefore the first sediment sample from our reference site, Kiska, will have the identifier K001S.
  9. All data will be entered into a note book and than transferred to an Excel spreadsheet for transmission to CRESA headquarters at regular intervals.

## **C. Water and Sediment Sampling Redesign Rationale, Amchitka Expedition- Water and Sediment Sampling Program**

### **Plan Detail on Board Ocean Explorer, June 21, 2004, Mark Johnson and C. D. Volz**

1. General- In the initial Implementation Plan Phase I water and sediment samples were primarily going to be taken in areas where obvious salinity inversions were observed (See section II.B. above). As there were no obvious inversions water samples were taken along transects, which were drawn in Phase I to cross the predicted ocean extension of major fault lines. These fault lines were identified during the planning phase of the expedition from existing geological surveys, satellite pictures and ocean maps. Refinements made over the course of the Phase I expedition by Chief Oceanographic Scientist, Mark Johnson using initial data from both Side Scan and Multibeam Sonar tows and CTD drops (Conductivity, Temperature and Density) further informed the selection of water sampling locations. Water samples were taken at CTD stations, along these transects, at various depths where bathymetry provided any possible indication of a fault or where there was the greatest probability for release as indicated by the study of existing surveys and maps.

Phase I sediment samples were originally to be taken using the same sampling strategy as described above for water samples. Sediment sampling began at CTD drop sites of interest but sampling was aborted because the ocean floor at many of these sites consisted entirely of volcanic rock. Further blind sampling would have damaged sediment sampling equipment. Refinements in sediment sampling locations were made after a careful review of the bottom mosaic, which again was made possible by graphics from both the Side Scan and Multibeam sonar work. Phase I sediment sampling was therefore performed off established transects but within the ocean areas of interest for both the Cannikin and Long Shot blast sites.

During the physical and biological scientific coordination meeting held on June 24<sup>th</sup>, 2004 on Adak Island, Alaska between the Phase I Physical Sampling and Phase II Biological Sampling teams, it was decided that where these transect lines were already drawn (at the Cannikin and Long Shot Test Shot Areas), they would be continued to shore. It is along these lines at 15, 30, 60 and 90 feet that divers were instructed to take bottom water samples and sediment samples, if sediments were encountered. Additional near shore transect lines were drawn in the Milrow test shot area and at the Kiska reference site, divers took water and sediment samples from selected depths as described above at both of these sites.

2. Sampling Procedures- All Phase I water and sediment samples were taken by CRESP Amchitka Project Director, Dan Volz with the assistance of 2 Ocean Explorer crewmembers. During all water and sediment sampling operations 6, on board, Navy technicians kept a detailed electronic log of the GPS position, time and depth of all water and sediment drops. Phase I water samples were taken using a Niskin sampler, lowered and raised using the Ocean Explorer's Crab Pot Wench. The Niskin Sampler is a cylinder, which has at each end a gasket closure device. When the sampler reaches the ocean bottom the cylinder is closed by sending a messenger device down the haul line, thus tripping the trigger mechanism to close the ends of the cylinder.

The Niskin Sampler holds approximately 1 liter of water. Since 2 liters of water are needed for analysis and the Nalgene sample bottles are 1 liter, each water sample is a composite of at least 2 Niskin Sampler drops and is composted in 2 Nalgene bottles. The GPS location, time and depth of each water sample were recorded.

Phase I sediment samples were taken using a Van Veen Grab, an instrument that has two hinged jaws and is heavily weighted. In its cocked position, it appears much like the open jaws of a coal shovel. To obtain sediment samples the Van Veen Grab was slowly lowered to the ocean bottom using the Crab Pot Wench. When the line slacked and the bottom reached, the Grab was hoisted approximately 5 feet off the bottom and than allowed to free fall to the ocean bottom. When the Grab hit the ocean bottom, its weight drove it into the sediment on the ocean bottom and the jaws were triggered shut. The Grab was slowly hoisted and carefully brought onto the deck where the jaws were slowly opened and the contents deposited on plastic sheeting or a clean rubber mat. Once on the deck the sediment was viewed to determine if it contained layers, a 1 Liter Nalgene Bottle was used to take a sample of the sediment, insuring representation of all visible layers. All sediment samples contained at least 500 grams of sediment, the depth, time and GPS coordinates of all sediment samples were logged by US Navy technicians

Phase II water and sediment samples were taken by divers in ocean depths ranging from 15 to 90 feet. These samples were taken using 1 Liter Nalgene bottles, which were filled with ocean water before the divers entered the water. Water samples were taken when divers encountered the ocean bottom, there the bottles were evacuated using compressed air and were filled immediately with ocean water and capped. Sediment samples were taken in a similar fashion when sediment was found at selected dive stations along established collection sampling transects. The depth and GPS coordinates of all Phase II water and sediment samples were noted.

3. Water and Sediment Sample Types, Locations and Approximate Depths- Table I, Water and Sediment Sample Breakdown and Totals, Amchitka Expedition-Phases I and II is shown below. This table lists the type, collection phase, approximate depth and location of all water and sediment samples taken during the Amchitka Science Plan Expedition. A total of 48 water samples and 27 sediment samples were taken over the course of the entire expedition.

Table 1, Water and Sediment Sample Breakdown and Totals, Amchitka Expedition- Phases I and II

A. Water Sample Breakdown- Samples are 2 Liter Composites

Sample Type	Collection Period	Depth (ft)	Cannikin	Long Shot	Milrow	Kiska	Totals
Boat Samples/Niskin Sampler	Phase I	120-270	12	8	1 <sup>1</sup>		21
Dive Samples	Phase II	15		2			2
Dive Samples	Phase II	30		1	4		5
Dive Samples	Phase II	60	4	5	4	4	17
Dive Samples	Phase II	90	1	2			3
Total Water Samples			17	18	9	4	48

B. Sediment Sample Breakdown- Samples represent all sediment sample layers and contain at least 500 grams of sedimentary material

Sample Type	Collection Period	Depth (ft)	Cannikin	Long Shot	Milrow	Kiska	Totals
Boat Samples/Van Veen Grab	Phase I	100-325	7	11 <sup>2</sup>	Volcanic At Drop	Volcanic At Drop	18
Dive Samples	Phase II	15	2				2
Dive Samples	Phase II	30	1				1
Dive Samples	Phase II	60	1	1	1	2	5
Dive Samples	Phase II	90		1			1
Total Sediment Samples			11	13	1	2	27

Superscript 1- One (1) water sample was taken from the Ocean Explorer at Milrow during Phase II before retreat was necessary due to high seas.

Superscript 2- Four (4) sediment samples were taken during Phase II from the Ocean Explorer using the Van Veen Grab.

**D. Results, Screening of Water and Sediment Samples**

Handheld monitoring of all water and sediment samples using the Ludlum Ratemeter with the attached gamma scintillation probe **showed no readings over background.** Background readings taken in various areas of the Ocean Explorer both on and below deck on June 13, 2004 between the hours of 1100 and 1400LT were between .9 and 2.0 micro R/Hr.

Scanning of water and sediment samples taken during Phase I and II of the expedition using the Ludlum-Alpha, Beta, Gamma Pancake probe showed no counts over previously established background using detector 1 and below detection on detector 2. Wipe sampling of the outer spillage of water and sediment samples taken in Phase I also showed no counts over previously established background using detector 1 and below detection on detector 2.

**E. Confirmatory Results from Phase I Sediment Samples, Vanderbilt Analysis From M. Stabin, Vanderbilt Department of Radiology and Radiological Sciences 7/2/04, Received by C.D. Volz aboard the Ocean Explorer**

At 0500 on 7/2/04 C.D. Volz received forwarded E-mail from David Kosson indicating that the sediment grab samples taken during Phase I of the expedition contained **“no suggestion of any fission product or fissile material contamination”**. These sediment samples were shipped to Vanderbilt University for analysis by Vikram Vyas upon his return to Rutgers University. V. Vyas received these samples in packed chests with a Chain of Custody seal directly from C.D. Volz when the Ocean Explorer returned to Adak following Phase I of the expedition. These sediment samples were carried by V. Vyas to Rutgers as excess baggage.

The report from M. Stabin to David Kosson and forwarded to C. D. Volz indicated that the samples were counted for 1 hour on a Broad Energy Ge detector. This analysis clearly showed naturally occurring radionuclides, including members of the U-238/Ra-226 series, the Th-232 series and K-40. M. Stabin reported that there were “absolutely no Cs-137 counts above baseline. Furthermore, M. Stabin indicated that “we looked for many other fission product nuclides, and studied every positive result above baseline, and saw nothing”. This report added confirmatory back-up to hand-held monitoring results indicating that the Phase I sediment samples contained no radiation source above natural background.

**F. Ambient Radiation Monitoring Aboard the Ocean Explorer**

Ambient background levels taken aboard the Ocean Explorer before steaming into Amchitka waters are shown in Section II.D. Ambient radiation levels were taken on board the Ocean Explorer during all phases of Oceanographic work, including multibeam and side scan sonar and CTD drop operations, in the Long Shot and Cannikin areas. All ambient radiation levels measurements taken during “on Amchitka” operations were within the previously determined background range. Additionally, scanning of surfaces of equipment submerged offshore of the coast of Amchitka was performed intermittently. These surfaces, including oceanographic and dive equipment and suits, were scanned during Phase I and II of the expedition using the Ludlum-Alpha, Beta, Gamma Pancake probe and showed no counts over previously established background using detector 1 and below detection on detector 2.

**III. Screening of Biological Samples and Preparation Surfaces On-Board the Ocean Explorer**

The methods for screening of samples brought on board the Ocean Explorer and for the scanning and wipe sampling of preparation surfaces are presented in Appendix 7G Amchitka Independent Science Plan, Radiation Anti-Cross Contamination Quality Control and Assurance (QA/QC) Report. The screening of all biological samples using the gamma scintillation probe showed no activity above the previously established background levels of between .9 and 2 microR/ Hr on board the Ocean Explorer.



Scanning of samples using the Ludlum-Alpha, Beta, Gamma Pancake probe showed no counts over previously established background using detector 1 ( between 25 to 60 cpm) and below detection on detector 2. All tabletop scanning performed before and after sample preparation at High Density Molecular Weight (HDMW), stainless steel and plastic covered workstations as well as wipe samples taken over the course of the expedition were within the background levels established prior to the expedition or indistinguishable from blanks respectively.

#### **IV. Land-Based Radiological Survey Monitoring**

The CRESP Project Director was also the Health and Safety Officer for Phase I of the expedition and accompanied and assisted the Magnetotelluric team in Base Camp set-up as well as operations from 5/14-18/05. He performed ambient radiation monitoring using the Ludlum Ratemeter with attached gamma scintillation meter during base camp set-up, latrine digging, during both *3H-2E* and *2E* Magnetotelluric station set-up and intermittently while crossing transects to characterize shot cavities. Previous to deployment on Amchitka, background sampling was performed on Adak Island and in Pittsburgh, Pennsylvania; sampling times were either 5 or 10 minute periods. The ambient background radiation activity on Adak Island ranged from 3.6 to 5.7 microR/Hr, while the background in Pittsburgh, Pennsylvania ranged from 4.7 to 8.3 microR/Hr. The ambient activity at Base Camp was approximately centered at 6.0 microR/Hr. Activity decreased as expected at the bottom of holes that were dug at Base Camp, falling to 2.2 microR/Hr approximately .33 meters below the surface as latrines were dug. Ambient activity at Long Shot and Cannikin ground zero was centered at 5.5 and 5.1 microR/Hr respectively. As holes were dug for MT stations, activity during the digging process was intermittently monitored. One such hole, very near Long Shot ground zero, for an x rod (1.75 meters long by .3 meters wide by .3 meters deep) showed activity falling from approximately 5 microR/Hr on the surface to 2 microR/Hr at the bottom of the hole. Ambient activity along MT transects never exceeded an upper reading of 6.0 microR/Hr.

Ambient reading on Amchitka Island were thus comparable to background readings on Adak Island and somewhat below upper readings found in Pittsburgh, Pennsylvania, which is in the Appalachian foothills at approximately 1000 feet above sea level.

#### **V. Radiation Survey Monitoring Conclusions**

All survey data indicate that **no radiation source above background** was encountered during Phase I and II operations. All water and sediment samples screened on the boat using both the gamma scintillation probe and the alpha, beta and gamma probe were within background levels. No biological samples or preparation areas contained activity over background during monitoring periods. Perhaps most importantly, analysis of Phase I sediment grab samples found **“no suggestion of any fission product or fissile material contamination”**.

## **VI. Movement, Access, Tracking and Storage of Sediment and Water Samples, Phase I and II of the CRESP Amchitka Project**

The CRESP Amchitka project collected water and sediment samples during both Phase I and II of the expedition. The overall objectives and structure of the project are available in “Amchitka Independent Assessment Science Plan” (Charles Powers, PI). Procedures for Phase I collection of water and sediment samples can be found in the implementation plan entitled “Procedure for Taking Water and Sediment Samples during the Oceanographic Portion of the Amchitka Expedition” by Conrad (Dan) Volz prepared on 6/08/04. During Phase I of the expedition many field changes were made in the implementation plan protocol. These changes were made as a result of better understanding of the oceanographic bathymetry, through use of multibeam and sidescan sonar, and the failure to find obvious salt-water/ freshwater anomalies. New water and sediment sampling locations were determined by Mark Johnson, Chief Oceanographic Scientist and sampling was executed by Conrad (Dan) Volz. Additionally, in meetings on Adak Island between the Phase I physical group and the Phase II biological group, it was decided that transects established for CTD probe tests would be extended to shore. These transects were used by divers to collect biological samples at 15, 30, 60 and 90 foot depths. Since there remained unused Nalgene bottles from Phase I expedition, it was decided that divers would collect both water and sediment samples on these transects and on transects established at Milrow and the reference site at Kiska. Refer to “Water and Sediment Sampling Purposes, On-Expedition Sampling Redesign Rationale and Procedures and Sample Breakdown” by D. Volz, revised 12/1/04, for more information on this process.

All water and sediment samples are in the custody of D. Volz at the Center for Public Health Practice, University of Pittsburgh, 3109 Forbes Avenue, Suite 209, Pittsburgh, PA 15260. These samples are contained in 8 sealed coolers. Water and sediment samples were randomly inserted into these coolers on the Ocean Explorer so that if a chest(s) were lost in transit, the loss would not represent samples from a specific site or transect. On December 9 and 10, 2004, Vikram Vyas and D. Volz will open these coolers for the purpose of inventorying the samples, assigning samples new sample numbers and new chain of custody forms. Once this is accomplished the samples will be maintained by D. Volz until the VU analysis protocols are established by the core CRESP group.

This document includes procedures to be followed by all participants in the water and sediment handling and laboratory analysis phases of the Amchitka project, in communicating data and information related to the project. The project continues to evolve and unanticipated situations may crop up that are not covered by this document. In such a contingency, the project participant is responsible for ensuring that the procedures followed for communicating and distributing information are consistent with those laid out in this document. **This document should therefore be read by all sample handling and laboratory analysis phase participants.**

## **A. Policies and Procedures**

The policies and procedures for the water and sediment sample handling and laboratory analysis phase are being set by a core CRESP group that gets all policy and procedure related information (documents via email). This core group consists of:

Charles Powers (PI)

David Kosson

Joanna Burger

Michael Gochfeld

Barry Friedlander

Conrad (Dan) Volz

Michael Stabin

Vikram Vyas

Hank Mayer

Ccs of all emails go to:

Bernard Goldstein

Michael Greenberg

Lisa Bliss

Joy Hardy

Xiomara Waldron

Dan Riley

Email addresses are located in the email distribution lists at the end of the document.

## **B. Input of Information to Database**

1. Transfer of Information from Logbooks and Associated Databases to an Omnibus Water and Sediment Database-The water and sediment samples from the Amchitka expedition were entered into two logbooks by Dan Volz– the Phase I Logbook, and the Phase II Logbook.

Information from these logbooks was entered into Excel spreadsheets by Dan Volz. Additional information on each Phase I water and sediment sample's GPS coordinates, depth, number of drops and UTC time were taken by Navy contractors on the Ocean Explorer, this information is contained in the CRESP database (and is maintained by the Navy, Dan Volz and Mark Johnson) in the following files

- QINSy NISKIN/BOTTOM MUD SAMPLE log
- Cannikin\_Niskin\_Actual\_Posits\_LL.txt
- Cannikin\_Grabs\_Actual\_Posits\_LL.txt
- Longshot\_Niskin\_Actual\_Posits\_LL.txt
- Longshot\_Grabs\_Actual\_Posits\_LL.txt

Sample information regarding Phase II water and sediment, taken by divers, were entered into the file CRESP04DIVETRENSECTS(1) by Steve Jewett, Chief Scientific Diver. This file is maintained in the CRESP database and by Dan Volz and Joanna Burger.

On December 9<sup>th</sup> and 10<sup>th</sup> V. Vyas and D. Volz will determine a process to merge all water and sediment sampling data into an Omnibus Water and Sediment Database that can be used to geospatially analyze both water and sediment sample results.

2. Distribution of Database Information-The final verified Omnibus Water and Sediment Database will be released by DM (Vikram Vyas) to the following CRESPP personnel, on authorization by the PI

Charles Powers:

Charles Powers  
Joanna Burger  
David Kosson  
Michael Gochfeld  
Michael Stabin  
Conrad Volz  
Lisa Bliss  
Barry Friedlander  
Henry Mayer

### **C. Sample Movement**

1. Phase I Water and Sediment Samples-Phase I water and sediment samples were inserted immediately into a cooler, after entering the sample number into the logbook, marking the Nalgene bottle with the appropriate sample number and performing handheld gamma wipe sampling on the contents of the of the sample. At the end of the Phase I expedition all coolers were sealed with a chain of custody form (COC) and were removed from the Ocean Explorer and taken to the CRESPP storage garage on Adak Island. There COC seals were broken and the 14 sediment samples were removed from the chests that were brought ashore. The sediment samples were resealed with a COC form and were carried to Piscataway, NJ by V. Vyas. V. Vyas sent these samples via Federal Express to VU where they were analyzed by Mike Stabin on the Broad Energy Ge Detector for health and safety purposes. After analysis these samples were returned to their cooler and shipped by parcel post to D. Volz in Pittsburgh for re-numbering. Phase I water samples were retained in a cooler on Adak Island in the CRESPP secure garage to be blended with Phase II samples following that part of the expedition.

2. Phase II Water and Sediment Samples-Phase II water and sediment samples were retained after collection, log-in and identification on the conveyor belt of the Ocean Explorer fish processing facility. At expedition conclusion samples were randomly inserted into 7 coolers. All coolers except one were sealed with a COC form. All coolers were than taken to the secure CRESPP garage where the Phase I water samples were inserted into the non-sealed (but secured with duct tape) cooler and sealed with a COC form. These 7 coolers were initially shipped to VU for analysis but were shipped back to D. Volz in Pittsburgh for dual observation opening with V. Vyas, as decided in the post expedition meeting by core CRESPP researchers. All 7 coolers reached D. Volz in good condition, all with COC seals intact.

## **D. Sample Inventory**

A water and sediment sample inventory of all specimens collected during the Amchitka expedition was completed on December 8–9, 2005 by V. Vyas and C. D. Volz at the University of Pittsburgh, Center for Public Health Practice.

The steps involved were as follows:

1. V. Vyas and D. Volz moved each of the 8 water and sediment coolers into the Center for Public Health Practice conference room.
2. Vikram Vyas and D. Volz opened each chest and D. Volz showed Vikram each sample as it is brought out of the chest, and read the sample ID for Vikram. Vikram entered that sample ID and any other identifying information (such as collection location, if available) into his log book. D. Volz and Vikram Vyas resolved any queries and made any necessary modifications. Thereafter, Vikram went over the hard copy of the inventory line by line, and tallied each entry with his log book records. No mismatches were identified. Photocopies of the Volz and Vyas inventory log book pages were made and subsequently stored in two different CRESP buildings (one set of copies will be in Charles Powers' office).
3. Following verification of all sample identities Vikram and Dan reinserted all water and sediment samples into re-numbered chests. The location of each sample within each chest was entered into Vikram's logbook and Dan received a copy of all recorded information.
4. Information from Vikram's log book was entered into an excel spreadsheet by Dr. Yu Ri Mun of DM.
5. Reviewed and approved inventories of opened chests were matched against logbook entries to tally all samples with database entries by Vikram and Yu Ri.. No mismatches were found.
6. The final reviewed and approved spreadsheets were retained in the database and sent to CRESP Headquarters.

## **E. Assignment of New Sample Numbers and Chain of Custody Forms and Shipment of Water and Sediment Samples to Vanderbilt University**

Following verification of water and sediment samples by V. Vyas and C. D. Volz the following procedures were followed to send samples to Vanderbilt University (VU).

1. Generation of Random Number List- V. Vyas generated a list of random numbers to assign to both water and sediment samples.
2. Assignment of New Numbers- C.D. Volz assigned new random sample numbers to all water and sediment samples, keeping a log of the change in numbers. This operation was performed to assure that Vanderbilt was blind to the original sample numbers and thus locations of sampling on either Amchitka or Kiska Islands. Additionally, the chest numbers changed as the renumbered samples were inserted into renumbered chests.
3. Shipment of Water and Sediment Samples-On 2/23/05 C. D. Volz sent 4 chests and on 2/25/05 he sent 3 chests to VU via FedEx. Vanderbilt sent an e-mail confirmation that they had received the chests; the confirmation was sent by Rossane Delapp. The distribution list for this correspondence is listed below.

"Charles Powers" <[cwpowers@eohsi.rutgers.edu](mailto:cwpowers@eohsi.rutgers.edu)>; "David Kosson" <[David.Kosson@vanderbilt.edu](mailto:David.Kosson@vanderbilt.edu)>; "Burger Joanna" <[burger@nel-exchange.rutgers.edu](mailto:burger@nel-exchange.rutgers.edu)>; "Gochfeld Mike" <[gochfeld@eohsi.rutgers.edu](mailto:gochfeld@eohsi.rutgers.edu)>;

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## **VII. CRESP Amchitka Water and Sediment and Health and Safety Documents**

### **Developed and Sent to CRESP HQ on 12/13/04 by C.D. Volz**

Presented below is a list of primary and secondary documents copied in the presence of and provided to Vikram Vyas by Dan Volz on December 9<sup>th</sup> and 10<sup>th</sup> in Pittsburgh, PA. Original documents will be kept by Dan Volz at the University of Pittsburgh, Graduate School of Public Health, Center for Public Health Practice, 3109 Forbes Avenue, Suite 210, Pittsburgh, PA.

Water and sediment documents are presented by expedition phase and primary documents are flagged. Omnibus water and sediment tables compiled from primary data in both expedition phases are presented. General health and safety documents and logs are presented in their own section.

#### **A. Phase I, Water and Sediment Sampling Documents**

1. Raw Document (WNSS) no.1, Water and Sediment Sampling, 6/21 LT. This document contains the initial handwritten entries of sampling data for water and sediment samples taken aboard the Ocean Explorer by Dan Volz. Sampling data includes sample number, sample type, filter paper wipe number, exposure in micro Roentgens per hour, exposure in counts per minute (cpm), the UTC stop time of each sample (the time that the sample was actually captured on the ocean bottom) and the initials of the Dan Volz. This document is also contained in the Phase I Daily Project Activity and Safety Plan
2. Raw Document (WNSS) no.2, Reconcile 6/22/04, QINSy Niskin/Bottom Mud Sample Log. This document reconciles the Navy document QINSy Niskin/Bottom Mud Sample Log with the original sample numbers given to water and sediment samples by Dan Volz immediately upon sampling and entered into the primary document Raw Document (WNSS) no.1.
3. QINSy Niskin/Bottom Mud Sample Log. The Navy contractors maintained logs of all water (Niskin) and sediment (Van Veen ) drops, whether successful or not. This file contains the UTC date and start and stop time for each drop, the site or waypoint name, the bottom depth and comments regarding the success or failure of the drop. This file was given to Vikram Vyas in both paper and electronic format.
4. Cannikin\_Niskin\_Actual\_Posits\_LL –This Navy file contains the site name and the latitude and longitude of all water samples and water sample attempts in Cannikin transects. The latitude and longitude data on successful Niskin drops are imported into the Excel file OmnibusData Entry, Water Sampling\_Volz12\_7\_04. This file was given to Vikram Vyas in both paper and electronic format.
5. Longshot\_Niskin\_Actual\_Posits\_LL - This Navy file contains the site name and the latitude and longitude of all water samples and water sample attempts in Longshot transects. The latitude and longitude data on successful Niskin drops are imported

into the Excel file OmnibusData Entry, Water Sampling\_Volz12\_7\_04. This file was given to V. Vyas in both paper and electronic format.

6. Longshot\_Grabs\_Actual\_Posits\_LL- This Navy file contains the site name and the latitude and longitude of all sediment samples and sediment sample attempts in Longshot transects. The latitude and longitude data on successful Van Veen drops are imported into the Excel file OmnibusData Entry, Sediment Sampling\_Volz12\_7\_04. This file was given to V. Vyas in both paper and electronic format.
7. Cannikin\_Grabs\_Actual\_Posits\_LL- This Navy file contains the site name and the latitude and longitude of all sediment samples and sediment sample attempts in Cannikin transects. The latitude and longitude data on successful Van Veen drops are imported into the Excel file OmnibusData Entry, Sediment Sampling\_Volz12\_7\_04. This file was given to V. Vyas (VV) in both paper and electronic format.

### **B. Phase II, Water and Sediment Sampling Documents**

1. CRESP04DIVETRANSECTS(1). This file was kept by Steve Jewett aboard the Ocean Explorer and updated each day to reflect the water and sediment samples taken that day. Contained in this file is the local date and time, the location, the station name the coordinates of the dive station and the collectors name. This file was given to VV in electronic form.
2. Phase II, Daily Project Activity and Safety Plan Sheets. These documents, kept daily by Dan Volz represent a primary source of data input on all water and sediment samples. Every day there was collection of water and/or sediment samples these samples were logged into the Daily Project Activity and Safety Plan Sheet. Also logged in was the exposure level of the sample as determined by the GM Pancake counter. Each entry is signed by Dan Volz and serves as dual observation of the water and sediment samples taken by Steve Jewett's dive team. These sheets were copied and given to VV.
3. Name and Position of Stations Occupied by UA Divers for the CRESP II Amchitka Project- This document shows the position of all points to draw transects at Cannikin, Longshot, Milrow and Kiska. It also shows the location of all Diver Down Flags and waypoints used to navigate to dive positions. The date and time shown on these sheets should be disregarded. VV and C. D. Volz learned in a conversation with Steve Jewett that when refinements were made to the coordinate points the GPS automatically changed the date and time of the dive to that of the modification. This area is crossed out on the sheets given to VV and retained by Volz.

### **C. Omnibus Water and Sediment Sampling Documents**

1. OmnibusData Entry, Water Sampling\_Volz12\_7\_04. This Excel file, developed by Dan Volz contains all the data on water sampling from primary and secondary sources. This is a first attempt at quality control. All successful cast data was correlated with the appropriate sample number and all data were reviewed at two different times by Dan.
2. OmnibusData Entry, Sediment Sampling\_Volz12\_7\_04. This Excel file, developed by Dan Volz contains all the data on sediment sampling from primary and secondary sources. This is a first attempt at quality control. All successful drop data was correlated with the appropriate sample number and all data were reviewed at two different times by Dan.

3. Chain of Custody Forms (COC) - Chain of Custody Forms for all chests 1-8 were removed and countersigned by both Vikram and Dan. Dan made copies of each countersigned COC form for Vikram.

**D. Safety and Health and Other Documents Copied for Vikram**

1. All Phase I Daily Project Activity and Safety Plan Sheets.
2. All Phase II Daily Project Activity and Safety Plan Sheets.
3. Acknowledgements Signature Page- That each person has read or been explained the Health and Safety Plan and understands the risk associated with the expedition and agreed to its provisions.
4. Anti-Contamination Log for Wipe Samples Aboard the Ocean Explorer.

**E. Other Documents Associated with Water and Sediment Sampling.**

1. Water and Sediment Sampling Purposes, On Expedition Sampling Redesign Rationale and Procedures and Sample Breakdown, Revised 12/1/04-D. Volz.
2. Movement, Access, Tracking and Storage of Sediment and Water Samples, Phase I and II of the CRESA Amchitka Expedition, Volz Modified 12/2/04.