



DEPARTMENT OF  
**ECOLOGY**  
State of Washington

## **Standard Operating Procedure NWP001, Version 1.1**

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### **Standard Operating Procedure for Collecting Samples at Hanford Nuclear Reservation**

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## Purpose of this document

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The Washington State Department of Ecology develops Standard Operating Procedures (SOPs) to document agency practices related to sampling, field and laboratory analysis, and other aspects of the agency's technical operations.

## Publication Information

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This SOP is available on the Department of Ecology's website at <https://fortress.wa.gov/ecy/publications/SummaryPages/1905011.html>.

## Contact Information

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For more information contact:

Publications Coordinator  
Environmental Assessment Program  
P.O. Box 47600, Olympia, WA 98504-7600  
Phone: (360) 407-6764

Washington State Department of Ecology – <https://ecology.wa.gov>

- Headquarters, Olympia 360-407-6000
- Northwest Regional Office, Bellevue 425-649-7000
- Southwest Regional Office, Olympia 360-407-6300
- Central Regional Office, Union Gap 509-575-2490
- Eastern Regional Office, Spokane 509-329-3400

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Original Author	Jerry Yokel, Quality Assurance Coordinator, NWP
Date	10/05/2012
Original Reviewer	Cheryl Whalen, Cleanup Section Manager, NWP
Date	10/05/2012
Current Author –	Jerry Yokel, Quality Assurance Coordinator, NWP
Date	04/16/2019
Current Reviewer	Cheryl Whalen, Cleanup Section Manager, NWP
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SIGNATURES AVAILABLE UPON REQUEST

*Please note that the Washington State Department of Ecology's Standard Operating Procedures (SOPs) are adapted from published methods, or developed by in-house technical and administrative experts. Their primary purpose is for internal Ecology use, although sampling and administrative SOPs may have a wider utility. Our SOPs do not supplant official published methods. Distribution of these SOPs does not constitute an endorsement of a particular procedure or method.*

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*Although Ecology follows the SOP in most instances, there may be instances in which the Ecology uses an alternative methodology, procedure, or process.*

### SOP Revision History

<b>Revision Date</b>	<b>Revision History</b>	<b>Summary of changes</b>	<b>Sections</b>	<b>Reviser(s)</b>
10/5/2012	1.0	New SOP	all	Kammin
10/29/2012	1.0	Minor edits	all	Kammin
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## **1.0 Purpose and Scope**

- 1.1 This document is the Nuclear Waste Program (NWP) Standard Operating Procedure (SOP) for obtaining environmental samples. This SOP covers collection of soil, water, and vegetation for chemistry or bioassay analyses using equipment currently available or used by Hanford contractor personnel.

## **2.0 Applicability**

- 2.1 This SOP should be followed for all collection activities performed by Ecology's Nuclear Waste Program to obtain samples for chemistry or bioassay analyses.
- 2.2 This SOP does not apply to sample collection in marine waters, estuarine waters, and freshwater.

## **3.0 Definitions**

- 3.1 Unit Manager – Ecology representative responsible for actions and events pertaining to a specific site.
- 3.2 Chemist – Ecology expert on chemistry, sampling data, and analytical methods.
- 3.3 Ecology Representative – Any personnel working for the Washington State Department of Ecology assisting or present during the sampling event.
- 3.4 Sample Initiator – Any Ecology representative asking that a sampling event or sampling split be performed.
- 3.5 Lead Ecology Representative – Ecology personnel directing how an event will take place, that is, the person directly in charge of the specific event.
- 3.6 ACES – Access Control Entry System used at Hanford to track employee entrance and exit into radiation control areas.
- 3.7 HPT – Health Physics Technician.
- 3.8 MW – Mixed Waste contains both hazardous waste (as defined by the Resource Conservation and Recovery Act [RCRA], and its amendments) and radioactive waste (as defined by the Nuclear Regulatory Commission [NRC]).

## **4.0 Personnel Qualifications/Responsibilities**

- 4.1 Ecology staff in the field are required to comply with facility safety plans and requirements of entry at the U.S. Department of Energy Hanford Site and non-Hanford permitted facilities.
- 4.2 Field staff training, badging, and monitoring requirements are presented in the current Nuclear Waste Program Field Safety Manual.

## **5.0 Equipment, Reagents, and Supplies**

- 5.1 Coolers, soil and liquid containers, plastic bags, security tape, and ice are stored in the secure shipping room. An ice machine, freezer, and large refrigerator are maintained in the shipping room. This room is locked at all times, and access is restricted to authorized personnel with key card access.
- 5.2 Reagents used for sample preservation are supplied and added in the field by the contractor. Ecology NWP does not have a hooded facility for storage and handling of reagents.
- 5.3 Laboratory Chain of Custody forms and shipping labels are stored in the shipping room.

## **6.0 Summary of Procedure**

- 6.1 The sample initiator contacts the lead Ecology chemist and provides the following information:
  - 6.1.1 The forms needed to request a sampling effort and where the forms are located. (Contract Request Form, Chain of Custody Form, and Sampling Request Form)
  - 6.1.2 The details of the site and area that are to be sampled.
  - 6.1.3 The type of samples to be collected, (i.e.; soil, water, etc.).
  - 6.1.4 The constituents to be analyzed.
  - 6.1.5 The anticipated sampling date.
  - 6.1.6 What sampling methods are necessary, if any in particular.
- 6.2 Based on the information from the sample initiator, the Ecology chemist will provide a sampling and analysis plan (SAP) or a description of work to the sample initiator. The sample initiator will complete a sampling request form and return it to the chemist.
- 6.3 The Ecology unit manager coordinates with the responsible contractor staff on site for the type of sampling being performed. Informs the United States Department of Energy (USDOE) and USDOE contractor representatives which constituents Ecology wants to be analyzed for. This information is provided whether Ecology is taking or obtaining splits and/or duplicates on one of the contractor's events, or if a contractor wants to obtain splits on a sampling event that has been initiated by Ecology.
  - 6.3.1 The Ecology lead chemist supporting the sampling event contacts one of Ecology's contractual laboratories and makes arrangements for them to ship to Ecology the sample containers, coolers, labels, custody papers, and any other materials that may be needed.
  - 6.3.2 The Ecology lead chemist lets the sample initiator know what progress has been made on arranging the sampling event.
  - 6.3.3 An Ecology chemist contacts the sample initiator when the containers have arrived for the sampling event. The initiator goes to the sample room and assists the lead chemist to sort and categorize the sample containers into sets. The containers are categorized and placed in coolers until the day of the sampling event.



## **6.4 Step 1. Work performed before the sample collection can occur.**

The lead Ecology chemist arranges the time and location for the Ecology sampling team (Ecology representatives attending the event and assisting) to meet with the contracted sampling team on site. (Remember, it is important to find out what USDOE contracted sampling team will be assisting in the collection of your samples. The sample initiator needs to know this, because depending on which contractor samplers are assisting, they will supply and control the radiation vials taken to the sampling event.)

- 6.4.1 USDOE Contractor conducts a pre-job safety meeting. Meeting includes introductions of personnel involved, what procedures and methods that will be used, and the goal of the sampling. The meeting also includes the Radiation Workers Permit (RWP) instructions, if a permit is needed.
- 6.4.2 An Ecology representative prepares the data logbook. The Ecology lead chemist, will use the logbook to log in samples as they are collected, as well as any changes from the SAP or work instruction and the weather conditions. (Preparation of the data logbook includes a brief explanation of the event name, sample numbers to be used, and attendees of the event, the starting time, the contractual lab being used, and the analytical method[s] to be used.)
- 6.4.3 An Ecology representative prepares the chain of custody forms and chain of custody security tape. The sample number, date, and time must be written on the forms and tape, and the lead Ecology representative must sign them.

## **6.5 Step 2. The sample collection**

- 6.5.1 An Ecology representative goes with the sampling team, observes, and collects the samples after they have been released by the Health Physics Technician (HPT). As each sample is collected, the Ecology representative records on a label the date and time, the sample identification number (prearranged by the lab), and which constituent(s) the sample is to be monitored for. Then the Ecology representative places the label on the sample container.
- 6.5.2 The Ecology representative then takes the sample to an assistant (if available), who logs the sample into the logbook. Logging includes the following data: Lot and serial number of the container; the laboratory sample number; the sample collection date and time; the preservative used, if any; and a description of the container including size and type (i.e.; 500 ml amber glass bottle).
- 6.5.3 The Ecology representative receives the sample container and gives it to another assistant (if available). The assistant or representative writes the date and time on the chain of custody tape and places the custody tape over the cap or lid of the container. The tape needs to be placed so that the container cannot be opened without breaking the custody tape seal. Tape may not be placed over any septum material on 40 ml volatile organic (VOA) lids. At this time, the VOA containers should be checked for air bubbles.
- 6.5.4 An Ecology representative (a member of the assisting team) checks the sample container to ensure that all necessary information is recorded on the label.

- 6.5.5 The Ecology representative wraps glass sample containers with bubble wrap, places the container into a plastic bag, and closes the opening. The representative then places the sample container in another plastic bag and closes that opening. Poly sample containers are not wrapped in bubble wrap, but are double-bagged in plastic bags for shipment.
- 6.5.6 The Ecology representative (a member of the assisting team) groups the samples having the same laboratory numbers and places all of them into a heavier, larger plastic bag. The representative places the large plastic bag containing all the samples with the same laboratory numbers in an ice chest and packs ice around them to keep them cool.
- 6.6 Step 3. After the samples are collected**
- 6.6.1 Because of an agreement between Ecology and USDOE with regard to radiation monitoring, an on-site refrigerated holding time is required before the samples can be radiologically screened, released, and shipped off-site. Chain of custody is relinquished to the contractor for the duration of the holding time.
- As of 1994, USDOE and its contractors have imposed a requirement on-site. This requirement specifies that anyone going into the refrigerated storage unit for holding of samples must use the ACES computer system. If they do not use ACES they are not allowed to enter.
- 6.6.2 Ecology representatives or contractor staff must take the samples to the holding area. The holding area location depends on the contractor and type of samples. When the samples are relinquished to refrigerated holding units, the chain of custody papers are placed with the samples. An alternative is that, after proper field radiation screening, the samples and the chain of custody papers can be relinquished to the Ecology sampling team at the sample location.
- 6.6.3 The Ecology representative(s) leave the samples and wait for the laboratory to contact Ecology. Shipping cannot occur until the laboratory contacts Ecology to confirm that the radiological total activity report for the samples has been completed.
- 6.6.4 The Ecology representative (an Ecology employee, i.e., unit manager, supervisor, chemist, etc.) makes arrangements for the shipping, then returns to the refrigerated holding units. USDOE contracted representatives meet the Ecology representative so they can relinquish custody of the samples back to Ecology. USDOE then calls an HPT. The HPT comes to the holding area and surveys out the samples so that Ecology can re-take custody.
- 6.6.5 If the samples meet the rad license requirements or are non-radioactive, Ecology ships the samples to our contracted lab via Federal Express and make all the arrangements. If the samples are radioactive, a USDOE contractor will ship the samples, and a Radiation Shipment Request (RSR) form, dependent on total activity, must be filled out. The radiation calculation is placed on the RSR. Then the “shipping group” is contacted. They come to the lab and the HPT surveys out the samples. The deciding factor to release for shipment or not, depends on the limits and counts the HPT receives on the samples.

## **6.7 Step 4. Packaging and shipping of the samples.**

- 6.7.1 Ecology or USDOE contractor packs the samples inside the ice chests with ice. Vermiculite, newspapers, etc., is then placed around the samples and over the top of the ice, if available. The vermiculite assures that the samples will stay in place and not shuffle around. Vermiculite is also an absorbent and collects the liquid from the ice as it melts. Then the shipping papers and chain of custody papers are completed, placed in water tight containers, and put in the chest with the samples. A piece of tape is placed over the drain spout inside and outside of the shipping coolers to avoid water leakage.
- 6.7.2 If USDOE ships the samples, the HPT talks to the carrier and verifies the carrier can transport samples containing the calculated limits. If the shipper is in agreement, the Ecology representative relinquishes custody to the shipper and the Ecology sampling event is completed.
- 6.7.3 If Ecology ships the samples through our own carrier, the HPT “surveys out” the samples and releases them to the Ecology representative. The representative then physically takes the samples, loads them into an Ecology vehicle, and transports them off- site. Once off-site, the samples are packaged with more ice and chain of custody tape is placed on the coolers, dated, and shipped via the chosen carrier.

## **7.0 Records Management**

- 7.1 Data packages are received at the NWP reception desk and logged in. A copy is given to the project Chemist for review. The original is placed in the NWP Central Files and kept according to the appropriate retention schedule.

## **8.0 Quality Control and Quality Assurance**

### **8.1 Field Quality Control Samples**

- 8.1.1 Replicate Samples: Replicate samples consisting of two samples collected at the same time or in series should be included at the discretion of the project chemist. These samples will estimate the total random variability (precision) of individual results.
- 8.1.2 Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples: MS/MSD samples consisting of 2 extra samples collected should be included at the discretion of the project lead. These samples are used to evaluate the potential for significant bias in the results due to the interference of the matrix.
- 8.1.3 Field Blanks (transfer and equipment blanks): A transfer blank is prepared by filling a sample container with pure water during routine sample collection to check for possible contamination from the surroundings. The transfer blank will also detect contamination from the containers or from cross-contamination during transportation and storage of the samples. The equipment blank is prepared by rinsing the cleaned equipment with pure water. Transfer blank and equipment blank samples should be included at the discretion of the project lead.

### **8.2 Results Quality Control**

After the contracted environmental mixed waste laboratory performs the sample analysis and obtains numerical results, the analyst and the lab QA/QC officer will review data and write up a case narrative. The contracted laboratory will compile the results and narrative into a report. After laboratory review, the report will be sent to Ecology with the data package.

The report and data package will be given to the Ecology project chemist, lead, or other designated project personnel for review. The person will review the results and case narrative and look for any errors, omissions, or inconsistencies. The reviewer is responsible for investigating any issues and notifying the project lead.

## **9.0 Safety**

9.1 Employees must follow safety procedures and all required training outlined in the current Ecology Safety Manual, Richland Office Safety Plan, and the Nuclear Waste Program Field Safety Manual.

9.1.1 The field employee and the employee's supervisor must sign the employee's required reading checklist. The signed checklist is placed in the employee's file.

## **10.0 References**

10.1 [Guidance for Preparing Waste Sampling and Analysis Documents and Quality Assurance/Quality Control Requirements at Nuclear Waste Sites](#)

10.2 [Nuclear Waste Program Field Safety Manual](#)

10.3 [Richland Office Safety Plan](#)

10.4 [Ecology Safety Manual](#)