

**STANDARD OPERATION PROCEDURE
PILOT DUST DISPERSION AND RESUSPENSION SURVEY
September 5, 2012**

**UTE MOUNTAIN UTE TRIBE
AIR QUALITY MONITORING PROGRAM
(UMUAQ)**

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A. PURPOSE AND APPLICABILITY

The purpose of this Standard Operation Procedure (SOP) is to establish and document a uniform procedure for: (1) collecting and preparing dust samples for shipping to the SRC Laboratory for analysis of metals and activities of radioactive particles; (2) surveying the ground level gamma and alpha/beta activities at every dust sampling point via a Geiger-Mueller tube radiation monitor. The procedures outlined in this SOP are applicable to the Ute Mountain Ute Tribe's Air Quality Monitoring Program (UMUAQ) that studies dust samples in the Tribe's White Mesa Community in Utah (WM). The dust samples are used for the concentration and/or activity analysis of U-238, Ra-226, Pb-210, Po-210, Th-230, Th-228 and Th-232 and also inductively coupled plasma mass spectrometry (ICP-MS) metal analysis for Ag, Al, As, B, Ba, Be, Cd, Co, Cr, Cu, Fe, Mn, Mo, Ni, Pb, Sb, Se, Sn, Sr, Ti, Tl, V, Zn and U and an additional special metal analysis for Li, Rb, Bi, Th, Hg.

B. SUMMARY OF THE METHOD

Dust samples are collected using a 1m by 1m sheet of adhesive paper suspended horizontally, no higher than 1 meter above ground but at least .5 meter, adhesive side down on a frame made of PVC pipe and joints. The devices will be left up to 3 weeks and then retrieved, with the adhesive side of paper folded inside and edges sealed, folded again and placed in a 1-gallon Ziploc bag and then in a UPS envelop, to be mailed out to the SRC Laboratory in Halifax, Canada as soon as reasonably possible, though the holding time is up to 120 days of the retrieval due to the long half-lives of the isotopes of interest, except for Po-210. If the holding time is more than a few days, the decay lapse of Po-210 will be corrected to the sampling date. The ground below every sampling point is surveyed also using a Geiger-Mueller tube radiation monitor for a 10 minute average of gamma and 10 minute average of combined beta/alpha activities in counts per minute (CPM).

C. HEALTH AND SAFETY WARNINGS

Dust collected may carry hazardous materials adhered on it, and the sampling devices should be handled with care. The UMUAQ staff is required to wear protective gloves, safety glasses and N95 respirator mask to protect him or her from other environmental hazards. In the summer and winter time, the sampler should take extra precautions when working outside in the extreme heat and cold. Also, pay particular attention to icy roads when traveling.

D. CAUTIONS

A very small amount of the dust picked up and/or lost during the handling of the sample collecting material can affect the result of analyses. Care must be taken when handling them as not to add or lose the dust.

E. INTERFERENCES

The purpose of representative sampling is to characterize the true picture of the presence of dust in ambient air at the time of sampling. Contaminants introduced into the sample containers through careless handling can bias the data.

F. PERSONNEL QUALIFICATIONS

This SOP is written specifically for the UMUAQ staff. All personnel who perform activities with this SOP must be the UMUAQ staff employed by Ute Mountain Ute Tribe and also previously reviewed this QAPP/SOP and verified by the UMUAQ's QA lead, the Environmental Specialist.

G. EQUIPMENT AND SUPPLIES

1. Geiger-Mueller tube radiation monitor (SE International's Inspector with a rated efficiency of approximately 15% for Cs-137) for gamma/alpha-beta survey of the dust sampling point. The monitor is calibrated on January 30st annually to Cs137 (and also when contamination is suspected in addition to this January schedule) to the NIST standard. Please see the attached manual for the isotope specific efficiencies and other details about the monitor;
2. Ziploc bag and a Wipe Test Plate to protect the Geiger from contamination when the gamma survey is done;
3. Two pieces of wood approximately 1/2" x 1/2" x 5" to float the Geiger monitor above ground to protect the monitor from contamination when the combined alpha/ beta survey is done;
4. GPS Unit (Montana, Garmin) is used to locate the grid distribution on ground and to record the dust sampling points;
5. Sampling frame: two 42 inch by 42 inch squares linked by four 24 inch legs (made of PVC pipe sections, joints and PVC glue);
6. Drip irrigation wire anchors;
7. Rubber mallet to anchor the bottom frame into ground;
8. A roll of adhesive paper, 42 inch wide, to be cut into 42 inch long and fixed onto a frame;
9. Ziploc bags and FedEx envelops.

H. PROCEDURAL STEPS

1. A master sampling grid will be generated using ArcGIS mapping software and a 2009 aerial photo, and each sampling location within the grid will be determined individually to satisfy the requirements and follow the procedural steps listed below.
2. Conditions encountered in the field can be quite variable. The sampler will find herself in situations in which she must make decisions based on common sense and a few fundamentals. Instead of hard-and-fast rules, the procedures listed in this SOP are guidelines meant to provide the fundamentals on which to make good decisions.

3. Sample where there are no visible structures that affect the air flow.
 - a. Sample away from the structures (i.e. fences, houses, trees, driveways, doghouses, etc.) The minimum clearance is 10 times the height of any nearby obstruction.
 - b. Sample where disturbance can be minimized.
 - c. Every sampling point is surveyed with a Geiger-Mueller tube radiation monitor for a 10 minute average of gamma (window closed and placed in a Ziploc bag) and a 10 minute average alpha/beta reading (window open and suspended on two pieces of wood to float above ground).
 - d. The Geiger-Mueller tube radiation monitor survey is uploaded through SE International's Observer Software into the UMUAQ's laptop computers.
4. Informing the Community and the Land Owners

Previous to the survey, the UMUAQ will disseminate the information about the study and speak to the nearby residents to notify about the survey and about the sampling devices, which need to be left alone.
5. Sample Collection

The sampling device is secured tightly to the ground using metal anchors threaded through the legs of the frame.

 - a. 42 inches by 42 inches adhesive sheet is secured onto the frame with the 1 meter by 1 meter of adhesive surface exposed downward.
 - b. The device is left out for 21 days.
6. Parameters to be recorded:
 - a. Gamma ray activity monitored for 10 minutes and recorded in the unit CPM using the Geiger-Mueller tube radiation monitor (on day 1 and day 21);
 - b. Total Beta and Alpha activities for 10 minutes and recorded in the unit CPM using the Geiger-Mueller tube radiation monitor (on day 1 and day 21);
 - c. Longitude and latitude (on day 1);
 - d. Weather information from the White Mesa weather station during the duration of the sampling.
7. Preparing samples for shipment to the laboratory.
 - a. After 21 days of sampling period, unsecure and turn the frame over, gently undo the adhered edges off the frame as not to lose or add any dust while doing so, and fold the adhesive side in and to enclose the dusted side in. Fold it in half again and wrap it in a wax paper and tape it shut. Put it in a 1-gallon Ziploc bag, zip it up, and put it in shipping envelop to be mailed within 1 week of the sample collection (however, the max sample holding time is up to 120 days, if the circumstances is such that the UMUAQ is not allowed to spend the lab analysis cost budgeted);

- b. Each sample must be accompanied by corresponding sample field ID and a chain-of-custody record placed on the bag. A custody form signed and dated, should be placed in envelop, taped onto a Ziploc bag.

I. DATA AND RECORDS MANAGEMENT

A data summary will be provided by the Lab and emailed to the UMUAQ Office. A hard copy and an electronic copy of the data will also be kept by the UMUAQ Office and the Lab along with all bench data.

J. QUALITY ASSURANCE AND QUALITY CONTROL

A field blank is prepared for every ten dust samples. If the parameters of interest are detected in a sample and also in the field blank, the UMUAQ is to ignore its presence in the sample unless it is found at a concentration 10 times or more than that found in the blank. If the concentration in the sample is 10 times that found in the field blank, the UMUAQ is to accept the reported sample value as is.

K. REFERENCES

I.A.E.A (2008). *"Thule-2007"-Investigation of Radioactive Contamination on Land*. Vienna: International Atomic Energy Agency.

Petersson, H. B. (1991). Investigation of Aerial Dispersion of Radioactive Dust From An Open-pit Uranium Mine. *Health Physics* , 60(5):681-90.

Thomas, P. A. (1999). *Doses From Radionuclides in Caribou Tissues*. Regina: Environmental Canada.

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Thomas, P. A. (1994). *Uranium Series Radionuclides, Polonium-210 and Lead-210 in the Lichen-Caribou-Wolf Food Chain of the Northwest Territories*. Regina: Environmental Canada.

L. Attachments

1. Chain of Custody Form: SRC Analytical (as Appendix B)

2. Standard Terms and Conditions: SRC Analytical (as Appendix F)
3. Microwave Digestion Methodology Summary of the SOP: SRC Analytical (as Appendix H)
4. Manufacturer's User Manual: SE International (attached to Appendix E- this document
http://seintl.com/manuals/InspectorPlus_Operation_Manual_English.pdf)