START

United States Environmental Protection Agency

Region 10
Hanford Project Office
712 Swift Boulevard, Suite 5
Richland WA 99352

0016176

9104208

EPA

August 28, 1991

Steven H. Wisness
Hanford Project Manager
U.S. Department of Energy
P.O.Box 550, A5-19
Richland, WA 99352

Re: Physical Sampling Criteria for the 100 Areas

Dear Mr. Wisness:

The Environmental Protection Agency (EPA) and their contractors are requiring that sampling for physical properties be included in the revised 100-Area RI/FS work plans. A request was made in the June rescoping meeting that the EPA submit the sampling criteria. Attached you will find the recommended physical sampling criteria for the 100 Areas. If you have any questions or comments please contact me at 376-4919.

Sincerely,

Pamela S. Innis
Unit Manager

Attachment

cc: Larry Goldstein, Ecology
Bob Stewart, DOE
Tim Veneziano, WHC
Merl Lauterbach, WHC
Administrative Record (All 100 Area OUs)

cc w/out attachment: Ward Staubitz, USGS

100-AREAS PHYSICAL PROPERTIES

A physical properties sampling plan is required for the revised 100-Area RI/FS work plans. The sampling plan as described below recognizes (1) the need for quantitative flow and solute transport analyses in the unsaturated-zone underlying the 100-Area waste sites for the purpose of developing defensible risk-assessments, (2) the need to develop an integrated approach for the 100-Areas, and (3) the difficulties in collecting uncompromised samples in the coarse soils found in the 100-Areas.

Cable-tool drilling has been proposed as the preferred method for drilling boreholes in the 100-Areas. It is anticipated that hard-tool drilling will be required to penetrate cobbley strata of the Hanford formation. Hard-tool drilling pulverizes the coarser fraction of the soil and requires the addition of water to form a slurry to allow bailing the drill cuttings from the borehole. Hard-tool drilling changes the particle-size distribution and moisture content of the soil, thereby seriously compromising the collection of representative soil matrix samples for physical property analyses. This problem was also anticipated in the development of the 1100- and 300-Area RI/FS work plans, and it was agreed that cable-tool drilling would be initiated with a reinforced carbide-tipped core barrel and that the core barrel would be used to collect physical property samples as deep as practical. Hard-tool drilling would be used only when necessary; the depths of hard-tool use would be noted in the driller's log; and soil physical properties would not be collected in intervals where the hard tool was used to advance the borehole. This strategy has proven to be successful in the 1100- and 300-Areas, and physical property samples have been collected in a greater number of areas than was originally anticipated.

Because the success of collecting physical property samples at any given site in the 100-Area is unknown, and because the cost of developing a statistically representative physical properties data base for each individual waste site would be prohibitively expensive, we propose that a 100-Area-wide physical property data base be developed. We propose that a minimum of 45 soil samples be collected from at least 15 boreholes throughout the 100-Areas. The soil samples should be taken from a variety of depths in the boreholes with no more than 3 samples taken from any individual borehole. Boreholes that are being drilled for the installation of observation wells should be appropriate for collecting physical property samples. It is anticipated that enough observation wells are being installed in the 100-Areas to provide an adequate sample size even if hard-tool drilling is required in many holes.

It is recognized that this strategy will result in a biased or censored data set; in that the cobbley soils in which only hard-tool drilling is effective will not be sampled. This shortcoming will be recognized and evaluated by the users of this data set.

A further concern in the analyses of physical properties of the 100-Area soils, is that the discharge of large volumes of liquid waste may have changed the physical properties of the soils underlying the waste sites either by solution of carbonates, the flushing of silt and clay sized particles from the soil, or by the precipitation of iron complexes. The physical properties of individual high volume waste sites will therefore also need to be evaluated to determine whether they indeed are represented by the 100-Area-wide physical property data base. To do so, we propose that five samples be collected from different depths in one borehole in each high volume waste site (or representatives of a waste facility type). These samples should be analyzed for soil moisture and other physical properties and compared to the 100-Area-wide physical-properties data base. If the values of the physical properties from the high volume waste sites fall within the .95/.95 confidence interval of the 100-Area-wide data set, they will not be considered outliers and we will conclude that the 100-Area-wide physical properties data base will adequately represent the physical properties of the high volume waste sites.

Physical properties to be measured for the 100-Area-wide data base should include (1) bulk density, (2) particle size distribution, (3) moisture retention (soil characteristic curves) (4) Ksat, and (5) Kunsat at 10 percent moisture content after full saturation. Physical properties of the high volume waste sites should include (1) bulk density, (2) particle size distribution, (3) Ksat, and (4) moisture content. If the physical properties of the high volume waste sites prove to be statistically different than the 100-Area-wide data base, the moisture retention curves and Kunsat of the high volume waste site soil samples will need to be measured.

CORRESPONDENCE DISTRIBUTION COVERSHEET

Author	Addressee	Correspondence No.
P. S. Innis, EPA	S. H. Wisness, RL	Incoming: 9104208

Subject: PHYSICAL SAMPLING CRITERIA FOR THE 100 AREAS

INTERNAL DISTRIBUTION

Approval	Date	Name	Location	w/att
		Correspondence Control	A3-01	X
		J. M. Ayres	H4-55	X
		S. W. Clark	H4-55	X
		R. E. Day	H4-55	X
		W. E. Green	H4-55	X
		A. D. Krug	H4-55	X
		H. P. Lachmann	H4-55	X
		N. M. Naiknimbalkar	H4-55	X
		J. W. Roberts	H4-55	X
		F. V. Roeck	H4-55	X
		M. T. Stankovich	H4-55	X
		S. G. Vukelich	H4-55	X
		EDMC	H4-22	X

No assignee needed as there is no action required. This is for tracking purposes only.