START

0027522

AUG 12 1992 **ENGINEERING DATA TRANSMITTAL**

Page 1 of 1

1. EDT 160032

Sta. 7 (14)

2. To: (Receiving Organization) Environmental Engineering	3. From: (Originating Organization) Environmental Project Safety Documentation	4. Related EDT No.:
5. Proj./Prog./Dept./Div.: Environmental Engineering	6. Cog. Engr.: J.M. Frain	7. Purchase Order No.: N/A
8. Originator Remarks: This document is the aggregate safety assessment for shallow/near surface sampling activities in support of Hanford Site characterization.		9. Equip./Component No.: N/A 10. System/Bldg./Facility: N/A
11. Receiver Remarks:		12. Major Assm. Dwg. No.: N/A 13. Permit/Permit Application No.: N/A 14. Required Response Date: July 21, 1992

APR 1993 RECEIVED EDMC

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Impact Level	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1	WHC-SD-EN-SAD-016 VOL 2		0	Safety Assessment for Environmental Investigations and Site Characterizations Volume 2: Aggregate Safety Assessment for Shallow/Near Surface Activities	2 ESQ	1&2	1	

16. KEY

Impact Level (F)	Reason for Transmittal (G)		Disposition (H) & (I)	
1, 2, 3, or 4 (see MRP 5.43)	1. Approval 2. Release 3. Information	4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment	4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Impact Level for required signatures)

(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.
1		Cog.Eng. J.M. Frain	JMFrain	7/27/92	H4-55						
1		Cog. Mgr. G.C. Henckel III	[signature]	7/27/92	H4-55						
1	/	QA ~~D.G. Farwick~~	[signature]		H4-16						
1	1	Safety F.A. Schmorde	[signature]	28 Jul 92	L6-57						
1	1	Env. E.M. Greagor	E.M. Greagor	7/27/92	L8-60						
1		SA&R N.R. Kerr	NK	7/27/92	N1-75						
1		SA&R J.J. Zimmer	NK for	7/27/92	N1-83						

18.	19.	20.	21. DOE APPROVAL (if required)
D.A. Harrold D.A. Harrold 7-27-92 Signature of EDT Originator / Date	Authorized Representative for Receiving Organization / Date	G.C. Henckel [signature] 7/27/92 Cognizant/Project Engineer's Manager / Date	Ltr. No. [] Approved [] Approved w/comments [] Disapproved w/comments

9 3 1 2 9 7 0 2 0 6 9

BD-7400-172-1 (07/91)

CS 8/12/92

SUPPORTING DOCUMENT

1. Total Pages ~~15~~ 17

2. Title	3. Number	4. Rev No.
Safety Assessment for Environmental Investigations and Site Characterizations Volume 2: Aggregate Safety Assessment for Shallow/Near Surface Activities	WHC-SD-EN-SAD-016	0

5. Key Words

Aggregate
Characterization
Sampling Activities
Safety Assessment

APPROVED FOR PUBLIC RELEASE V. Birklund 8/5/92

6. Author

Name: D.L. Harrold

D. L. Harrold
Signature

Organization/Charge Code 29550/PK13A

7. Abstract

This document is the aggregate safety assessment for shallow/near surface sampling activities in support of Hanford Site characterization.

9. Impact Level 2 ESQ

10. RELEASE STAMP

OFFICIAL RELEASE BY WHC (14)
DATE AUG 12 1992
Sta. 1

9312970207 0

CONTENTS

9 3 1 2 9 7 0 2 0 7 1

1.0 SUMMARY AND INTRODUCTION

Westinghouse Hanford Company (Westinghouse Hanford) manages the investigation and characterization of the Hanford Site for the U.S. Department of Energy (DOE). Groundwater well drilling, deep vadose zone boring, and shallow/near surface sampling are three categories of activities conducted for the purpose of characterizing soils on the Hanford Site. This safety assessment addresses the hazards associated with the shallow/near surface sampling activities.

The majority of the shallow/near surface sampling activities are involved with characterizing the upper 1 m (3 ft) of the vadose zone. Trowels, spoons, hand augers, and earthmoving equipment such as backhoes are the types of equipment used. Other investigative activities not directly related to the vadose zone such as concrete, pond sludge, and septic tank sampling are also classed as shallow/near surface sampling activities and are covered in this assessment. The Environmental Investigations Instructions (EII) provided by Westinghouse Hanford (WHC 1989) give descriptions of the sampling techniques and procedures for the various types of shallow/near surface sampling activities.

The hazards of the shallow/near surface sampling activities are a function of the quantity of hazardous material and the mechanisms available for dispersing the material. Dispersal of material in air provides the potential avenue for an internal deposition or further spread to the environment. Trench and test pit sampling are examples of the types of activities that present an accumulation of material and provide a potential mechanism for dispersal. The hazardous material consists of potential radiological and nonradiological hazardous substances entrained in the soil.

The radionuclides found in the Hanford Site soils have originated from operations involving mixed fission products. Isotopes of cobalt, strontium, cesium, europium, and uranium are commonly found. Concentrations in the surface soils have generally been found in the pCi/g range. Other hazardous nonradiological substances that may be encountered during shallow characterization activities are heavy metals and organic compounds. Concentrations of these substances in Hanford Site soils are relatively low (measured in p/b).

The review and authorization requirements of DOE 5481.1B, *Safety Analysis and Review System*, specify the approval levels for hazardous activities (DOE 1986). These requirements would apply to mechanized soil sampling (testpit, trench, auger, etc.) in areas that did not meet the release criteria in WHC 1988c, Section 11. All other shallow/near surface sampling activities specified in the *Environmental Investigations and Site Characterization Manual* (WHC 1989) and the *Environmental Monitoring Manual* (WHC 1990a) are considered general use and therefore, exempt from additional safety analysis and review (DOE 1986).

For the large majority of the sampling activities, the procedures provided by Westinghouse Hanford are adequate to assure safe operation (WHC 1989, 1990a). Job Safety Analyses (JSA) and Radiation Work Permits (RWP) also provide additional guidance for worker safety. In the case of mechanized soil sampling, two operational safety limits (OSL) have been established as an administrative control. These OSLs specify limits on surface contamination encountered during the excavations and in turn have the effect of limiting the amount of contaminants that can be dispersed in the air.

2.0 WORK DESCRIPTIONS

Shallow/near surface sampling activities are performed to obtain samples from potential waste sources other than the deep vadose zone. The samples are then analyzed to determine if hazardous radioactive and nonradioactive substances are present.

The majority of these activities involve characterizing surface soils and the upper 1 m (3 ft) of the vadose zone. The equipment used to perform these particular activities include trowels, spoons, augers, and earth-moving equipment, such as backhoes. The following are investigative activities not directly related to the vadose zone, yet are classed under the same general heading of shallow/near surface sampling activities:

- Soil gas sampling
- Concrete sampling
- Sampling of septic tanks
- Surface wipes
- Sampling of underground fuel storage tanks (gas, diesel oil etc.)
- Sampling of underground chemical storage tanks
- Pond sludge sampling
- Biotic/ecological sampling.

Details on sampling equipment and procedures for most of the work described above are contained in the EII (WHC 1989). Table 1 is a list of activities and applicable EIIs. All samples will be screened with hand-held field instruments for alpha, beta, and gamma radiation.

Table 1. Sampling Activities and Corresponding EIIs.

Activities	EII
Hand auger	5.2 Appendix E
Scoop/spade/shovel	5.2 Appendix E
Test pits/trenches	5.2 Appendix F
Sludge sampling	5.2 Appendix G
Biotic sampling	5.3
Mechanized auger	6.7 Appendix B

2.1 INVENTORIES

The intrinsic hazards of the shallow/near surface sampling activities are a function of the quantity of hazardous material and the mechanisms available for dispersing the material. The types of material sampled may include septic wastes, petroleum based fuels, pond sludge, concrete, soil gas, chemicals, and shallow soils. Radiological, organic and inorganic hazardous substances entrained in the sampled matrix are the inventories of concern.

The radionuclides found at the Hanford Site have originated primarily from operations involving mixed fission products. Isotopes of cobalt, strontium, cesium, europium, and uranium are some of the more common radionuclides. Concentrations in surface and subsurface soils have generally been found in the pCi/g range. The maximum contamination levels evaluated for in this assessment are 100 times the surface radioactivity guides (fixed plus removable) (DOE 1988) for beta/gamma decaying radionuclides, 10 times the guides (fixed plus removable) for uranium, and 10 times the guides for alpha decaying transuranics. For example, the maximum contamination levels would be 500,000 dpm/100 cm^2 for ^{60}Co, ^{137}Cs, and ^{152}Eu; 50,000 dpm/100 cm^2 for ^{238}U; 100,000 dpm/100 cm^2 for ^{90}Sr; and 3,000 dpm/100 cm^2 for ^{239}Pu. These limits are averages for a one square meter area (11 ft^2). These levels can be increased by a factor of three for any 100 cm^2 (16 $in.^2$) as long as the average for one square meter is not exceeded.

Other hazardous nonradiological substances that may be encountered during characterization activities are heavy metals and organic compounds. Concentrations of these substances in the Hanford Site soils are relatively low (measured in p/b). Environmental Engineering has provided a summary of controlling inorganic and organic contaminant concentrations that were derived from process analytical data of Hanford Site soils (see Attachment A). This list, summarized in Table 2, represents the maximum concentrations of limiting constituents that are anticipated.

Table 2. Hazardous Organic and Inorganic Substances Anticipated in Hanford Soils.

Analyte	Average Concentration p/b	Maximum Concentration p/b
Mercury	1.28	20
Lead	28	319
Chromium	54	380
Cyanide	51	246
Hydrazine	59	88
Carbon tetrachloride	4,352	8,700
Cyclohexane	670	900
Tetrachloroethane	410	1,200
Phenol	37	80

For most of the shallow/near surface sampling activities, the potential hazard inventory consists of the material sample volume that in most cases is less than one L. The methods (hand tools, etc.) used to obtain these samples generally do not provide sufficient energy for generating a source term to uninvolved individuals.

Excluding mechanized excavation sampling, mechanisms for generating a source term are not available in the shallow/near surface sampling activities. In the case of mechanized soil sampling, where there are relatively large volumes of dirt [$>1m^3$ (30 ft^3)], potentially contaminated soil can be brought to the surface, and exposure to wind or other dispersal mechanisms can occur.

The shallow/near surface sampling activities can be segregated into four categories:

1. Nonintrusive/nonaccumulative (soil gas sampling, radiological surveys, etc.). Based on the lack of a material hazard, the activities fitting this description are excluded from safety review requirements.

2. Intrusive/accumulative sampling (mechanized or nonmechanized), where no contaminants are anticipated. Based on the lack of a material hazard, the activities fitting this description are excluded from safety review requirements.

3. Nonmechanized intrusive/accumulative sampling where the small volumes (measured in L) of accumulated material exceed the release criteria provided by Westinghouse Hanford (1988c, Section 11.4.6). Based on the limited accumulation of material and the lack of a means for dispersing the material, existing safety documentation and procedures are adequate to control the work. The existing documentation consist of JSAs, Hazardous Waste Operations Permits (HWOPs), and RWPs. The procedures that will control the work consist of the EII (WHC 1989). Activities that fall into this category are excluded from the OSL requirement.

4. Mechanized intrusive/accumulative (test pit, test trench, auger) sampling where relatively large soil volumes can be displaced or accumulated and exceed the release criteria provided by WHC 1988c, Section 11.4.6. Activities in this category require a safety review and an OSL to limit the potential spread of contamination.

Test pit soil sampling, typical of a category 4 activity, is a method of sampling that is used to determine the nature and extent of potential sources of contamination at facilities where shallow, nonradioactive contamination was identified by other shallow/near surface sampling activities (e.g., soil gas sampling).

The test pits will be excavated with a backhoe or similar bucket-equipped heavy equipment. Test pit sampling will be performed in accordance with EII 5.2, Appendix I (WHC 1989). Disturbed samples will be collected from the bucket of the backhoe. Procedures for decontamination of sampling equipment are contained in EII 5.5 (WHC 1989). Procedures for decontamination of the excavation equipment are addressed under the procedures described in EII 5.4 (WHC 1989).

The test pits and all samples will be screened with hand-held field instruments for alpha, beta, and gamma radiation and volatile organic compounds. Field logs will be maintained to record all observations and activities in accordance with EII 1.5 (WHC 1989). Samples for laboratory analysis will be placed in appropriate containers and properly preserved in accordance with EII 5.2 (WHC 1989). During test pit excavation and sampling, measures will be taken to prevent migration of contamination in accordance with EII 5.2, Appendix F (WHC 1989).

2.2 POTENTIAL ENERGIES

The energies of concern consist of mechanical stresses caused by the digging action of the bucket or auger and wind stress. These energies contribute to a potential inhalation hazard of resuspended dust. Other energies (such as fire, electricity, etc.) were considered and dismissed as having no appreciable impact on the dispersement of material. Natural phenomena were considered for hazard impacts. A wind storm was identified as having the undesirable effect of spreading the contamination to other areas, but because of the unstable air conditions, it would not add to an inhalation hazard. In addition, the work is generally not performed in wind speeds greater than 15 m/hr. Other phenomena such as a flood or earthquake would not have any appreciable hazard impact during sampling activity.

3.0 SITE DESCRIPTIONS

3.1 PHYSICAL SETTING

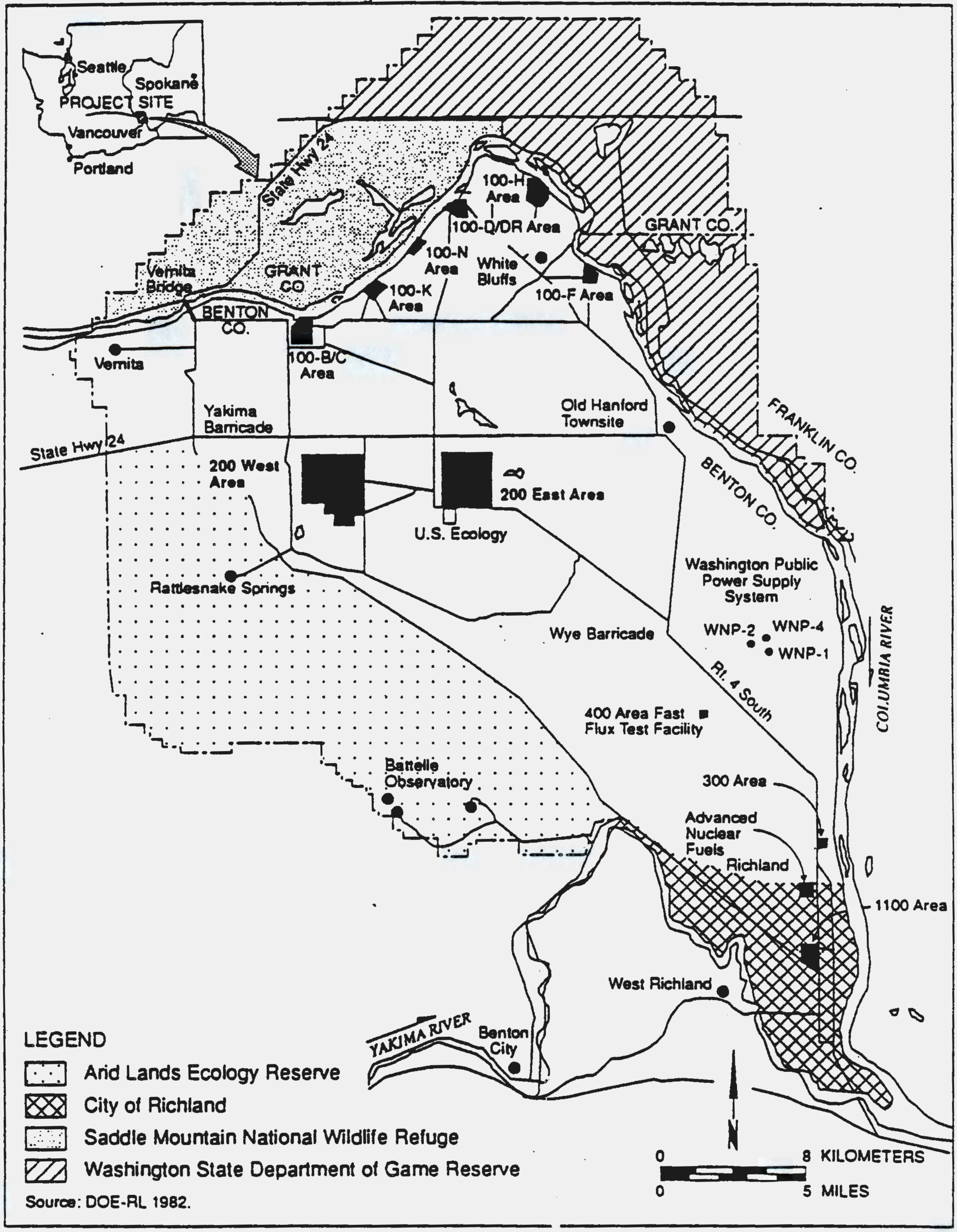
The Hanford Site is located in south-central Washington State, approximately 273 km (170 mi) southeast of Seattle and 201 km (125 mi) southwest of Spokane (Figure 1). The average annual precipitation at the Hanford Site is 16.1 cm (6.3 in.). Most of the precipitation takes place during the winter, with nearly half of the annual amount occurring from November through February (Delaney et al. 1991). Average monthly temperatures at the Hanford Site range from 1.5° C (29° F) in January to 24.7° C (76° F) in July (PNL 1990).

3.2 METEOROLOGY

Prevailing wind directions are generally from the northwest throughout the year. Winds from the northwest quadrant occur most often during the winter and summer. During the spring and fall, the frequency of southwesterly winds increases.

Monthly average wind speeds are generally lowest during the winter, averaging 10 to 11 km/h (6.2 to 6.8 mi/h). Monthly average wind speeds peak in the summer, averaging 14 to 16 km/h (8.7 to 9.9 mi/h). Wind speeds well above average are usually associated with southwesterly winds (PNL 1990).

Figure 1. Hanford Site.



903-1273/26169/9-17-91

9 3 1 2 2 7 0 2 0 7 7

3.3 GEOLOGY

The Hanford Site sediments consist of pebble to boulder gravel, fine to coarse grained sand, and silt. The 100 Areas are the site of eight old terminated reactors along the Columbia River. Sediments in the 100 Areas consist of poorly sorted gravel, sand, and silt. The moisture content is generally low, ranging from 2% to 7% in coarse and medium grained soils with 7% to 15% in silts.

The 200 Areas contain inactive nuclear fuels reprocessing and plutonium separations facilities, as well as the majority of radioactive waste storage and disposal facilities on the Hanford Site. More than 45 yrs of operations in these areas have resulted in the storage, disposal, and accidental release of radioactive and hazardous wastes. Sediments range from fine grained, silty sands in the southern parts of the 200 Areas to granule to boulder gravels in the northern part of the 200 Areas. Field moisture content of the sediments range from 2% to slightly greater than 6%.

The 1100 Area, which is adjacent to the city of Richland in Benton County, composes the southeastern most portion of the Hanford Site. The 1100 Area has been used as a maintenance area, warehouse facility and equipment storage yard in support of operations at the Hanford Site. Sediments in the 1100 Area consist of interbedded sandy gravel, gravelly sand, and silty sandy gravel.

The 300 Area, located in the southeastern portion of the Hanford Site, contains a number of support facilities for the Hanford Site. Sediments in the 300 Area consist of course grained sand and sandy gravel with cobbles and boulders increasing with depth.

4.0 HAZARDS

4.1 SUMMARY OF POTENTIAL HAZARDS

The potential exposure pathways for hazardous substances encountered during the sampling activities may consist of inhalation, ingestion, absorption, or direct irradiation. The materials to be sampled include septic wastes, petroleum based fuels, pond sludge, concrete, soil gas, chemicals, and shallow soils. Radioactive, organic, and inorganic substances identified in Section 2.1 are the hazards of concern. For those activities in categories 1, 2, and 3 of Section 2.1, the procedures outlined in the EII (WHC 1989), along with other occupational safety documentation (i.e., JSA, RWP, etc.) will adequately control the hazardous materials.

The limiting health hazard associated with the activities is the potential inhalation of contaminated particulates by sampling personnel; this, however, is unlikely. Other minor health hazards include such events as potential skin contaminations of sampling personnel. Minor environmental contamination could occur from loose piles or exposed excavations in the event of high winds. The worst case exposure analyzed is < 0.01 rem to the maximum exposed worker.

4.2 DISMISSAL OF NEGLIGIBLE HAZARDS

Criticality - A criticality event was dismissed based upon insufficient quantities of fissionable material in the shallow soils of the Hanford Site.

Natural Phenomena - Natural phenomena events such as floods, runoff, lightning, and earthquakes do not contribute to potential health or environmental consequences resulting from the shallow/near surface sampling work procedures.

High wind events could potentially contribute to the spread of minor surface contamination in the case of shallow/near surface sampling excavations. Loose spoils of contaminated silts, clays, and sands could be resuspended or otherwise carried by saltation to cause possible detectable levels of surface contamination. Because of the limited duration of trench and pit sampling, the anticipated low levels of contamination, and the implementation of applicable work procedures, the health or environmental risks are considered to be very low. High wind events would result in potential air concentrations far less than the stable air analysis provided by the American National Standard Institute (ANSI 1978) and summarized in Section 5.0 below.

5.0 HAZARDS ASSESSMENT

5.1 RADIOLOGICAL

The American National Standard Institute document (ANSI 1978) addressing the control of radioactive surface contamination provides a conservative analysis and estimate of surface contamination levels that could, under ideal stable air conditions, produce air concentrations equal to that of the derived concentration guides (DCG) (WHC 1988a). The DCGs are derived for the purpose of relating concentrations of radionuclides in the environment to a human dose. When a standard individual is exposed continuously for 1 yr to air concentrations at one times the DCG values, that person will receive an effective committed dose equivalent of 100 mrem (0.0114 mrem if exposed for 1-hr) to the whole body or other limiting dose to an organ (WHC 1988a). The surface contamination guides in DOE 5480.11 (DOE 1988) and WHC 1988c reflect the results of the ANSI standard.

The assumed time for an inhalation to occur is 2-h. The conditions existing in the field during sampling activities (trench and pit sampling) are expected to be less than the ideal and stable air conditions specified in the ANSI standard analysis. The assumption can therefore be made that the ANSI standard analysis would be a conservative application to the shallow/near surface sampling activities. Given the bounding concentrations specified in Section 2.1, the dose consequences and hazard class limits are summarized in Table 3.

Table 3. Dose Consequences and Hazard Class Limits.

Receptor	Dose consequence (rem)	Hazard class limit (rem)
Site worker	< 0.01	25
Onsite worker	<< 0.01	5
Offsite individual	<<< 0.01	0.5

5.2 TOXICOLOGICAL

To assess the health hazards of potential organic and inorganic contaminants in the soils, a rough screening exercise (see Attachment B) was performed to determine whether any potential hazards existed. Air samples obtained during the Mt. St. Helens eruption show maximum dust concentrations in the air to be 5 mg/m^3. This dust loading of 5 mg/m^3 is assumed to be contaminated with the organic and inorganic contaminant concentrations from Section 2.1 as a means of estimating a maximum concentration in air. The results were then compared to the time weighted averages (TWA) and immediately dangerous to life and health (IDLH) values. The results show that the hazard due to the organic and inorganic materials in the soils is insignificant. Table 4 summarizes the results.

Table 4. Air Concentrations and Corresponding Limits.

Analyte	Air concentration mg/m^3	IDLH mg/m^3	TWA mg/m^3
Mercury	1.0E-7	1.0	0.01
Lead	1.6E-6	variable	0.05
Chromium	1.9E-6	50.0	1.0
Cyanide	1.2E-6	0.5	5.0
Hydrazine	4.4E-7	10.5	1.3
Carbon tetrachloride	4.4E-5	189.0	31.5
Cyclohexane	4.5E-6	34,360.0	1,030.0
Tetrachloroethane	6.0E-6	103.0	7.0
Phenol	4.0E-7	30.3	19.0

In some areas [i.e., 200 West locales over carbon tetrachloride (CCL_4) plume] where ambient air concentrations of volatile organic compounds may reach TWA levels, personnel protection measures implemented through the work procedures of WHC 1989 would be necessary to keep worker exposures at as low as reasonably achievable levels.

5.3 CONCLUSION

The intrinsic hazards associated with the shallow/near surface sampling activities described in category 4 of Section 2.1 are commensurate with that of a low hazard activity. The maximum worst case exposure to personnel was estimated to be < 10 mrem, which is more than 3 orders of magnitude below the low hazard class limit of 25 rem. The estimated air concentrations of the organic and inorganic substances are commensurate with that of a general use activity. OSLs that specify limits on surface radioactivity are implemented for defining the safety envelope of this assessment. All shallow/near surface sampling activities that meet the descriptions in category 1, 2, and 3 in Section 2.1 of this assessment are excluded from the OSL requirement.

6.0 LIMITS AND PRUDENT ACTIONS

An OSL is an auditable limit established within Westinghouse Hanford for the safe operation of a nonreactor nuclear facility or activity. The U.S. Department of Energy, Richland Field Office has a policy that at least one acceptable limit be established to assure the facility is operated or activity is performed safely and within the bounds of the safety assessment. Two OSLs are implemented that apply to activities described as category 4, in Section 2.1 of this assessment.

6.1 OPERATIONAL SAFETY LIMITS

<u>OPERATIONAL SAFETY LIMIT 1</u>

This OSL applies to direct readings of beta/gamma radiation on soil surfaces measured with a hand-held field instrument such as a Geiger Mueller (GM). If sampling in areas where ^{90}Sr is known to be present in approximate equal amounts with ^{137}Cs, a general purpose energy compensated GM probe with beta shield (e.g., Eberline HP-270 or equivalent) may be used to discriminate between beta and gamma radiation.

1.0 **Title** - Limit the quantity of surface radioactivity.

1.1 **Applicability** - This limit applies to beta/gamma activity on soil surfaces of shallow soil sampling and characterization activities in quantities of >1m^3 (30 ft^3).

1.2 **Objective** - To reduce the potential for generation of airborne contamination.

1.3 **Requirement** - When excavating into the shallow soils with a backhoe auger, or other mechanized equipment, the following limits on soil surfaces shall not be exceeded.

a. Surface radioactivity shall not exceed 100,000 cpm/100 cm^2 or 50,000 cpm/100 cm^2 averaged over 1 m^2.

b. In areas where ^{90}Sr is known to be prevalent, beta readings on a general purpose energy compensated GM probe with a 30 mg/cm^2 wall thickness (Eberline model HP-270 or equivalent) shall not exceed 30,000 cpm/100 cm^2 or 10,000 cpm/100 cm^2 averaged over one m^2. (These limits may be revised in the future as more data becomes available.)

1.4 **Surveillance** - Soil surface radioactivity shall be monitored at a frequency that is to be determined on a case-by-case basis. Operational Health and Safety will provide input for determining the frequency. The results of the surveillance shall be recorded and maintained as an auditable record.

1.5 **Recovery** - In the event that the OSL is exceeded the work shall stop. The source of the unanticipated contamination levels shall be evaluated. Line management shall be responsible to prepare a recovery plan. Safety Assurance will provide the oversight approval prior to implementation of the recovery plan.

1.6 **Basis** - The limits provide assurance that the potential worst case consequences estimated in the assessment will not be exceeded.

OPERATIONAL SAFETY LIMIT 2

This OSL applies to areas where alpha contamination is known to occur and cannot be adequately controlled by beta-gama monitoring techniques. Alpha contamination is to be measured with a hand-held field instrument such as a portable alpha meter (PAM).

2.0 **Title** - Limit the quantity of surface radioactivity.

2.1 **Applicability** - This limit applies to alpha activity on the surface of the excavation equipment.

2.2 **Objective** - To reduce the potential for generation of airborne contamination.

2.3 **Requirement** - When excavating into the shallow soils with a backhoe or other similar equipment, the following limit on the bucket surfaces shall not be exceeded. Surface radioactivity shall not exceed 300 cpm/100 cm^2 alpha. (This limit may be revised in the future as more data becomes available.)

2.4 **Surveillance** - Surface contamination of excavation tool faces shall be monitored at a frequency that is to be determined on a case-by-case basis. The results of the surveillance shall be recorded and maintained as an auditable log.

2.5 **Recovery** - In the event that the OSL is exceeded, the work shall stop. The source of the unanticipated contamination levels shall be evaluated. Line management is responsible for a recovery plan. Safety Assurance will provide the oversight approval prior to implementation of the recovery plan.

2.6 **Basis** - The limits are based on the maximum concentration and assessment of safety assessment consequences. The limits provide assurance that shallow sampling activities are managed as low hazard activities.

6.2 PRUDENT ACTIONS

Prudent actions are commitments to ALARA goals and are generally good engineering work practices. Credit is given to the EIIs (WHC 1989) for providing the safe work practices for performing these activities. Two specific prudent actions are identified below.

Function - Minimize fugitive dust.

Prudent Action 1 - Excavated piles of potentially contaminated soil should be treated as specified in EII 5.2 (WHC 1989) for minimizing the potential for fugitive dust generation.

Function - Minimize exposures to potential volatile gases (CCl_4, ammonia, radon)

Prudent Action 2 - If sampling in areas (i.e., CCl_4 plume) where potential air concentrations of volatile gases could reach or exceed occupational limits, appropriate protection measures should be taken to minimize personnel exposures. Environmental protection and building managers are good sources to confer with in identifying such areas.

7.0 REFERENCES

ANSI, 1978, *Draft American National Standard Control of Radioactive Surface Contamination on Materials, Equipment, and Facilities to be Released for Uncontrolled use*, ANSI N13.12, American National Standards Institute, Inc., New York, New York.

Delaney, C., K. Lindsey, and S. Reidel, 1991, *Geology and Hydrology of the Hanford Site: A Standardized Text for Use in Westinghouse Hanford Company Documents and Report*, WHC-SD-ER-TI-003, Rev. 0, Richland, Washington.

DOE, 1986, *Safety Analysis and Review System*, DOE 5481.1B, U.S. Department of Energy, Washington, D.C., September 23.

DOE, 1988, *Radiation Protection for Occupational Workers*, DOE 5480.11, U.S. Department of Energy, Washington, D.C., December 21.

NIOSH 85-114, Pocket Guide to Chemical Hazards", U.S. Department of Health and Human Services, September 1985.

PNL, 1990, *Climatological Summary of Wind and Temperature Data for the Hanford Meteorology Monitoring Network*, PNL-7471, 1990, Pacific Northwest Laboratory, Richland, Washington.

WHC, 1988a, *Environmental Compliance Manual*, WHC-CM-7-5, Westinghouse Hanford Company, Richland Washington.

WHC, 1988b, *Nonreactor Facility Safety Analysis Manual*, WHC-CM-4-46, Westinghouse Hanford Company, Richland, Washington.

WHC, 1988c, *Radiation Protection Manual*, WHC-CM-4-10, Westinghouse Hanford Company, Richland, Washington

WHC, 1989, *Environmental Investigations and Site Characterization Manual*, WHC-CM-7-7, Volume 1, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990a, *Operational Environmental Monitoring Manual*, WHC-CM-7-4, Westinghouse Hanford Company, Richland, Washington.

WHC, 1990b, *Implementation Guideline For Hazard Documentation*, WHC-SD-GN-ER-301 Rev. 0, Westinghouse Hanford Company, Richland, Washington.

ATTACHMENT A
WORST CASE SCENARIO: HAZARDOUS WASTE CONCENTRATION

DONT SAY IT ---*Write it!*

DATE: January 7, 1991

TO: Noel Kerr B1-35

FROM: T.E. Moody 6-0396

cc: Mel Adams
TEM: lb

SUBJECT: WORST CASE SCENARIO: HAZARDOUS WASTE CONCENTRATION

The following are the possibile inorganic and organic contaminants that could be analyzed and stored in the mobile screening laboratory. This data is taken from the process analytical data from all areas compiled by Francis Jungfleisch of Environmental & Waste Management/Waste Management Division. These contaminants were then crossed referenced against the Washington Department of Ecology (WDOE) publication Dangerous Waste Regulations, chapter 173-303 WAC, list 9903. This list constitutes acutely dangerous chemical products that have a WDOE hazard designation of EHW (Extremely Hazardous Waste).

Analyte	#Hits	Min conc ppb	ave. conc ppb	max conc ppb
Inorganic				
Mercury	106	0.1	1.28	20
Lead	78	5	28	319
Chromium	39	10	54	380
Cyanide	24	10	51	246
Hydrazine	6	36	59	88
Organic				
Tetrachloromethane (carbon tet)	50	3	4352	8700
Cyclohexane	2	440	670	900
Tetrachloroethene	3	5	410	1200
Phenol	6	11	37	80

Noel, I hope you find this information useful in your preparation of a worst case scenario. If you have any questions, don't hesitate to call.

ATTACHMENT B
ROUGH SCREENING EXERCISE

This document provides a rough screening of contaminant concentrations identified in Attachment A.

Assumption: A 5mg/m^3 dust loading is contaminated with the maximum concentrations identified in Attachment A.

Constituents	Soil Concentration (mg/g)		Dustload (g/m^3)		Air Concentration (mg/m^3)
Mercury	2 E-5	x	5 E-3	=	1.0 E-7
Lead	3.19 E-4	x	5 E-3	=	1.6 E-6
Chromium	3.8 E-4	x	5 E-3	=	1.9 E-6
Cyanide	2.5 E-4	x	5 E-3	=	1.2 E-6
Hydrazine	8.8 E-5	x	5 E-3	=	4.4 E-7
Carbontetrachloride	8.7 E-3	x	5 E-3	=	4.4 E-5
Cyclohexane	9.0 E-4	x	5 E-3	=	4.5 E-6
Tetrachloroethene	1.2 E-3	x	5 E-3	=	6.0 E-6
Phenol	8.0 E-5	x	5 E-3	=	4.0 E-7

Calculations performed by ______ Date 7/27/92

Second check performed by ______ Date 7/27/92

Date Received: 7/29/92	INFORMATION RELEASE REQUEST	Reference: WHC-CM-3-4

Complete for all Types of Release

Purpose		ID Number (include revision, volume, etc.)
[] Speech or Presentation [] Full Paper (Check only one suffix) [] Summary [] Abstract [] Visual Aid [] Speakers Bureau [] Poster Session [] Videotape	[] Reference [x] Technical Report [] Thesis or Dissertation [] Manual [] Brochure/Flier [] Software/Database [] Controlled Document [] Other	WHC-SD-EN-SAD-016, Rev. 0, Volume 2 List attachments. Attachments A and B Date Release Required July 28, 1992

Title	Unclassified Category	Impact Level
Safety Assessment for Environmental Investigations and Site Characterizations Volume 2: Aggregate Safety Assessment for Shallow/Near Surface Activities	UC-	2 ESQ

New or novel (patentable) subject matter? [X] No [] Yes
If "Yes", has disclosure been submitted by WHC or other company?
[] No [] Yes Disclosure No(s).

Information received from others in confidence, such as proprietary data, trade secrets, and/or inventions?
[X] No [] Yes (Identify)

Copyrights? [X] No [] Yes
If "Yes", has written permission been granted?
[] No [] Yes (Attach Permission)

Trademarks?
[X] No [] Yes (Identify)

Complete for Speech or Presentation

Title of Conference or Meeting		Group or Society Sponsoring

Date(s) of Conference or Meeting	City/State	Will proceedings be published? [] Yes [] No Will material be handed out? [] Yes [] No

Title of Journal

CHECKLIST FOR SIGNATORIES

Review Required per WHC-CM-3-4	Yes	No	Reviewer - Signature Indicates Approval Name (printed)	Signature	Date
Classification/Unclassified Controlled Nuclear Information	[]	[x]			
Patent - General Counsel	[x]	[]	S W BERGLIN	SWBerglin	8/3/92
Legal - General Counsel	[x]	[]			
Applied Technology/Export Controlled Information or International Program	[]	[x]			
WHC Program/Project	[]	[x]			
Communications	[]	[x]			
RL Program/Project	[]	[x]			
Publication Services	[x]	[]	Steven M. Neale	Steven M. Neale	8/5/92
Other Program/Project	[]	[x]			

Information conforms to all applicable requirements. The above information is certified to be correct.

	Yes	No
References Available to Intended Audience	[x]	[]
Transmit to DOE-HQ/Office of Scientific and Technical Information	[]	[x]

Author/Requestor (Printed/Signature) Date
D.L. Harrold D. L. Harrold

Intended Audience
[] Internal [] Sponsor [x] External

Responsible Manager (Printed/Signature) Date
N.R. Kerr NRK 7/09/92

INFORMATION RELEASE ADMINISTRATION APPROVAL STAMP

Stamp is required before release. Release is contingent upon resolution of mandatory comments.

APPROVED FOR RELEASE OFFICIAL DOCUMENT JB Date 8/5/92

Date Cancelled	Date Disapproved

9312970203 7