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C. Willingham
(Signature)

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7. Abstract

This document establishes the technical basis in support of Emergency Planning Activities for post Hanford hazardous releases on the Hanford Site. This document supports EPA-400 requirements.

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EMERGENCY RESPONSE ENVIRONMENTAL SAMPLING PLAN

R. E. BROZ

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EMERGENCY RESPONSE ENVIRONMENTAL SAMPLING PLAN

1.0 PURPOSE

This plan documents the extent and philosophy of the three phase radiological and non radiological hazardous material sampling and monitoring program in the event of a Hanford hazardous facility emergency.

2.0 SCOPE

Environmental sampling following a Hanford emergency is divided into multiple phases. The first phase is termed the plume phase. Once the release of hazardous materials is terminated the second phase begins and is termed the ingestion phase. The last phase is termed the reentry phase. This plan will identify the types of environmental samples to be taken during each of these phases, and describe the general sampling plan for the Hanford site. Each sample and its results and location are to be reported to the dispatching center and the information is to be integrated into the Emergency Management System (EMS). Appropriate Hanford Environmental Information System (HEIS) and Surface Environmental Sampling Project sample data and location information are to be housed in the EMS.

The Protective Action Guides (PAGs) for the emergency phases of an emergency event are identified in EPA-400, and adopted for use at Hanford. These PAGs limit the Committed Effective Dose Equivalent (CEDE) which is the sum of the effective dose equivalents projected over 50 years resulting from external exposure from the plume and or ground deposition, and the CEDE incurred from all significant inhalation pathways during the early (plume) phase. The PAG for the Plume Exposure Pathway and the early phase of an event is 0.01 sievert (Sv). Committed dose equivalents to the thyroid and to the skin may be 5 to 50 times larger, respectively. Attachment 1 is a chart showing the EPA-400 PAGs for the emergency phases.

3.0 FIELD TEAM OPERATIONAL PHILOSOPHY

The philosophy of this sampling and monitoring plan encourages field teams to be autonomous if not independent. Teams are expected to receive a briefing from the Field Team Coordination Center upon activation, a sector assignment and then proceed to the sector to perform the various sampling and monitoring requirements for the two initial sampling phases. Sector assignments are to be made using Attachment 2. The team is expected to find the plume and negotiate within the sector without FTCC direction, reporting back to the FTCC when results exceed established guidelines of the field surveys. Prior to the actual release, when a release is imminent, field teams will deploy down wind on UDAC projected centerline and await plume arrival.

4.0 PLUME PHASE

This phase begins when the Emergency Notification System alerts team supervision. Teams are expected to be organized, equipment gathered, and transportation acquired. Information about the event will be communicated to the appropriate field team dispatchers via telephone and or radio. Sector assignments can be made by supervision without FTCC direction as long as the assignments are documented and communicated, consistent with the accident conditions.

Teams, both radiological and non radiological, are to find the edge of the plume by evaluating the event site, wind direction and velocity, and team's estimated time of arrival at the first sampling location. The plume edge is assumed to be 2X background determined by an area, 1 meter, gamma survey. At the first location that the team discovers the 2X background radiation level, an air sample is necessary. That initial sample must be dispatched to a lab facility as soon as possible for the isotopic analysis to be completed. The lab results are communicated to the FTCC. A detailed survey including α , β , and γ contamination and dose rate are a minimum. The teams are to continue pursuing the edge (leading, side or trailing) as determined in the initial briefing. Continue reporting location and monitoring results. Once the plume has either ceased or traveled out of the assigned sector, an approximate 12 hour, low volume air sample and a surface soil sample are to be obtained for determination of the resuspension factor.

The UDAC/EACT will determine and provide recommendations for protective actions to be taken in downwind areas associated with the plume. These areas will either be sheltered or evacuated and will typically be an area greater than is actually required to be evacuated for an extended time frame.

5.0 INGESTION PHASE

Teams will be continually briefed as to the event and the hazardous material release. Once the release has been terminated and the plume has dissipated a second phase will commence. This phase is termed the ingestion phase. During this phase the teams will find and report the dose rate and location of the $1.29\text{E-}7$ coulombs/kilogram ($500 \mu\text{R/hr}$) and $5.16\text{E-}9$ coulombs/kg ($20 \mu\text{R/hr}$) levels of radiation and non radiological contaminants and collect a variety of environmental samples. To effectively determine the consequence of the plume passage to the environment, comparison of the post accident environmental readings to the EMS baseline or pre accident data is necessary to assess the significance of the release. This data and all post accident results will be logged in the EMS.

The nearest exposure rate level to the event is called the Relocation Area isopleth and it is defined as $1.29\text{E-}7$ coulombs/kilogram (radiological) and ERPG-3 (non radiological). The PAG which determines the area known as the Relocation Area are 0.02 Sv the first year, 0.005 Sv the second year, not to exceed 0.05 Sv CEDE for the 50 years following the event. The pathways for this phase and the development of the Relocation Area are resuspension of deposited material and direct exposure from deposited surface material. The teams are expected to find and communicate locations of $1.29\text{E-}7$ coulombs/kilogram readings in the downwind sector from the point of release. The emergency centers need approximately 25 points for each of the $1.29\text{E-}7$ coulombs/kilogram, as well as ERPG-3 lines.

During the ingestion phase it is necessary to define an area within which contaminated and or potentially contaminated crops, pasture, and water exist. This area is defined as the Food Control area. This food controlled area is an area within which consumption of foodstuffs is prohibited in order to prevent exposures in excess of the PAG of 0.005 Sv, 50 year CEDE. This PAG roughly equates to an area defined as $5.16\text{E-}10$ coulombs/kg above background. The illustration in Attachment 3 is a graphic representation of the relationship between the Plume footprint, Relocation area, and Food Control area.

The teams are also expected to find and communicate locations of the $5.16\text{E-}9$ coulombs/kg boundary (radiological) and ERPG-2 (non radiological) in their operating sector.

Each time a team monitors a location and determines that they are between the $1.29\text{E-}7$ coulombs/kilogram and Food Control Boundary ($5.16\text{E-}10$ coulombs/kg) environmental samples are to be obtained. These samples include; vegetation, soil, water, and milk where appropriate. The environmental samples are to be monitored by field instruments and after double bagging, are to be monitored for contamination. Samples are to be labeled and delivered to the counting laboratory.

6.0 RECOVERY PHASE

Teams are expected to participate in the cleanup (recovery) phase by monitoring and sampling the environment once remediation has been accomplished. During the Recovery phase the primary objective is to return occupants to their residences. This is accomplished through extensive surveys and sampling specific to the affected area and the type of event that has occurred.

7.0 SUMMARY

Emergency Preparedness depends upon pre-accident monitoring and sampling that other organizations have performed. This information is in a historical data base (HEIS) that can be accessed and compared to information gathered by emergency responders. The HEIS information is to be available on the Emergency Management System. This sampling plan will identify, quantify and document the environmental impact of a Hanford radiological or non radiological accident.

September 30, 1994

ATTACHMENT 1 Protective Action Guidelines

Projected Dose Commitment (50 year) Recommendations	Emergency Protective Response Recommendations (EPA 400)	Preventive Protection Response (EPA 400)
Whole Body	0.01 to 0.05 Sv	0.005 Sv
Thyroid	0.15 Sv	0.015 Sv

Area of Concern	Protective Action Guideline (Sv)	Exposure Pathway
Plume Exposure Area	< 0.01 Sv CEDE	Submersion and Inhalation
Relocation Area Isopleth	< 0.02 Sv 1st Year < 0.005 Sv 2nd Year < 0.05 Sv 50 Year CEDE	Resuspension and Ground Shine
Food Control Isopleth	< 0.005 Sv CEDE	Ingestion Pathway

ATTACHMENT 2 Hanford Emergency Sectors

ATTACHMENT 3 Dose and Food Control Concept