STRATEGY FOR MANAGEMENT OF INVESTIGATION-DERIVED WASTE

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ABSTRACT

Large quantities of wastes containing hazardous and/or radiological constituents are being generated as part of the field investigations at the U.S. Department of Energy's Hanford Site in Richland, Washington. A problem exists with the integration of regulations under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980*, the Resource Conservation and Recovery Act of 1976**, the Washington Hazardous Waste Management Act of 1976***, and the Washington Administrative Code****. Waste management criteria under these regulations need to be consolidated into a single, acceptable management approach that can reasonably be applied to the Hanford Site cleanup effort. In response to this need, a Technical Task Team of representatives from the Washington Department of Ecology, U.S. Environmental Protection Agency, U.S. Department of Energy, and Westinghouse Hanford Company was organized. As a result of nearly two years of negotiations the Technical Task Team produced a specific waste management plan which is presented in the paper as the Strategy for Management of Investigation-Derived Waste.

The paper outlines the strategy for handling and storing investigation-derived waste within a given operable unit until a waste unit-specific Record of Decision can be issued. To date, the Strategy for Management of Investigation-Derived Waste has not been finalized. However, formal approval by the U.S. Environmental Protection Agency is expected soon and will result in implementation of the management strategy at waste sites in which they have been identified as the lead regulatory agency. Negotiations with the Washington State Department of Ecology are ongoing. At the time of this writing, it is uncertain what the Washington State Department of Ecology's position will be regarding investigation-derived waste. Both the U.S. Environmental Protection Agency and the U.S. Department of Energy believe the Strategy for Management of Investigation-Derived Waste to be protective of human health and the environment and to be a cost-effective method of dealing with the investigation-derived waste.

INTRODUCTION

The U.S. Department of Energy's Hanford Site in Richland, Washington, is engaged in remedial and removal actions pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Resource Conservation and Recovery Act of 1976 (RCRA)(1,2). The Hanford Site, mandated for cleanup by the National Priorities List (1), contains 78 areas, each destined to undergo either CERCLA's remedial investigation/feasibility study or RCRA's facility investigation/corrective measures study by the year 2018. Agreements and milestones for cleanup are presented in the Hanford Federal Facility Agreement and Consent Order [also known as the Tri-Party Agreement (3)], a landmark agreement between the Washington State Department of Ecology (Ecology), the U.S. Environmental Protection Agency (EPA), and the U.S. Department of Energy (DOE). Westinghouse Hanford Company (Westinghouse Hanford) is DOE's Operations and Engineering contractor at the Hanford Site.

The Hanford Site is governed by a complex mix of regulatory requirements and agreements. Based primarily on geographic area and common waste sources, individual waste management units have been organized into 78 areas called operable units. Individual waste management units, as defined in the Tri-Party Agreement, consist of the following:

- Treatment, Storage, and Disposal units--units used for treatment, storage, or disposal of hazardous waste which will be permitted (for operation and/or postclosure care) and/or closed pursuant to RCRA requirements as determined in the Tri-Party Agreement
- Resource Conservation and Recovery Act of 1976 Past-Practice Units--units that have received releases of RCRA hazardous wastes or constituents from sources other than TSD units at the Hanford

* "Comprehensive Environmental Response, Compensation and Liability Act of 1980," as amended, 42 USC 9601 et seq.
** "Resource Conservation and Recovery Act of 1976," 42 USC 6901 et seq.
*** "Washington State Hazardous Waste Management Act of 1976, as amended, Revised Code of Washington, Chapter 70.105, Olympia, Washington.
**** Washington State Department of Ecology "Dangerous Waste Regulations," Washington Administrative Code 173-303, Olympia, Washington (1990).

Site regardless of the date of waste receipt at the unit. The corrective action authority is available for RCRA past-practice units under RCRA as amended by the Hazardous and Solid Waste Amendments of 1984(4), Sections 3004(u), 3004(v), and 3008(h)

- Comprehensive Environmental Response, Compensation, and Liability Act of 1980 Past Practice Units--units that have received hazardous substances, as defined by CERCLA, irrespective of the date such hazardous substances were placed at the unit.

Under the Tri-Party Agreement, a lead regulatory agency approach to minimize duplication of effort, maximize productivity, and reduce the potential for imposing conflicting requirements has been agreed upon. Under this approach, either the EPA or Ecology will be the lead regulatory agency for each operable unit. In general, Ecology has the lead on RCRA TSD units and RCRA past-practice units, and EPA has the lead on CERCLA past-practice units. Although in some cases TSD units are closely associated with the past-practice units either geographically or through similar processes and waste streams, EPA's and Ecology's intent, as documented in the Tri-Party Agreement (3), is to direct RCRA and CERCLA past-practice cleanup actions at Hanford Site in a physically consistent manner.

In the National Contingency Plan (1) preamble language, the EPA has stated that studies and investigations undertaken pursuant to CERCLA, such as activities conducted during the Remedial Investigation/Feasibility Study, are considered removal actions. Removal actions must comply with applicable or relevant and appropriate requirements (ARARs) to the extent practicable, considering the contingencies of the circumstances. Therefore, the handling, treating, or disposing of investigation-derived waste (IDW) onsite should be conducted in compliance with ARARs.

Therefore, the Strategy for Management of Investigation-Derived Waste (Strategy) integrates regulations, provides consistent directives, reduces costs, and develops an approach for managing waste generated during the remedial/facility investigation phases.

INVESTIGATION-DERIVED WASTE MANAGEMENT SUMMARY

Scope

The Strategy applies to CERCLA and RCRA past-practice site characterizations and investigations that involve large-scale drilling activities and surface sampling activities. Specific examples of IDW include drill cuttings, core samples, decontamination fluids, and miscellaneous trash such as personal protective equipment, rags, and gloves.

The overall management strategy is illustrated in Fig. 1, Waste Determination Logic Diagram. The paragraphs following describe the main aspects of the diagram.

Waste Site Identification/Collection of Waste

Initially, waste sites within a given operable unit are to be identified based upon historical knowledge and non-intrusive surveys, then confirmed in the field with the use of field screening instruments during drilling and sampling operations. These instruments include, but are not limited to, field pH meters, *organic vapor sensing* instruments [such as the organic vapor analysis (OVA) meter], and Geiger-Mueller counters, gamma energy analyzers, and portable alpha meters for detecting radioactive contaminants.

For investigations undertaken *inside* the boundaries of a known waste site, all resulting IDW is to be placed in containers at the time it is generated. Until all parties approve an alternate storage container, Department of Transportation (DOT) specification drums are being used. Before filling, all drums are lined with either a 10-mil reinforced plastic liner or a 90-mil plastic liner (for saturated radioactive waste). Slurries or decontamination rinsate contained in DOT drums may be placed in 95-gallon DOT polyethylene overpack drums to protect the inner drum from breach of containment due to freezing in the winter months.

For investigations conducted *outside* the boundaries of a waste site, the need to collect and sample IDW will be agreed upon among DOE, EPA, and Ecology. Collecting and sampling from nonwaste sites normally is not required because material from such areas is not expected to be contaminated. In these cases, drill cuttings will be collected in soil piles near the point of generation instead of being collected in drums. However, if visual evidence or field screening indicates the potential presence of contamination, or if a justified need for sampling is identified, the soil piles will be analyzed for the constituents of concern. Should the analyses indicate soil pile contamination not apparent through field screening, the soil pile and the soil surface, to a depth of 2 inches below the soil pile, will be drummed and transported to an operable unit-specific Centralized Waste Container Storage Area for appropriate storage. The Centralized Waste Container Storage Areas are the field locations where contained waste, managed in accordance with this Strategy, is stored pending the Record of Decision (ROD). All Centralized Waste Container Storage Areas will be located within the boundaries of the operable unit from which the stored waste was generated.

Waste Characterization

In most cases, soil samples are routinely collected as part of the waste site investigation. Sampling analysis plans are used to identify the constituents of concern and outline the field methods and instruments used for collecting the samples. These samples are submitted for analyses and provide the basis for characterizing both the site and the collected material. Laboratory analyses, historical knowledge, and field screening instruments/test kits are to be used to identify wastes that are ignitable, corrosive, reactive, or toxic. Such hazard classifications, if any, shall be included on the waste container labels. At a minimum, soil samples are collected from the area of investigation at 5-foot intervals and analyzed for radiological constituents. Additional screening for radiological contamination may be performed as needed.

In support of existing historical knowledge, the waste characterization activities described above serve to protect human health and the environment.

Waste Management Determinations

This section provides the rationale for determining how IDW will be managed. Some of the following practices are currently in place; others are to be instituted under the Strategy.

Containers of IDW are radiologically released when they contain < 7.4 becquerels (Bq) per gram of beta/gamma radiation, and < 2.22 Bq per gram of alpha radiation. In addition

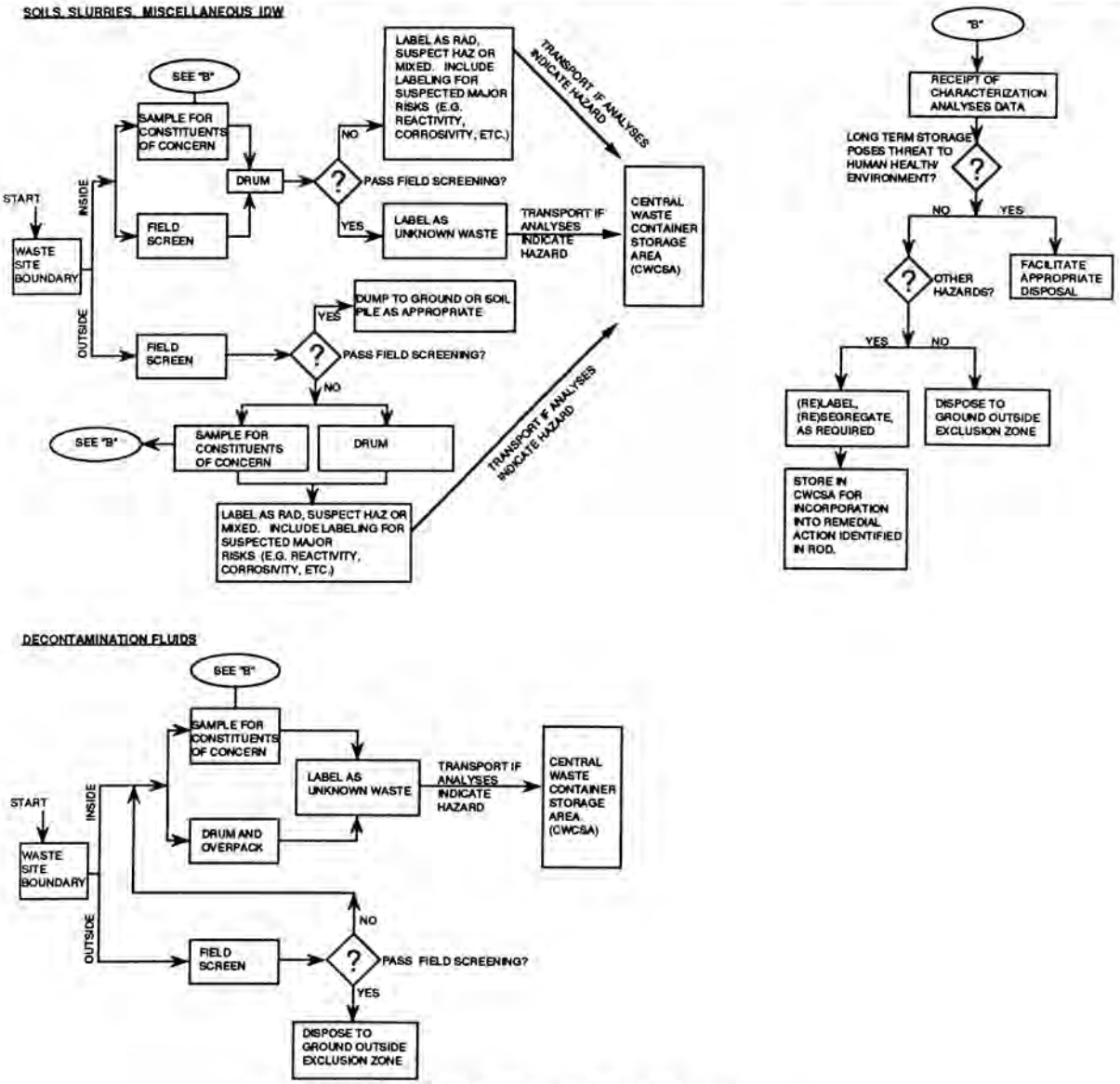

Fig. 1. Waste determination logic diagram.

to the radiological determination, the following criteria also will be used.

- Soils--containers of IDW soils/drill cuttings containing hazardous constituents below Washington State dangerous waste designation limits, and that have been radiologically released shall be returned to the ground at or near the point of generation but outside of the waste site exclusion zone. Soils containing constituents or characteristics above dangerous waste designation limits will be transported to the Centralized Container Waste Storage Area and managed as described under *Container Management*.
- Vadose zone slurries--all vadose zone slurries (soil and water mixtures) are contained when generated. Vadose zone slurries collected from *inside* a waste site are to be stabilized and stored pending the ROD for the associated waste unit. Depending on the waste site characteristics (e.g., radioactive, nonradioactive), free liquid stabilization techniques may include absorption, gelling, concreting, etc. Vadose zone slurries collected from *outside* a waste site are not stabilized unless field/laboratory screening indicates chemical/radiological contamination. In this case, material is to be handled the same as vadose zone slurries collected from inside a waste site. Noncontaminated slurries are returned to the ground at or near the point of generation.
- Groundwater slurries--all groundwater slurries (from both inside and outside waste site boundaries) are contained when generated. The free liquid from groundwater slurries will be allowed to settle and then decanted. Resulting liquid will then be transported to purgewater storage tanks. Resulting soils will be managed as described under *Soils*.
- Rinsate--decontamination rinsate from drilling operations conducted within a waste site is collected while awaiting chemical and radiological analyses. Rinsate containing constituents that are *above* Washington State dangerous waste limits is to be stabilized and stored pending the ROD. Rinsate containing constituents *below* dangerous waste limits, or rinsate generated from nonwaste sites in which field

screening instruments did not detect any radiological or hazardous contamination, is discharged to the ground near the point of generation outside of the exclusion zone.

Technical Task Team negotiations are currently being conducted that would permit potentially contaminated decontamination rinsate to be transported to purgewater storage tanks without requiring the costly sample analyses currently being conducted on drums of rinsate.

- Miscellaneous solid waste--rags, gloves, personal protective equipment, etc., are segregated in plastic bags, marked with the footage interval at which associated soils were generated, and stored in drums pending receipt of the associated soil sample analyses. For solid materials generated *inside* a waste site, the toxicity characteristic is determined by review of a total constituent analysis. If the total analysis demonstrates that individual contaminants of concern are present only in such low concentrations that the relevant regulatory levels could not be exceeded, the IDW in question is not assigned the toxicity characteristic status. If the material is found to be below dangerous waste limits, or was generated from *outside* a waste site in which field screening instruments detected no hazardous or radiological contamination, the miscellaneous solid waste is taken to Hanford's landfill for disposal. Otherwise, the waste is to be managed as described under *Container Management*.

Container Management

Each waste-producing operable unit will contain its own Centralized Waste Container Storage Area for storing waste that meets or exceeds the Washington State dangerous waste limits. All IDW stored in this area will be either treated or disposed based on the ROD for the specific waste unit. However, in cases where IDW presents a significant threat to human health or the environment, it will be transported to a TSD facility or alternate onsite storage.

The substantive federal and state regulatory requirements for managing hazardous/dangerous waste containers are established under 40 CFR Subpart I and Washington Administrative Code (WAC) 173-303-630, respectively (4,5). These substantive requirements will be met as follows:

- All IDW determined to pose a potential threat to human health or the environment are to be placed in containers. Each container shall be labeled/marked to identify its content, hazard class, and location where generated (i.e., well number).
- Investigation-derived waste and container compatibility will be ensured by using field screening instruments and/or process knowledge to select the appropriate liner and container. In addition, all analytical results will be reviewed to identify the hazard class for subsequent labeling/marking and segregation purposes.
- Containers are to be kept closed except when waste is added or removed.
- All containers in Centralized Waste Container Storage Areas are to be stored on pallets to prevent contact with the soil and/or accumulated liquids.
- A minimum aisle space of 30 inches shall be maintained with a container row being no more than two containers wide. Containers must not be stacked more than two high. When stacked, the second row shall be placed upon pallets and strapped together with a metal band.
- Containers of liquid waste are to be inspected weekly; containers of solid waste are to be inspected monthly.
- Containers of IDW determined to be extremely hazardous waste, based upon site characterization data, are to be protected from the elements by means of a building or other protective covering that otherwise allows for adequate inspection. Future management of this type of IDW will be discussed among Westinghouse Hanford, Ecology, EPA, and DOE waste management representatives.
- Any container posing an exceptional threat to human health or the environment or posing a potential container management problem (excessive radiation, for example) will be transported to a TSD facility for hazardous waste, Hanford Site's Central Waste Complex for low-level mixed waste storage, or Hanford Site's Low-Level Burial Grounds for low-level waste disposal, as appropriate.
- Containers of radioactive and radioactive mixed waste shall be segregated from each other as well as from other waste containers and labeled with appropriate radiation warning labels.
- If a container is inspected and found to be in poor condition (e.g., severe rusting, apparent structural defects, leaking) it will be immediately placed in an overpack container. If more than two containers of a similar waste type begin to fail, a determination will be made regarding future management of the containers.

Disposal of Investigation-Derived Waste

The IDW will be stored within an operable unit until the ROD is reached for the waste unit in question. At this time, the waste will be treated and/or disposed as part of the remedial action.

As discussed previously, a case-by-case determination is to be made in instances where IDW poses a significant threat to human health or the environment. In such cases, IDW containers will not be managed in the Central Waste Container Storage Area.

Benefits

The benefits derived from this Strategy are substantial. Waste will be minimized by being incorporated into the final remedial action because large scale, onsite methods for waste remediation are more efficient than drum-by-drum, offsite waste disposal methods. Additionally, waste will remain at or near its point of generation thus reducing the risks associated with transporting and moving large volumes of heavy waste drums. The potential for safety hazards and industrial

accidents will be reduced. Also, employee exposure levels will be minimized.

Significant cost avoidances are being realized as a result of this Strategy. In figuring an actual dollar amount, comparisons were made between the cost of drum-by-drum shipments of projected waste volumes to radioactive, hazardous, and mixed-waste storage facilities versus the waste management strategy outlined in this report. The preliminary savings appears to be in the 4- to 6-million dollar range and may be conservative considering that it excludes the costs associated with constructing any additional facilities.

SUMMARY

This Strategy for managing IDW has resulted from nearly two years of negotiations between Westinghouse Hanford, EPA, Ecology, and DOE. To date, the Strategy has not been finalized. However, formal approval by the EPA is expected soon. The Washington State Department of Ecology recently notified EPA and DOE of an organizational change (creation of a new Policy Unit) and have transferred responsibility for investigation-derived waste negotiations to the new Policy Unit. According to Ecology, this unit has determined that management of investigation-derived waste "must be governed by a policy to ensure compliance with Dangerous Waste Regulations." Because of this change, it is uncertain, at the time of this writing, what Ecology's position will be regarding investigation-derived waste. Nevertheless, it is anticipated that the Strategy for Management of Investigation-Derived Waste will soon be implemented at the sites in which EPA has been identified as the lead regulatory agency.

The approach for managing waste as described in the Strategy integrates regulations, provides consistent directives, and reduces costs for managing waste generated during the remedial/facility investigation.

REFERENCES

1. "Comprehensive Environmental Response, Compensation and Liability Act of 1980," as amended, 42 USC 9601 et seq.
2. "Resource Conservation and Recovery Act of 1976," 42 USC 6901 et seq.
3. ECOLOGY, EPA, DOE, "Hanford Federal Facility Agreement and Consent Order," Washington Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington (1990).
4. "Solid Waste Amendments Act of 1984," as amended 42 USC 6901.
5. FEDERAL REGISTER "Hazardous Waste Management System; Identification and Listing of Hazardous Waste; Toxicity Characteristics Revisions; Final Rule," Volume 55, Number 61: 11798-11877.
6. WASHINGTON STATE DEPARTMENT OF ECOLOGY "Dangerous Waste Regulations," Washington Administrative Code 173-303, Olympia, Washington (1990).